

PART I
IT in the Organization



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CHAPTER

3

Strategic Information Systems for Competitive Advantage

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LEARNING OBJECTIVES

After studying this chapter, you will be able to:

- 1 Describe strategic information systems (SISs) and explain their advantages.
- 2 Describe Porter's competitive forces model and how information technology helps companies improve their competitive positions.
- 3 Describe 12 strategies companies can use to achieve competitive advantage in their industry.
- 4 Describe Porter's value chain model and its relationship to information technology.
- 5 Describe how linking information systems across organizations helps companies achieve competitive advantage.
- 6 Describe global competition and global business drivers.
- 7 Describe representative SISs and the advantage they provide to organizations.
- 8 Discuss the challenges associated with sustaining competitive advantage.



ROSENBLUTH INTERNATIONAL: COMPETING IN THE DIGITAL ECONOMY

➔ THE PROBLEM

Rosenbluth International (*rosenbluth.com*) is a major global player in the extremely competitive travel agent industry. Rosenbluth's mission is "to be the quality leader in the development and distribution of global travel services and information." The digital revolution has introduced various threats and business pressures to Rosenbluth and other agencies in the industry:

1. Airlines, hotels, and other service providers are attempting to displace travel agents by moving aggressively to electronic distribution systems (e.g., airlines are issuing electronic tickets and groups of airlines are sponsoring selling portals for direct sale of tickets and packages).
2. Some travel service providers have reduced commissions caps and have cut the commission percentage for travel agents from 10 percent to 8 and then to 5 percent.
3. A number of new online companies such as *expedia.com* are providing diversified travel services as well as bargain prices, mostly to attract individual travelers. These services are penetrating to the corporate travel area, which has been the "bread and butter" of the travel agents' business.
4. The competition among the major players is rebate-based. The travel agencies basically give back to their customers part of the commission they get from travel service providers.
5. Innovative business models that were introduced by e-commerce, such as auctions and reverse auctions, were embraced by the providers in the industry, adding to competitive pressures on travel agencies (see Turban et al., 2004).

All of these business pressures threatened the welfare of Rosenbluth.

➔ THE SOLUTION

The company responded with two strategies. First, it decided to get out of the leisure travel business, instead becoming a purely corporate travel agency. Second, it decided to rebate customers with the *entire* commission the agency receives and instead bill customers by service provided. Rosenbluth charges fees, for example, for consultation on how to lower costs, for development of in-house travel policies, for negotiating for their clients with travel providers, and for calls answered by the company staff. To implement this second strategy, which completely changed the company's business model, it was necessary to use several innovative information systems.

Rosenbluth uses a comprehensive Web-based business travel management solution that integrates Web-based travel planning technology, policy and profile management tools, proprietary travel management applications, and seamless front-line service/support. This browser-based service allows corporate travelers to book reservations any time, anywhere—within corporate travel policy—in minutes. Three of the customer-facing tools that comprise this system are:

- **DACODA (Discount Analysis Containing Optimal Decision Algorithms).** This is a patented yield-management system that enables travel managers to decipher complex airline pricing and identify the most favorable airline contracts. Use of this system optimizes a client corporation's travel savings.
- **Global Distribution Network.** This network electronically links the corporate locations and enables instant access to any traveler's itinerary, personal travel preferences, or corporate travel policy.
- **iVISION.** This proprietary back-office application provides Rosenbluth's clients with consolidated, global data to enable them to negotiate better prices with airlines, hotels, car rental companies, and other travel providers.

THE RESULTS

Using its IT innovations, Rosenbluth grew from sales of \$40 million in 1979 to over \$5 billion in 2002. Today, the company has physical offices in 57 countries and employs over 4,700 associates. The company not only survived the threats of elimination but has become the third-largest travel management company in the world and a leader in customer service, travel technology, and integrated information management.

Sources: Compiled from Clemons and Hann (1999) and from information at rosenbluth.com.

LESSONS LEARNED FROM THIS CASE

This opening case is a vivid example of a company that has achieved competitive advantage in the digital era by using IT. Rosenbluth's experience illustrates the following points:

- It is sometimes necessary to completely change business models and strategies to succeed in the digital economy.
- Web-based IT enables companies to gain competitive advantage and to survive in the face of serious corporate threat.
- Global competition is not just about price and quality; it is about service as well.
- IT may require a large investment over a long period of time.
- Extensive networked computing infrastructure is necessary to support a large global system.
- Web-based applications can be used to provide superb customer service.
- It is necessary to patent innovative systems to assure competitive advantage. Otherwise, competitors will copy the systems, and the advantage will disappear.

The most important lesson learned from this case is the double-sided potential of the Internet: It can become a threat to an entire industry, yet it can also be an extremely important tool for gaining strategic advantage for an innovative company. As a matter of fact, many executives who until 1998 were cynical about the strategic advantages of IT have completely reversed their attitudes. They are seeing the potential of Web-based systems to provide competitive advantage to organizations, and Web-based opportunities and risks are now attracting universal attention in executive boardrooms.

As a matter of fact, computer-based information systems of all kinds have been enhancing competitiveness and creating strategic advantage for several decades (e.g., see Griffiths et al., 1998, Galliers et al., 1999, and Ward and Peppard, 2002). Through numerous examples, this chapter demonstrates how different kinds of strategic information systems work. We also present some classic models upon which strategic information systems have been built and utilized from the 1970s to this very day.

3.1 STRATEGIC ADVANTAGE AND INFORMATION TECHNOLOGY

Strategic Information Systems

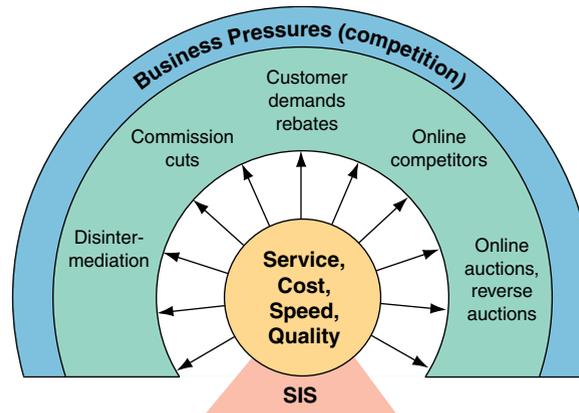
Strategic information systems (SISs), like the ones developed at Rosenbluth International, are systems that *support* or *shape* a business unit's competitive strategy (Callon, 1996, and Neumann, 1994). An SIS is characterized by its ability to *significantly* change the manner in which business is conducted, in order to give the firm strategic advantage. An SIS cannot be classified by organizational structure, functional area, or support system as described in the previous chapter. Any information system—EIS, OIS, TPS, KMS—that changes the goals, processes, products, or environmental relationships to help an organization gain a competitive advantage or reduce a competitive disadvantage is a strategic information system.

A *competitive strategy* is a broad-based formula for how a business is going to compete, what its goals should be, and what plans and policies will be required to carry out those goals (Porter, 1985). Through its competitive strategy an organization seeks a **competitive advantage** in an industry—an advantage over competitors in some measure such as cost, quality, or speed. Competitive advantage is at the core of a firm's success or failure (Porter and Millar, 1985, and Porter, 1996); such advantage seeks to lead to control of the market and to larger-than-average profits. A strategic information system helps an organization gain a competitive advantage through its contribution to the strategic goals of an organization and/or its ability to significantly increase performance and productivity. An SIS enables companies to gain competitive advantage and to benefit greatly at the expense of those that are subject to competitive disadvantage.

Competitive advantage in the digital economy is even more important than in the old economy, as will be demonstrated throughout this chapter. For some businesses the impact of the digital economy is revolutionary. Frequent changes in technologies and markets and the appearance of new business models can introduce radical changes in industry structure (Deise et al., 2000) and the nature of competition can shift rapidly (Afuah and Tucci, 2003, and Choi and Whinston, 2000).

At the same time, the digital economy has not changed the *core business* of most firms. For most businesses, Internet technologies simply offer the tools, sometimes very powerful tools, that can increase their success through their traditional sources of competitive advantage—be that low cost, excellent customer service, or superior supply chain management. For the overwhelming majority of businesses, the first step to competitive advantage in the digital economy is to ask and answer the question, "Where, given my industry and position, does my competitive advantage come from?" Then the follow-up question, "How can

FIGURE 3.1 Strategic information systems at Rosenbluth—defending against business pressures and competition.



information technology, especially the Internet, help my business?" will be easier to answer (Bithos, 2001).

Let's examine Rosenbluth's competitive situation in light of the business pressures and organizational responses described in Chapter 1. As Figure 3.1 shows, there were five business pressures on the company. Rosenbluth's strategic response was (1) to eliminate the retailing activities, which were most likely to be impacted by the pressures, and (2) to change the revenue model from commission-based to fee-for-service-based. Such strategy required extensive IT support.

Originally, strategic information systems were considered to be *outwardly focused*—that is, aimed at increasing direct competition in an industry and visible to all. For example, strategic systems have been used to provide new services to customers and/or suppliers, to increase customer switching costs, and to lock in suppliers, all with the specific objective of achieving better results than one's competitors. But since the late 1980s, strategic systems have also been viewed *inwardly*: They are focused on enhancing the competitive position of the firm by increasing employees' productivity, streamlining business processes, and making better decisions. These approaches may not be visible to the competitors (and therefore are not as easily copied). An example of an inward-focused SIS is RadioShack Online, as described in *IT at Work 3.1*.

In order to better understand strategic information systems, next we will examine the role information technology plays in strategic management.

The Role of IT in Strategic Management

Strategic management is the way an organization maps the strategy of its future operations. The term *strategic* points to the long-term nature of this mapping exercise and to the large magnitude of advantage the exercise is expected to give an organization. Information technology contributes to strategic management in many ways (see Kemerer, 1997, and Callon, 1996). Consider these eight:

1. **Innovative applications.** IT creates innovative applications that provide direct strategic advantage to organizations. For example, Federal Express was the first company in its industry to use IT for tracking the location of every package in its system. Next, FedEx was the first company to make this database accessible to its customers over the Internet. FedEx has gone on to provide



IT At Work 3.1

RADIOSHACK ONLINE PROVIDES ALL THE ANSWERS



RadioShack's advertising tagline, "You've got questions. We've got answers" reflects a change from a geek-oriented business model to a for-everyone model that is intended to attract and keep customers who are not so technically literate and not so interested in "do-it-yourself" electronics. A key component of this new strategy is RadioShack Online (*radioshack.com*), an intranet that educates in-store associates about business processes and product information, making them better equipped to address customer questions and needs.

Applications supported by RadioShack Online include:

- **Customer ticket look-up.** Returns can be verified from any store, on any sale, for any date, with or without a receipt.
 - **Parts look-up.** Each store is able to maintain catalogs featuring 100,000 items not ordinarily kept on-hand. Items can be ordered in the store and shipped directly to customers' homes.
 - **Service contracts.** When a customer returns a defective product under a service contract, associates can go online to instantly verify that there is a contract and to get approval for fixing the merchandise.
 - **Product availability.** When a desired item is out of stock, employees can search for it through the entire stock file for all stores in all regions.
- **Testing.** Tests that are part of the RadioShack's employee-certification program can now be taken online in a store, with immediate feedback.
 - **Electronic memos and manuals.** Paper manuals have now been put online for easier access and updating.
 - **Online credit card applications.** Associates can type credit card applications directly into the online network and receive an approval or rejection within 60 seconds.
 - **Sales reports.** These can illustrate performance by associate, store, and region.

Customers never see, touch, or use this internal network, but they benefit from its existence. Bob Gellman, Vice President for On-line Strategies at RadioShack says that thanks to RadioShack Online, shoppers view associates as "friendly, knowledgeable people who are very adept at de-mystifying technology." RadioShack benefits too by retaining happy customers.

For Further Exploration: How does RadioShack Online fit into RadioShack's new business model? In addition to the benefits for customers and for RadioShack that were highlighted in the case, how do in-store associates benefit? Why would RadioShack Online qualify as a strategic information system?

Source: Fox (2002).

e-fulfillment solutions based on IT and is even writing software for this purpose (Bhise et al., 2000).

2. **Competitive weapons.** Information systems themselves have long been recognized as a competitive weapon (Ives and Learmouth, 1984, and Callon, 1996). Amazon.com's one-click shopping system is considered so significant and important to the company's reputation for superior customer service that it has patented the system. Michael Dell, founder of Dell Computer, puts it bluntly: "The Internet is like a weapon sitting on the table, ready to be picked up by either you or your competitors" (Dell, 1999).
3. **Changes in processes.** IT supports changes in business processes that translate to strategic advantage (Davenport, 1993). For example, Berri is Australia's largest manufacturer and distributor of fruit juice products. The principal goal of its enterprise resource planning system implementation was "to turn its branch-based business into a national organization with a single set of unified business processes" in order to achieve millions of dollars in cost-savings (J.D. Edwards, 2002a). Other ways in which IT can change business processes

include better control over remote stores or offices by providing speedy communication tools, streamlined product design time with computer-aided engineering tools, and better decision-making processes by providing managers with timely information reports.

4. **Links with business partners.** IT links a company with its business partners effectively and efficiently. For example, Rosenbluth's Global Distribution Network allows it to connect agents, customers, and travel service providers around the globe, an innovation that allowed it to broaden its marketing range (Clemons and Hann, 1999). Other examples of interorganizational strategic information systems are presented later in this chapter.
5. **Cost reductions.** IT enables companies to reduce costs. For example, a Booz-Allen & Hamilton study found that: a traditional bank transaction costs \$1.07, whereas the same transaction over the Web costs about 1 cent; a traditional airline ticket costs \$8 to process, an e-ticket costs \$1 ([ibm.com/partnerworld/pwhome.nsf/vAssetsLookup/ad2.pdf/\\$file/ad2.pdf](http://ibm.com/partnerworld/pwhome.nsf/vAssetsLookup/ad2.pdf/$file/ad2.pdf)). In the customer service area, a customer call handled by a live agent costs \$33, but an intelligent agent can handle the same request for less than \$2 (Schwartz, 2000).
6. **Relationships with suppliers and customers.** IT can be used to lock in suppliers and customers, or to build in switching costs (making it more difficult for suppliers or customers to switch to competitors). For example, Master Builders sells chemical additives that improve the performance characteristics of concrete. The company offers customers MasterTrac, a tank-monitoring system that automatically notifies Master Builders when additive inventories fall below an agreed-on level. Master Builders then resupplies the tanks on a just-in-time basis. The customer benefits from an assured supply of product, less capital tied up in inventory, and reduced inventory management time and processing. Master Builders benefits because competitors face a more difficult task to convince concrete companies to switch to them (Vandenbosch and Dawar, 2002).
7. **New products.** A firm can leverage its investment in IT to create new products that are in demand in the marketplace. Federal Express's package-tracking software is one example. In Australia, ICI Explosives no longer views its business model as just selling explosives; it now also writes contracts for broken rock. ICI engineers developed computer models that specify drilling procedures and explosives use for different types of rockfaces to produce rock in the sizes that the customer needs. According to Vandenbosch and Dawar (2002), "The redefinition of ICI's role not only generated much higher margins for the business, it also gave ICI a much more defensible competitive position" (p. 38).
8. **Competitive intelligence.** IT provides competitive (business) intelligence by collecting and analyzing information about products, markets, competitors, and environmental changes (see Guimaraes and Armstrong, 1997). For example, if a company knows something important before its competitors, or if it can make the correct interpretation of information before its competitors, then it can act first, gaining strategic advantage through *first-mover advantage* (the competitive advantage gained by being the first to offer a particular product or service that customers deem to be of value). Because competitive intelligence is such an important aspect of gaining competitive advantage, we look at it in some detail next.

Competitive Intelligence

As in war, information about one's competitors can mean the difference between winning and losing a battle in business. Many companies continuously monitor the activities of their competitors to acquire **competitive intelligence**. Such information-gathering drives business performance by increasing market knowledge, improving knowledge management, and raising the quality of strategic planning. For example, consider the following uses of competitive intelligence, cited by Comcowich (2002):

- A sporting goods company found an activist group planning a demonstration and boycott months in advance, enabling the company to implement a counter strategy.
- Within days of launch, a software firm found dissatisfaction with specific product features, enabling the technicians to write a "patch" that fixed the problem within days instead of the months normally required to obtain customer feedback and implement software fixes.
- A packaging company was able to determine the location, size, and production capacity for a new plant being built by a competitor. The otherwise well-protected information was found by an automated monitoring service in building permit documents within the Web site of the town where the new plant was being built.
- A telecommunications company uncovered a competitor's legislative strategy, enabling the company to gain an upper hand in a state-by-state lobbying battle. (Remarkably, the strategy was posted on the competitor's own Web site.)
- The creative team embarking on development of a new video game used the Internet to identify cutting-edge product attributes that game-players prefer. The intensive research uncovered three key "gotta haves" that were not identified in focus groups and had not been included in the original design specification.

Competitive intelligence can be done with technologies such as optical character recognition, intelligent agents (Desouza, 2001), and especially the Internet.

The Internet is a company's most important tool to support competitive intelligence (see Teo, 2000, Bell and Harari, 2000, and Buchwitz, 2002). The visibility of information that a competitor places on the Internet and the power of Web-based tools to interrogate Web sites for information about prices, products, services, and marketing approaches have generated increased corporate interest in these intelligence-gathering activities. For example, online niche bookseller Fatbrain.com (now part of *barnesandnoble.com*) uses "e-spionage" firm Rivalwatch.com to keep track of competitors in Fatbrain's specialist professional and educational book market. By tracking prices at rival firms such as Amazon.com, Fatbrain can offer competitive prices without giving away profit margins when it does not need to (Cross, 2000).

Power and Sharda (1997) proposed a framework in which the Internet capabilities are shown to provide information for strategic decisions. According to the framework, shown in Figure 3.2, the external information required (upper left) and the methods of acquiring information (upper right) can be supported by Internet tools for communication, searching, browsing and information retrieval. Power and Sharda emphasize the search capability of the various tools of the Internet. Using these tools an organization can implement specific search strategies, as illustrated in *A Closer Look 3.1*.

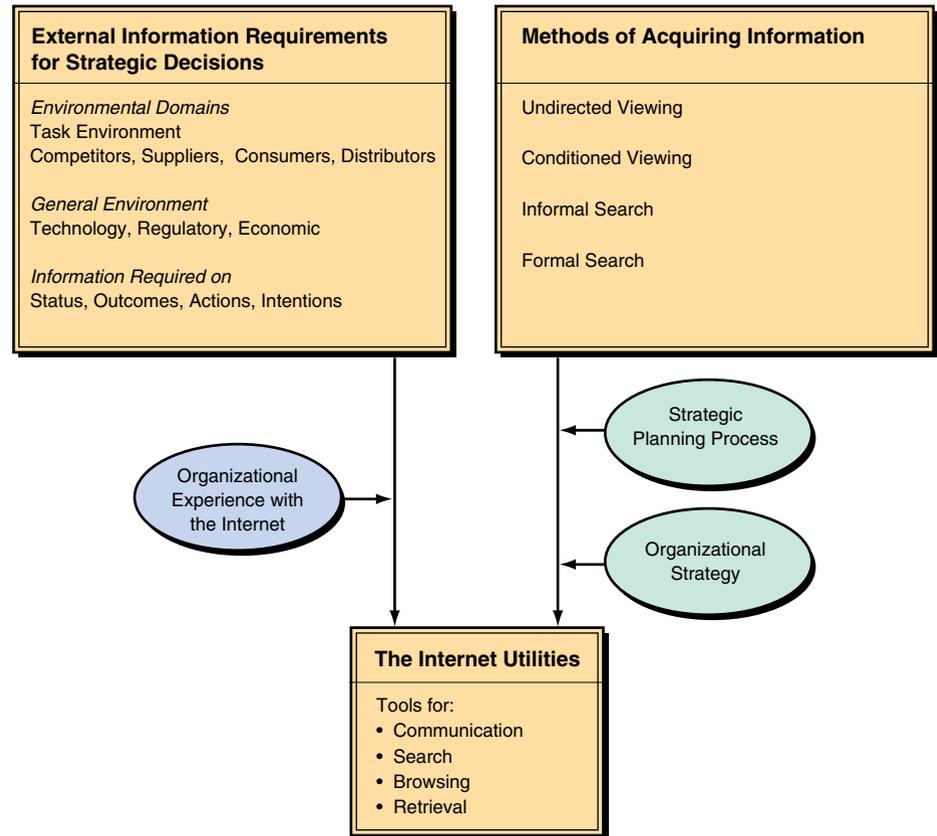


FIGURE 3.2 A framework for the Internet as a source of information for strategic decision making. (Source: Reprinted from *Long Range Planning*, 30, B. S. Pawar and R. Sharda, "Obtaining Business Intelligence on the Internet," 1997. With Permission from Excerpta Media Inc.)

However, it's not enough just to gather information on a competitor. Analyzing and interpreting the information is as important as collecting it. For these tasks, one can use IT tools ranging from *intelligent agents* (software tools that allow the automation of tasks that require intelligence; see Chapter 11) to *data mining* (searching in large databases for relationships among bits of data, using specialized logic tools, see Chapter 11). For example, J.P. Morgan Chase (New York) uses data mining to track several sources of information. Chase's goal is to determine the possible impact of the information on the bank, the customers, and the industry.

Another, more sinister, aspect of competitive intelligence is *industrial espionage*. Corporate spies, which actually do exist in some industries, look for confidential marketing plans, cost analyses, proposed products/services, and strategic plans. Industrial espionage is considered to be unethical and usually illegal. One type of industrial espionage is the theft of portable computers at airports, hotels, and conferences. Many of the thieves are interested in the information stored in the computers, not the computers themselves. Protecting against such activities is an important part of maintaining competitive advantage. This topic is discussed in Chapter 15, and in McGonagle and Vella (1998).

This section has shown that IT can contribute to a firm's competitive advantage, and profitability, in many ways. In order to understand how and why this is so we next examine two classical strategic models.



A CLOSER LOOK

3.1 COMPETITIVE INTELLIGENCE ON THE INTERNET

The Internet can be used to help a company conduct competitive intelligence easily, quickly, and relatively inexpensively in the following ways.

1. **Review competitor's Web sites.** Such visits can reveal information about new products or projects, trends in budgeting, advertising strategies, financial strength, and much more. Potential customers and business partners can be found by use of the Link:URL command in search engines to reveal what companies link to competitors' Web sites.
2. **Analyze related electronic discussion groups.** Internet newsgroups and Web site discussion boards can help you find out what people think about a company and its products. For example, newsgroup participants state what they like or dislike about products provided by you and your competitors. (For example, see *obo.co.nz* for a discussion board about field hockey equipment.) You can also examine potential customers' reactions to a new idea by posting a question.
3. **Examine publicly available financial documents.** This can be accomplished by entering a number of databases. Most charge nominal fees. The most notable database of financial documents is the Securities and Exchange Commission EDGAR database. (*sec.gov/edgar.shtml*).
4. **Do market research at your own Web site.** You can conduct surveys or pose questions to visitors at your site. You can even give prizes to those visitors who best describe the strengths and weaknesses of competitors' products.
5. **Use an information delivery service to gather news on competitors.** Information delivery services (such as Info Wizard, My Yahoo) find what is published in the Internet, including newsgroup correspondence about your competitors and their products, and send it to you. Known as *push technologies*, these services provide any desired information including news, some in real time, for free or for a nominal fee.
6. **Use corporate research companies.** Corporate research and ratings companies such as Dun & Bradstreet (*dnb.com*) and Standard & Poor's (*standardandpoors.com*) provide, for a fee, information ranging from risk analysis to stock market analysts' reports about your competitors.
7. **Dig up the dirt on your competitors.** Individual and business background checks are available from *knowx.com*. Credit report services such as the Red Book Credit Service (*thepacker.com*) can provide a credit history of competitors. "Actionable intelligence" on competitors is available from *rivalwatch.com*.
8. **Find out what are the "going rates" for employee pay.** Try *wageweb.com* for a free analysis of compensation rates.
9. **Find corporation credit history.** Dun & Bradstreet (*dnb.com*) offers credit histories for some companies. Other places to look would be court records, banks, annual reports, and credit bureaus.

3.2 PORTER'S COMPETITIVE FORCES MODEL AND STRATEGIES

The Impact of the Internet on Competition

The most well-known framework for analyzing competitiveness is Michael Porter's **competitive forces model** (Porter, 1985). It has been used to develop strategies for companies to increase their competitive edge. It also demonstrates how IT can enhance the competitiveness of corporations.

The model recognizes five major forces that could endanger a company's position in a given industry. (Other forces, such as those cited in Chapter 1, including the impact of government, affect all companies in the industry and therefore may have less impact on the relative success of a company within its industry.) Although the details of the model differ from one industry to another, its general structure is universal. The five major forces can be generalized as follows.

1. The threat of entry of new competitors
2. The bargaining power of suppliers

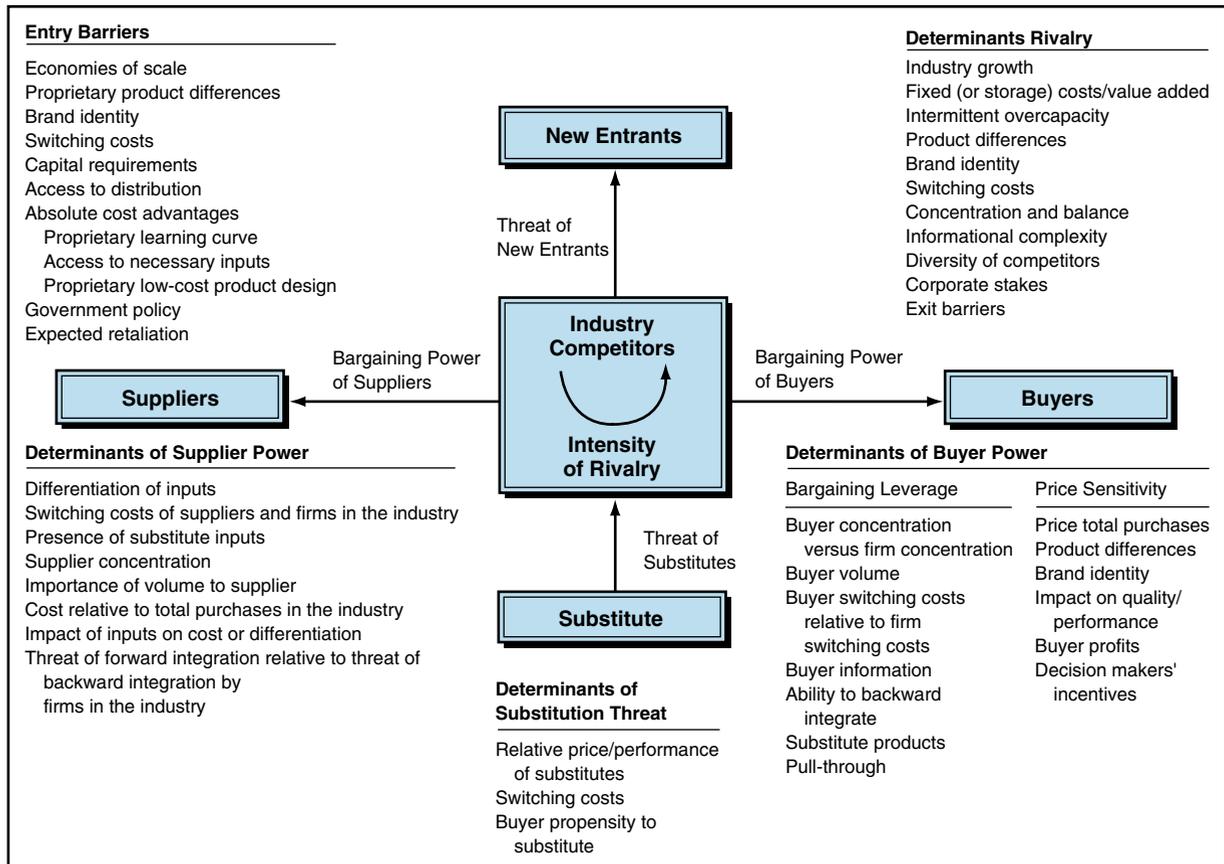


FIGURE 3.3 Porter's five forces model, including the major determinant of each force. (Source: Adapted with permission of the Free Press, a division of Simon & Schuster, Inc., from Michael Porter, *Competitive Advantage: Creating and Sustaining Superior Performance*, p. 6. © 1985, 1998 by Michael Porter.)

3. The bargaining power of customers (buyers)
4. The threat of substitute products or services
5. The rivalry among existing firms in the industry

The strength of each force is determined by factors related to the industry's structure, as shown in Figure 3.3.

Just as the Internet has changed the nature of doing business, it has also changed the nature of competition. Some have suggested semiradical changes in Porter's model. For example, Harmon et al. (2001) propose adding a sixth force—bargaining power of employees—to the original five. Porter himself argues that the Internet doesn't change the model, but that it is only another tool to be used in seeking competitive advantage. In his words, "The Internet per se will rarely be a competitive advantage. Many of the companies that succeed will be the ones that use the Internet as a complement to traditional ways of competing, not those that set their Internet initiatives apart from their established operations" (Porter, 2001, p. 64).

Porter (2001) and Harmon et al. (2001) suggest some ways the Internet influences competition in the five factors:

1. **The threat of new entrants.** For most firms, the Internet *increases* the threat of new competitors. First, the Internet sharply reduces traditional barriers to entry, such as the need for a sales force or a physical storefront to sell goods and services. All a competitor needs to do is set up a Web site. This threat is especially acute in industries that perform an intermediation role as well as industries in which the primary product or service is digital. Second, the geographical reach of the Internet enables distant competitors to bring competition into the local market, or even an indirect competitor to compete more directly with an existing firm.
2. **The bargaining power of suppliers.** The Internet's impact on suppliers is mixed. On the one hand, buyers can find alternative suppliers and compare prices more easily, reducing the supplier's bargaining power. On the other hand, as companies use the Internet to integrate their supply chain and join digital exchanges, participating suppliers will prosper by locking in customers and increasing switching costs.
3. **The bargaining power of customers (buyers).** The Web greatly increases a buyer's access to information about products and suppliers, Internet technologies can reduce customer switching costs, and buyers can more easily buy from downstream suppliers. These factors mean that the Internet greatly increases customers' bargaining power.
4. **The threat of substitute products or services.** Information-based industries are in the greatest danger here. Any industry in which digitalized information can replace material goods (e.g., music, books, software) must view the Internet as a threat.
5. **The rivalry among existing firms in the industry.** The visibility of Internet applications on the Web makes proprietary systems more difficult to keep secret, reducing differences among competitors. In most industries, the tendency for the Internet to lower variable costs relative to fixed costs encourages price discounting at the same time that competition migrates to price. Both are forces that encourage destructive price competition in an industry.

Porter concludes that the *overall* impact of the Internet is to increase competition, which negatively impacts profitability. According to Porter, "The great paradox of the Internet is that its very benefits—making information widely available; reducing the difficulty of purchasing, marketing, and distribution; allowing buyers and sellers to find and transact business with one another more easily—also make it more difficult for companies to capture those benefits as profits" (2001, p. 66).

In many other ways Web-based systems are changing the nature of competition and even industry structure. Consider the following.

- Bookseller Barnes & Noble, hardware sales giant The Home Depot, and other companies have created independent online divisions, which are competing against the parent companies. Such companies are termed "click-and-mortar" companies, because they combine both "brick-and-mortar" and e-commerce operations.
- Any company that sells direct to consumers is becoming a distributor (wholesaler or retailer), competing against its own traditional distributors.



IT At Work 3.2

TECHNOLOGY INTRODUCES NEW COMPETITION FOR BRITANNICA



For generations *Encyclopaedia Britannica* was known for its world's-best content and brand name. However, in 1997 the company lost so much money that it was liquidated and sold for a fraction of its book value. What happened?

Microsoft started to sell a much-less-known encyclopedia, *Funk & Wagnalls*, on CD-ROMs for \$50, under the name *Encarta*. Later on, the CD-ROMs were given away free with Microsoft PCs. In contrast, *Britannica's* price was about \$2,000. Furthermore, *Encarta* was media-rich. It included video clips, voices, and many pictures.

Britannica's sales declined rapidly. To compete, the company created a media-rich CD-ROM version, which was

given free with the printed version. Without the print version, the CD-ROM was sold for \$1,000. But very few people were willing to pay \$1,000 when a competing product was available essentially for free.

For Further Exploration: What were the critical events that led to the demise of *Britannica*? What was the role of the Internet and Web in the demise of *Britannica*? Consult *britannica.com* to find out in what form *Britannica* has survived.

Source: Venkatraman, 2000.

- The variable cost of a digital product is close to zero. Therefore, if large quantities are sold, the product's price can be so low that it might be given away, for free. For example, some predict that commissions for online stock trading will go to zero for this reason.
- Competitors are getting together and becoming more willing to share information. Examples are the vertical exchanges owned by industry leaders. The "Big Three" auto manufacturers, for example, operate the auto exchange *covisint.com*. Similar exchanges exist in the paper, chemical, and many other industries. (See Turban et al., 2004.)

In some cases it is not a specific strategic information system that changes the nature of competition, but it is the Web technology itself that renders obsolete traditional business processes, brand names, and even superior products. One example is provided in *IT at Work 3.2*.

Strategies for Competitive Advantage

Porter's model identifies the forces that influence competitive advantage in the marketplace. Of greater interest to most managers is the development of a *strategy* aimed at establishing a profitable and sustainable position against these five forces. To establish such a position, a company needs to develop a strategy of performing activities differently from a competitor.

Porter (1985) proposed cost leadership, differentiation, and niche strategies. Additional strategies have been proposed by other strategic-management authors (e.g., Neumann, 1994; Wiseman, 1988; Frenzel, 1996). We cite 12 strategies for competitive advantage here.

1. **Cost leadership strategy:** Produce products and/or services at the lowest cost in the industry. A firm achieves cost leadership in its industry by thrifty buying practices, efficient business processes, forcing up the prices paid by competitors, and helping customers or suppliers reduce their costs. A cost leadership example is the Wal-Mart automatic inventory replenishment system. This system enables Wal-Mart to reduce storage requirements so that Wal-Mart stores have one of the highest ratios of sales floor space in the

industry. Essentially Wal-Mart is using floor space to sell products, not store them, and it does not have to tie up capital in inventory. Savings from this system and others allows Wal-Mart to provide low-priced products to its customers and still earn high profits.

2. **Differentiation strategy:** Offer different products, services, or product features. By offering different, “better” products companies can charge higher prices, sell more products, or both. Southwest Airlines has differentiated itself as a low-cost, short-haul, express airline, and that has proven to be a winning strategy for competing in the highly competitive airline industry. Dell has differentiated itself in the personal computer market through its mass-customization strategy.
3. **Niche strategy:** Select a narrow-scope segment (niche market) and be the best in quality, speed, or cost in that market. For example, several computer-chip manufacturers make customized chips for specific industries or companies. Some of the best-selling products on the Internet are niche products. For example, *dogtoys.com* and *cattoys.com* offer a large variety of pet toys that no other pet toy retailer offers.
4. **Growth strategy:** Increase market share, acquire more customers, or sell more products. Such a strategy strengthens a company and increases profitability in the long run. Web-based selling can facilitate growth by creating new marketing channels, such as electronic auctions. An example is Dell Computer (*dellauction.com*), which auctions both new and used computers mainly to individuals and small businesses.
5. **Alliance strategy:** Work with business partners in partnerships, alliances, joint ventures, or virtual companies. This strategy creates synergy, allows companies to concentrate on their core business, and provides opportunities for growth. Alliances are particularly popular in electronic commerce ventures. For example, in August 2000 Amazon.com and Toysrus.com launched a co-branded Web site to sell toys, capitalizing on each others’ strengths. In spring 2001 they created a similar baby-products venture. Of special interest are alliances with suppliers, some of whom monitor inventory levels electronically and replenish inventory when it falls below a certain level (e.g., Wal-Mart, Master Builders). Alliances can also be made among competitors in a strategy known as “co-opetition” (cooperation + competition). For example, airlines in global alliances such as OneWorld and the Star Alliance compete for ticket sales on some routes, but once the ticket is sold they may cooperate by flying passengers on competitor’s planes to avoid half-full planes. Additional examples of alliances are provided in Chapters 5 through 8.
6. **Innovation strategy:** Introduce new products and services, put new features in existing products and services, or develop new ways to produce them. Innovation is similar to differentiation except that the impact is much more dramatic. Differentiation “tweaks” existing products and services to offer the customer something special and different. Innovation implies something so new and different that it changes the nature of the industry. A classic example is the introduction of automated teller machines (ATM) by Citibank. The convenience and cost-cutting features of this innovation gave Citibank a huge advantage over its competitors. Like many innovative products, the ATM changed the nature of competition in the banking industry so that now an ATM network is a competitive necessity for any bank. Eight

TABLE 3.1 Areas of IT Related to Technological Innovations

Innovation	Advantage
New business models	Being the first to establish a new model puts one way ahead of possible competitors. The Web enables many innovative new business models, such as Priceline's "name-your-own-price" and Auto-by-Tel's infomediary model. Creating and applying these models can provide strategic advantage.
New markets, global reach	Finding new customers in new markets. Using the Web, Amazon.com is selling books in over 200 countries, all by direct mail. Rosenbluth International expanded to 57 countries backed by its communication systems.
New products	Constantly innovating with new competitive products and services. Electronic Art Inc. was first to introduce CD-ROM-based video games. MP3 Inc. enabled downloading of music from its Web site.
Extended products	Leveraging old products with new competitive extensions. When a Korean company was the first to introduce "fuzzy logic" in its washing machines, sales went up 50 percent in a few months.
Differentiated products	Gaining advantage through unique products or added value. Compaq Computers at one time became the leading PC seller after providing self-diagnostic disks with its computers. Dell Computer pioneered the concept of home delivery of customized computers.
Supersystems	Erecting competitive barriers through major system developments that cannot be easily duplicated. American Airlines' reservation system, SABRE, became so comprehensive that it took years to duplicate; a supersystem always stays ahead of the competition. Caterpillar's multibillion-dollar equipment maintenance system is difficult to duplicate.
Interorganizational systems	Linking two organizational information systems together can lock out the competition. In the 1980s, American Hospital Supply installed supply-reordering systems in hospitals, to their competitive advantage.
Computer-aided sales	Offering systems that provide computer support to marketing and sales. For example, a company might equip salespeople with wireless hand-held computers that allow them to provide price quotations at the customer's location.

ways that IT can introduce technological innovation for competitive advantage are shown in Table 3.1, and others will be provided in Chapter 11.

In the late 1990s innovation became almost synonymous with electronic commerce. The Internet, especially, enabled dot-com entrepreneurs to create innovative Web-based business models, such as Priceline's name-your-own-price model, Auto-by-Tel's infomediary model, and Amazon.com's affiliate program.

A key consideration in introducing innovation is the need to continually innovate. When one company introduces a successful innovation, other companies in the industry need to respond to the threat by attempting to duplicate or better that innovation. Especially in electronic commerce, the visibility of technologies on the Web makes keeping innovations secret more difficult.

7. Operational effectiveness strategy: Improve the manner in which internal business processes are executed so that a firm performs similar activities better than rivals (Porter, 1996). Such improvements increase employee and customer satisfaction, quality, and productivity while decreasing time to market. Improved decision making and management activities also contribute to improved efficiency. Web-based systems can improve the administrative efficiency of procurement, for example, by 20- to 30-fold.

8. **Customer-orientation strategy:** Concentrate on making customers happy, as is the case with RadioShack Online. Strong competition and the realization that the customer is king (queen) is the basis of this strategy. Web-based systems that support customer relationship management are especially effective in this area because they can provide a personalized, one-to-one relationship with each customer.
9. **Time strategy:** Treat time as a resource, then manage it and use it to the firm's advantage. "Time is money," "Internet time" (i.e., three months on the Internet is like a year in real time), first-mover advantage, just-in-time delivery or manufacturing, competing in time (Keen, 1988), and other time-based competitive concepts emphasize the importance of time as an asset and a source of competitive advantage. One of the driving forces behind time as a competitive strategy is the need for firms to be immediately responsive to customers, markets, and changing market conditions. A second factor is the time-to-market race. As Louis Gerstner, former CEO of IBM, has said, "A disproportionate amount of the economic value occurs in the early states of a product's life. That's when the margins are most significant. So there is real value to speed, to being first" (quoted in Frenzel, 1996, p. 56).
10. **Entry-barriers strategy:** Create barriers to entry. By introducing innovative products or using IT to provide exceptional service, companies can create barriers to entry from new entrants. For example, Priceline.com has received U.S. patent 5,794,207 on its name-your-own-price business model (Lipton, 1998). Cisco's Dynamic Configuration Tool (cisco.com/appcontent/apollo/configureHomeGuest.html) allows prospective buyers to complete an online configuration of a Cisco product and receive intelligent feedback about compatibility and ordering. Service levels such as this make it difficult for new entrants to compete against Cisco.
11. **Lock in customers or suppliers strategy:** Encourage customers or suppliers to stay with you rather than going to competitors. Locking in customers has the effect of reducing their bargaining power. A classic example is frequent-flyer and similar buyer-loyalty programs in the airline, hospitality, and retail industries. Companies that have such programs have more customers who are "locked in" by the incentives the loyalty programs offer. A business-to-business example in the car industry is e-procurement system Covisint, which locks in car manufacturers as customers and part manufacturers as suppliers.
12. **Increase switching costs strategy:** Discourage customers or suppliers from going to competitors for economic reasons. For example, Master Builders builds in switching costs with its concrete additive tank-monitoring system, as described earlier. Interorganizational information systems (discussed below) increase buyer and seller dependencies, making it difficult or more expensive for buyers to turn to competitors. E-procurement systems that record sales in a buyer's purchasing system can be difficult to set up, but offer a great deal of reliability and convenience for the buyer. Once set up, the buyers face switching costs to add or change suppliers.

These strategies may be interrelated. For example: Some innovations are achieved through alliances that reduce cost and increase growth; cost leadership improves customer satisfaction and may lead to growth; and alliances are key to



IT At Work 3.3

HOW EXPEDIA IS USING WEB SERVICES



Expedia.com is a leading online travel service in the United States, with localized versions in the United Kingdom, Canada, and Germany. Expedia operates in a very competitive marketplace with competition from similar services such as Travelcity and Orbitz, ticket discounters such as Priceline.com and Lastminute.com, traditional travel agencies such as Rosenbluth, and, increasingly, airlines and hotels themselves. Expedia harnesses the power of Web services to distinguish itself in this market.

Expedia's competitive strategy is driven by nearly every traveler's need to receive up-to-the-second, diverse information at any time and any place. Expedia actively supplies travelers with dynamic and real-time personalized information, such as flight status. This information is *pushed to* travelers (sent to them from Expedia) as well as *pulled from* the company's portal (accessed by the travelers through specific inquiries). Travelers use desktop computers, cell phones, and other Web-enabled devices to receive or access the information. This multichannel provision of timely travel information is the key for attracting new customers and for keeping existing customers.

To make this happen Expedia needs to connect to many service providers (airlines, hotels, car rental companies) as well as airports, news services, map services, and more. By using Web services the company solves the integration problem as well as creating device-independent information delivery. This way Expedia can write information only once and then deliver it via whichever method the customer wants—eliminating the need to rewrite the information for each delivery method. Expedia can also can tie information into the users' existing "buddy lists" and calendars. This way customers do not have to reconstruct their contact lists and schedules within Expedia.

The solution is based on Microsoft's .NET Passport. A single sign-in for customers provides authentication and eliminates redundant log-on procedures. Using Passport's notification service, a user can choose to receive alerts to any device, including wireless ones. Furthermore, customers can, for example, automatically send notifications of flight plans to people on their contact lists. The users can also enter their itinerary schedule to their computer calendars in a second, moving it from .NET calendar.

The architecture of the system, shown in Online File W3.1, is flexible enough to work with non-Internet devices. For example, many people with PDAs do not have wireless capabilities. So they can receive information from Expedia via a synchronized solution (the users can synchronize the information from a PC to their PDAs and vice versa). By using a system development vendor (Microsoft), Expedia did not have to build its own services such as authentication, message notification, and calendaring. This enabled the company to be a first mover in getting these services to market. Using this XML-based service, Expedia adds value for its customers, which provides Expedia with an edge over its competitors.



For Further Exploration: How many of the competitive strategies described in this section are exemplified in this case study? What is the advantage of being the first mover in this case? How can small travel agencies that cannot build such a system (at least for several years, until technology will be affordable) respond?

Source: Compiled and condensed from Microsoft (2001) (microsoft.com/servers/evaluation/casestudies/Expedia.doc).

locking in customers and increasing switching costs. The Expedia case study in *IT at Work 3.3* illustrates several of the competitive strategies described above.

Porter's model is industry-related, assessing the position of a company in its industry. Companies can use the model for competitive analysis, to suggest specific actions. In most cases such actions involve the use of IT. With Porter's five forces model and various competitive strategies in mind, let us see an example of how the generic model works in practice. We will use Wal-Mart as an example (see Figure 3.4) to demonstrate the four steps involved in using Porter's model.

Step 1. List the players in each competitive force. An illustration of a competitive threat is online shopping, which may be offered by *e-tailers* (electronic retailers). In 2002, for example, Amazon.com started to sell clothes

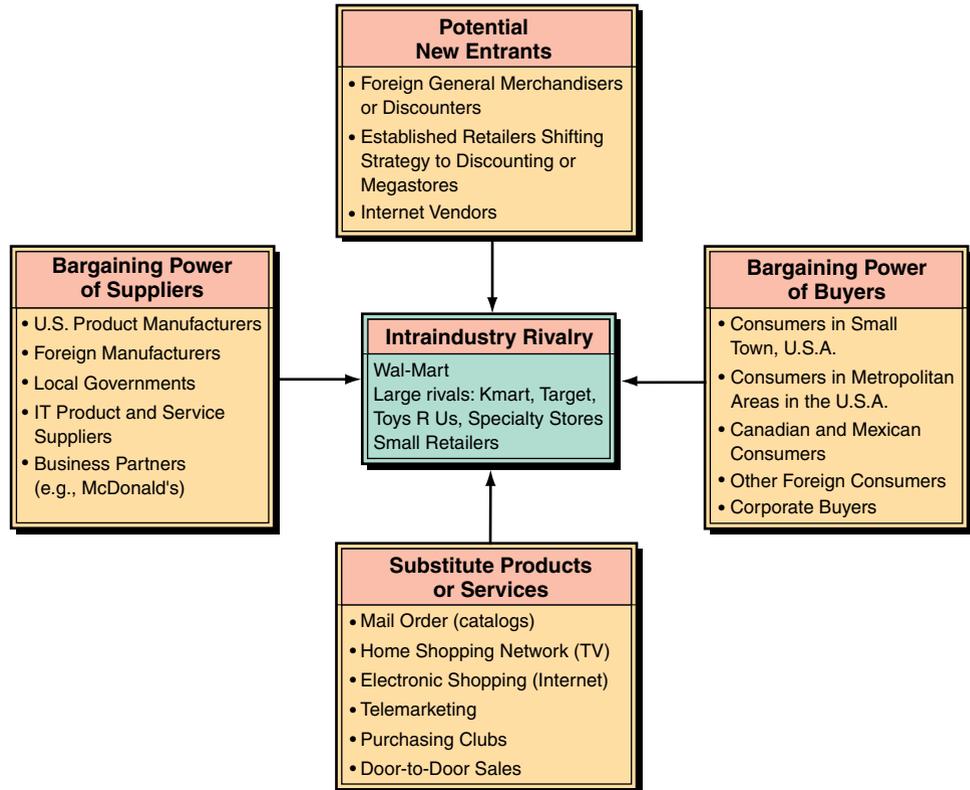


FIGURE 3.4 Porter's model for Wal-Mart. (Source: Adapted by Callon (1996) and reprinted by permission of *Harvard Business Review*. From Michael Porter, "How Competitive Forces Shape Strategy" March – April 1979. © 1979 by Harvard Business School Publishing Corporation; all rights reserved.)

online, competing directly with Wal-Mart in one of Wal-Mart's largest product lines.

Step 2. Relate the major determinants of each competitive force (shown in Figure 3.3, p. ••) to each player in the market. For example, for Wal-Mart, with respect to online shopping, we can check the switching cost for the buyers, the buyers' propensity to substitute, and the convenience advantage of online shopping.

Step 3. Devise a strategy with which Wal-Mart can defend itself against the competitive forces, based on the specific players and the determinants. For example, to counter online shopping, Wal-Mart can provide playgrounds for children, hand out free samples of products, and recognize frequent shoppers personally. Wal-Mart can also respond by imitating the competition. In fact, the company did just that by introducing Wal-Mart Online.

Step 4. Look for supportive information technologies. An illustration of this step for online shopping is a technology for managing frequent shoppers. Wal-Mart uses a gigantic database, data-mining techniques, smart cards, and decision support capabilities to analyze shoppers' activities accurately and to act competitively in response. Wal-Mart uses IT extensively both to defend itself against the competition and to create innovative services and cost reduction, especially along its supply chain. (We'll provide more specific examples in Chapter 8.)

Almost 20 years after it was first published, Porter's competitive forces model remains the dominant framework for analyzing competitive advantage within an industry. A different way to analyze competition and the role of IT is provided in Porter's value chain model, which is the subject we turn to next.

3.3 PORTER'S VALUE CHAIN MODEL

The Model According to the **value chain model** (Porter, 1985), the activities conducted in any manufacturing organization can be divided into two parts: *primary activities* and *support activities*. The five **primary activities** are those activities in which materials are purchased, processed into products, and delivered to customers. They are:

1. Inbound logistics (inputs)
2. Operations (manufacturing and testing)
3. Outbound logistics (storage and distribution)
4. Marketing and sales
5. Service

The primary activities usually take place in a sequence from 1 to 5. (An exception to this sequencing is Dell Computer's build-to-order strategy, as described in *IT at Work 3.4*.) As work progresses according to the sequence, *value* is added to the product or service in each activity. To be more specific, the incoming materials (1) are processed (in receiving, storage, etc.), and in this processing, value is added to them in activities called *inbound logistics*. Next, the materials are used in *operations* (2), where significant value is added by the process of turning raw materials into products. The products need to be prepared for delivery (packaging, storing, and shipping) in the *outbound logistics* activities (3), and so more value is added in those activities. Then *marketing and sales* (4) attempt to sell the products to customers, increasing product value by creating demand for the company's products. (The value of a sold item is much larger than that of an unsold one.) Finally, *after-sales service* (5) such as warranty service or upgrade notification is performed for the customer, further adding value. All of these value-adding, primary activities result (it is hoped) in profit.

Primary activities are supported by the following **support activities**:

1. The firm's infrastructure (accounting, finance, management)
2. Human resources management
3. Technology development (R&D)
4. Procurement

Each support activity can support any or all of the primary activities, and the support activities may also support each other.

A firm's value chain is part of a larger stream of activities, which Porter calls a value system. A **value system** includes the suppliers that provide the inputs necessary to the firm and their value chains. Once the firm creates products, they pass through the value chains of distributors (which also have their own value chains), all the way to the buyers (customers). All parts of these chains are included in the value system. Gaining and sustaining a competitive advantage, and supporting that advantage by means of IT, requires an understanding of this entire value system.



IT At Work 3.4

HOW DELL COMPUTER BTOs ITS VALUE CHAIN



Dell Computer is well-known for its ability to mass-produce computers that are customized to a customer's order, a production and operations process known as *mass-customization* or, in a value-chain context, a *build-to-order (BTO) strategy*. The ability to build to order depends on how well a company can efficiently meet customer demands at each stage of the value chain. At Dell, this ability depends on computer systems that link customer order information to production, assembly, and delivery operations.

At Dell the BTO process begins with receipt of the customer order from the Internet, fax, or telephone. It takes approximately one day to process the order and for production control to ensure that the necessary parts are in stock. Assembly and shipment takes another day, and delivery to the customer's home or office takes a final 1 to 5 days.

The value chain in place at most firms assumes a *make-to-forecast strategy*. That is, standard products are produced from long-term forecasts of customer demand. Thus the primary activities of the value chain move from inbound logistics to operations to outbound logistics and then marketing and sales, all based on projections of what customers will be buying and in what quantities. A make-to-forecast strategy offers efficiencies in production, but if the forecasts are inaccurate, as they frequently are, the results are lost sales (inadequate supply) or heavy discounting to move excess product (oversupply). Then the bottom line is, literally, less profit. Another major disadvantage of the make-to-forecast strategy is the inability of the firm to track ongoing changes in customer demand.

Dell's value chain moves the marketing and sales activity forward to the front of the value chain. In its build-to-order strategy, Dell assembles the product only after the customer has placed the order, so marketing and sales comes first. The primary disadvantage of the BTO strategy is system sensitivity to short-term changes in customer demand. For example, if a particular computer component suddenly becomes wildly popular or temporarily unavailable, the standard two-week supply in inventory

may diminish fast and customer orders will not be completed on time.

A successful build-to-order strategy offers companies like Dell numerous benefits in process, product, and volume flexibility. For example, customer requirements are linked directly to production. As a result production decisions are based on up-to-the-minute customer demand, not long-range forecasts, which can be wildly inaccurate. This increases management's knowledge about trends in the marketplace and decreases inventory holding costs. BTO also offers partners in Dell's value system increased visibility to the demand and flow of goods. As noted in the text, understanding this entire value system can give additional insight and opportunities for competitive advantage. In addition, the support structures for BTO are naturally more flexible, creating a higher sense of responsiveness within the firm and a more flexible and agile company. One outcome of such flexibility is that adjustable price and sales incentives can be used to manage demand levels, rather than reactively discounting excess stock. Finally, because the customer gets exactly what he or she wants, first-time customers are likely to become repeat customers and recommend Dell to friends and colleagues.

Executing a build-to-order strategy isn't easy, as many companies have found out. Not only must interconnected information systems be built, but BTO frequently requires a change in organizational culture, managerial thinking, and supplier interactions and support. Inevitably the process begins by acquiring a better understanding of customer demand; then improvements in information flow will produce the ability to increase responsiveness in all areas of the value chain.

For Further Exploration: Use the Internet, if necessary, to find other companies that use a BTO strategy. How would a BTO strategy work in another industry, for example, automobiles or toys? What are the implications of BTO for the value chains of suppliers of Dell components?

Source: Holweg and Pil (2001).

The value chain and value system concepts can be diagrammed for both products and services and for any organization, private or public. The initial purpose of the value chain model was to analyze the internal operations of a corporation, in order to increase its efficiency, effectiveness, and competitiveness. The model has since then been used as a basis for explaining the support IT can provide. It is also the basis for the *supply chain management* concept, which we will present in Chapter 8.



FIGURE 3.5 The airline industry value chain superimposed on Porter's value chain. (Source: Adapted by Callon (1996) and reprinted by permission of *Harvard Business Review*. From Michael Porter, "How Competitive Forces Shape Strategy," March – April 1979. © 1979 by Harvard Business School Publishing Corporation; all rights reserved.)

The value chain model can be used in different ways. First, we can use it to do company analysis, by systematically evaluating a company's key processes and core competencies. To do so, we first determine strengths and weaknesses of performing the activities and the values added by each activity. The activities that add more value are those that might provide strategic advantage. Then we investigate whether by adding IT the company can get even greater added value and where in the chain its use is most appropriate. For example, Caterpillar uses EDI to add value to its inbound and outbound activities; it uses its intranet to boost customer service. In Chapters 5 through 12, we include many examples of how IT supports the various activities of the value chain for individual firms.

A second use for the value chain model is to do an industry analysis, as shown for the airline industry in Figure 3.5. As in the company analysis, once the various activities have been identified, then it is possible to search for specific information systems to facilitate these activities. For example, in "Marketing and Sales," agent training can be conducted on the corporate portal. Similarly, technology now allows preticketed customers to self-check their baggage at some airports.

Finally, the value chain model can be used either for an individual company or for an industry by superimposing different types of information systems that may help special activities. For example, EDI can help inbound and outbound logistics; virtual reality can help both advertising and product development.

Porter's Models in the Digital Age

The application of Porter's models is still valid today. But some adjustments may be needed to take into account the realities of business in the digital economy. Consider a company such as Amazon.com. Who are Amazon's competitors? It

depends. In books they compete mainly against Barnes & Noble Online, in toys against Kmart, Wal-Mart, and Sears, and in music against CDNOW.com. Amazon.com could also be seen to compete against television, video games, and the Internet itself, because each of these compete for customers' leisure time. In that view, Amazon.com is not necessarily in the book-selling business, but in the entertainment business. Could we use one diagram such as Figure 3.3 (p. ••) to describe Amazon.com's competitive environment? Probably not. We might need several figures, one for each of Amazon's major products. Furthermore, due to alliances (such as between Amazon.com and Toysrus.com), the competition and the value chain analysis can be fairly complex and frequently in flux.



For a presentation of strategic information systems frameworks proposed by other researchers, see Online File W3.2 at the books Web site.

3.4 INTERORGANIZATIONAL STRATEGIC INFORMATION SYSTEMS

Many of the strategic information systems of the 1970s through the 1990s were developed and implemented by individual companies. With the emergence of the Internet as a tool that could easily connect businesses, companies began to look outside their own operations to form alliances and business partnerships based on Internet connectivity. As discussed in Chapter 2, such systems are called *interorganizational information systems (IOSs)*, and they are considered a part of electronic commerce.

Several of the electronic markets (or exchanges) that emerged in the 1990s used private lines and/or EDI. (For more detail on how EDI works, see Appendix 5.1.) An example is Citus Belgium (*citus.be*). Citus acts as a hub between customers and suppliers, hosting suppliers' catalogs electronically. Using a pioneering technology, the company gained incredible competitive advantage by significant cost reduction and the building of a loyal customer community (see Timmers, 1999).

However, traditional EDI was difficult and expensive to implement. "Old EDI" required the use of complex standards (e.g., ANSI or EDIFACT), expensive value-added networks (VANs), complex application-to-application software, and across-the-board buy-in (agreement) within the industry. Today, new interorganizational SISs use *Internet-based EDI*. In this "new EDI" the proprietary standards have been replaced by extensible markup language (XML), the VAN has been replaced by the Internet, and system-to-system connectivity gives organizations much greater flexibility in terms of internal implementation. The strategic benefits of Internet-based EDI—a faster business cycle, automation of business procedures, and increased reduced costs—have spurred the growth of interorganizational information systems and have provided many organizations greater advantage in a fierce competitive environment.

Another way in which groups of companies are using IT and the Internet to create interorganizational information systems to create or sustain competitive advantage include establishing *consortia*—electronic exchanges for suppliers and buyers. Consortia can be considered either vertical or horizontal. *Vertical (industry) consortia* are organized, operated, and controlled by the major players in an industry (e.g., steel, paper, insurance, oil, cars, mining). These exchanges are used primarily for purchasing and are designed to reduce the bargaining power of suppliers. *Horizontal consortia* are organized by large companies from different

industries for the purpose of purchasing maintenance, replacement, and operations (MRO) items. In Australia, all the largest corporations are organized in an e-purchasing exchange (see *corprocure.com*).

In a connected world, no organization can stand alone. Instead, competitive advantage is enhanced when businesses use the Internet and private networks to exchange information and conduct business as partners. Competitive strategies such as alliance and value systems imply organizations working together to achieve common goals, and all participants benefiting from the use of IT for executing competitive strategies.

3.5 A FRAMEWORK FOR GLOBAL COMPETITION

Many companies are operating in a global environment. First, there are the fully global or multinational corporations. Second, there are the companies that export or import. Third, a large number of companies face competition from products created in countries where labor and other costs are low, or where there is an abundance of natural resources. Other companies have low-cost production facilities in these same countries. Finally, electronic commerce facilitates global trading by enabling even small companies to buy from or sell to business partners in other countries. Thus, globalization is rapidly increasing.

Doing business in a global environment is becoming more and more challenging as the political environment improves and as telecommunications and the Internet open the door to a large number of buyers, sellers, and competitors worldwide. The increased competition forces companies to look for better ways to do global business. Porter and Youngman (1995), for example, propose an approach that focuses on employment policies and government regulations. Similarly, Ghemawat (2001) proposes a framework in which companies are urged to consider cultural, administrative, geographical, and economic dimensions to assess their ability to compete in global markets. Ghemawat calls this a “CAGE distance” framework, an acronym for the four dimensions to be considered by businesses that are selling products outside their local area, especially internationally.

A comprehensive framework that connects IT and global business was suggested by Ives et al. (1993). According to this *global business driver framework*, the success of companies doing business in a competitive global environment depends on the alignment of a company’s information system and its global business strategy. This connection is demonstrated by Rosenbluth International, whose strategy enables it to compete with local travel agencies in 57 countries, and by Caterpillar Corporation, which employs a business strategy of strong support to dealers and customers worldwide by means of its effective global information system. The success of multinational firms and companies engaged in global activities, in a highly competitive global market, thus strongly depends on the link between their information systems and their business strategy. Information managers must be innovative in identifying the IT systems that a firm needs in order to be competitive worldwide and must tie them to the strategic business imperatives.

The global business driver framework provides a tool for identifying business entities, such as customers, suppliers, projects, and orders, that will benefit most from an integrated global IT management system. The basic idea is to apply IT through a firm’s **global business drivers**. These are business factors that benefit from global economies of scale or scope and thus add value to a global business strategy. Typical global business drivers are risk reduction, availability of a skilled

and/or inexpensive workforce, quality products/services, location of materials, supply and suppliers, location of customers, and a country's infrastructure. The idea of the global business drivers framework is to look at the drivers in terms of current and future information needs and to focus on worldwide implementation.

Advances in Internet availability and electronic commerce are of special interest to global traders. First, many of the business drivers can be facilitated by the Internet, which is much cheaper and more accessible than private communication networks. Second, the Internet and e-commerce are answers to several of the analysis questions related to global business drivers. Additional analysis of some global business drivers is available at the book's Web site.



3.6 STRATEGIC INFORMATION SYSTEMS: EXAMPLES AND ANALYSIS

The models, strategies, and frameworks presented in the previous sections suggest opportunities that companies can pursue to gain strategic advantage. Several SISs developed in the 1970s and 1980s are considered classic illustrations of the power of IT to provide companies with strategic advantage (see Online File W3.3 at the book's Web site). In this section, we provide several contemporary examples of how IT has successfully supported the various strategies that companies use to gain competitive advantage.



Wiring the “Customer Supply Chain” at 1-800-Flowers. 1-800-Flowers sits in the middle of a complex and critical “customer supply chain.” On one side of this supply chain are the customers who call the 1-800 number or visit the Web site (*800flowers.com*) to order flowers or gifts. On the other side are the 1,400 floral affiliates who actually create and deliver the product. Maintaining satisfactory customer relationships on both sides of this supply chain is critical to 1-800-Flowers's success, and the key to those relationships is the wired communication system the company has built.

When 1-800-Flowers opened for business in 1986 it was one of the first businesses to promote the 1-800 toll-free number system on a nationwide basis. The initial 1-800-Flowers system included a complex but effective system for directing incoming calls to agents in various call centers across the nation.

It was only natural that an intermediary that based its business on connecting customers and suppliers by a telephone network would be one of the first companies to see the potential of the Web. In 1995, 1-800-Flowers was one of the first three beta testers of the Netscape platform and launched its Web site later that year. Web-sourced orders, which amounted to approximately half of all orders in 2001, were woven into the existing telephone-based business through data networking services. Customer purchases, customer profiles, and internal information created an efficient, wired customer supply chain that helped 1-800-Flowers maintain a competitive advantage.

The next step was to wire-up the connection to the florists. In 1997, 1-800-Flowers initiated BloomLink, an extranet that sends orders out to affiliates and tracks progress in getting the shipments to customers. Additionally, BloomLink offers training programs and access to wholesale flower supply networks. This network helps lock in the suppliers and create switching costs. The significance of BloomLink is its ability to support both the business goal of order fulfillment and the competitive-advantage goal of supplier relationship management.

Like many companies in numerous industries, establishing and maintaining excellent relationships with customers and suppliers is critical to the success of



1-800-Flowers. By wiring up customers and suppliers on both side of its supply chain, 1-800-Flowers has achieved its goals. (*Sources: Reda, 2002; Kemp, 2001; 800flowers.com.*)

Increasing Tax Collection Efforts at the Wisconsin Department of Revenue. How does an organization in a noncompetitive industry measure competitiveness? Without the usual measures of market share or profitability, how does a charity, an association, a nongovernmental agency such as the Red Cross, or a governmental agency strive for competitive advantage?

One approach is to compete against yourself. Each year's goals are set higher than last year's performance, and "competitive strategies" are put into place to achieve those goals. Essentially, an organization is competing against its former performance. This was the approach adopted by the State of Wisconsin Department of Revenue for the collection of delinquent taxes.

The Department is responsible for processing and auditing various state taxes as well as for recovering delinquent taxes, to ensure that the state maximizes the income from its largest source of revenue. To realize its goals in the collection area, the Department implemented the Delinquent Tax System (DTS) "for case management and coordinating the actions involved in collections, including hearings, installment agreements, wage certifications, levies, bankruptcy, and warrant filing." The DTS was built in an object-oriented environment using IBM's DB2 database.

Some of the benefits from the DTS implementation have been increased productivity, ease of access to case information in geographically remote offices, reduction of overhead costs, and more standard treatment of cases. Competitively, it has achieved its greatest benefit in the results it has produced. Vicki Siekert, Director of Compliance for the Department, says, "In the last couple years, we've been much more successful at meeting our collection goals; I can say that the Delinquent Tax System has certainly helped our efforts." (*Source: "Customer Case Study: State of Wisconsin Department of Revenue," no date.*)

Time-Based Competitive Advantage at Cannondale. Companies in the motorsports bike industry are in a constant race to introduce new, innovative products. So when Cannondale introduced the FX400, its first-ever all-terrain vehicle, it wasn't surprised to learn that Suzuki and market leader Honda were not far behind. Challenged to put constant innovation into its design, test, and production process to stay ahead, Cannondale turned to a relatively new kind of application—product life-cycle management (PLM) software.

The promise of PLM software is to share information associated with all phases of a product's life-cycle with everyone in an organization—engineering, purchasing, manufacturing, marketing, sales, aftermarket support—as well as with key suppliers and customers. Most PLM packages contain elements of project management, workflow, and collaboration software.

What have been the results for Cannondale? Paul Hammerstrom, head of R&D for Cannondale's Motorsport Division, says the PLM software has given his company the ability to react quickly in the rapidly changing marketplace. "They [Suzuki] will make 25,000 units in one factory run, and they'll be stuck with them. Thanks to this software we can constantly improve features even in the middle of a production run" (Raskin, 2002). The software "gives the 50-plus people involved in upgrading the bikes for 2003 near-instant access to constantly moving requests for design changes, product specifications, and work orders." He cites this example: "If five dealers walked in today and said "This seat is way too



hard,' I could have new ones in production in a couple of days. Speed is our friend" (Raskin, 2002).

As discussed earlier in this chapter, time is one of the major strategies for achieving competitive advantage. Just as speed enables its motorsport customers to win races, having speed as a friend helps Cannondale beat competitors in the marketplace. (*Source: Raskin, 2002, and Stackpole, 2003.*)



Southwest Airlines Flies High with SWIFT. Southwest Airlines is an outstanding success story in an industry in which many of the major carriers—American, United, and Canada Air, for example—are in or near bankruptcy. Southwest's success can be attributed to its well-known innovations—no-frills flights, no seating assignments, and an aircraft fleet of efficient 737 airplanes. Each of Southwest's 2,600 daily flights requires data about the flight route, fuel requirements, and in-route weather. If these data aren't in the right place at the right time, flights can be delayed or canceled. Efficient dispatching of a growing volume of flight information can be as critical a success factor as moving baggage or customers.

To handle Southwest's requirements for efficient delivery of flight information, Southwest created SWIFT—the Southwest Integrated Flight Tracking System. SWIFT is a set of applications for managing the aircraft fleet and dispatching flights. "SWIFT was developed using a multi-threaded, open server architecture. Clients are connected to the system database and a replication server that captures completed transactions. All clients are X-Motif applications executed on UNIX stations." One innovative piece of software in SWIFT is SmartSockets from Talarian, Inc. "SmartSockets functions as the transport mechanism for distributing real-time updates for Southwest's fleet management and operations and enables processes to communicate reliably and securely." This messaging software replaced a remote procedure call solution. The result has been elimination of system outages and a more stable SWIFT.

Innovations like SWIFT allow Southwest to fly higher than its competition in system sophistication, integration, and ease-of-use. These factors keep Southwest in the skies, flying ahead of its competitors in airline efficiency and profitability. (*Source: Talarian, 2000.*)



Using ERP to Meet Strategic Challenges at Turner Industries. Turner Industries is a Forbes 500 company that provides a variety of construction, maintenance, cleaning, and environmental services to its customers in the refining, petrochemical, power generation, and other industries. It does so through 25,000 employees, a \$100 million fleet of construction equipment, and advanced software applications designed to meet strategic challenges in time, cost, and customer satisfaction.

Two of the challenges Turner Industries faces is completing projects on time and within budget. A strategic solution to this challenge is Interplan. At the heart of Interplan is a J.D. Edwards ERP system with bolt-on applications that include scheduling software and project control and estimating systems. Interplan contributes to the goal of meeting or exceeding customer expectations by enabling the company to complete projects on time and without cost overruns. This keeps customers happy and wins Turner Industries repeat business and an increasing list of customers. Interplan is so effective that the company typically receives an increased profit margin on projects that use Interplan and is even able to pass on some of these cost savings to its customers.

An even larger contributor to meeting the customer-satisfaction challenge is Turner-Direct.com. Recognizing the need to help customers help themselves, in

1996 Turner Industries began to give customers Internet access to real-time manufacturing and shipping information. Lowell Vice, CIO of Turner Industries, attributes a dramatic rise in the pipe-fabrication facility—from \$20 million to \$120 million in just several years—to Turner-Direct.com.

These systems have not gone unnoticed by industry peers. Interplan was the winner of *Constructech's* 2000 Vision award for software innovation in the heavy construction industry. That same year, Turner-Direct.com received *CIO Magazine's* CIO-100 award for customer service and customer relationship management.

None of this success has caused Turner Industries to sit on its laurels. The company is building a business intelligence system that will collect up-to-the-minute data about the cost and revenue margins of any project and provide that data to the customer so that inefficiencies and glitches in projects can be identified early and fixed immediately. (Source: J.D. Edwards, 2002b).



The Port of Singapore Exports Its Intelligent Systems Over Its Enterprise Portal. The Port of Singapore is the world's busiest and largest container port in the world. Over 250 shipping companies use the port to ship goods to 600 ports in 123 countries. However, the port is experiencing strong competition from neighboring ports in Malaysia, Indonesia, and the Philippines. In these neighboring countries, labor, space, utilities, and services are significantly cheaper.

What has been the response? PSA, the company that operates the Port of Singapore, uses its Computer Integrated Terminal Operations System (CITOS) to automate many of its port services and reduce costs. Additionally, the port's intelligent systems reduce the cycle time of unloading and loading vessels. This cycle time is very important to ships, since their fixed cost is very high; the longer they stay in port, the higher the cost. An intelligent system is used to expedite trucks' entry into and exit from the port. As a result of using neural computing, the time is down to 30 seconds per truck instead of 3 to 5 minutes in other countries. Expert systems plan vessel loading, unloading, and container configuration, so cycle time can be as little as 4 hours (versus 16 to 20 hours in a neighboring port).

PSA's newest innovation is the export of its port operations expertise to other ports. Portnet.com, a fully owned subsidiary of PSA, has joint venture, franchise, or licensing agreements with 14 different ports in 9 different countries in all parts of the world. Essentially PSA is selling its e-business systems and expertise to its competitors. (Sources: Field, 2002; Tung and Turban, 1996; corporate sources in Singapore, July 2000; *portnet.com*.)

SUMMARY. The relationships between the competitiveness strategies presented earlier in the chapter and some of the company examples are summarized in Table 3.2.

TABLE 3.2 Company Examples and Competitiveness Strategies

Company	Cost Leadership	Differentiation	Alliance	Innovation	Time	Customer Orientation	Lock in Suppliers or Customers
Rosenbluth	X	X		X		X	X
RadioShack		X				X	
Expedia	X	X	X		X	X	X
Cannondale					X		X
1-800Flowers		X	X		X		X

3.7 IMPLEMENTING AND SUSTAINING SIS

SIS Implementation

Implementing strategic information systems may be a complex undertaking due to the magnitude and the complex nature of the systems. In this section we will briefly look at several related issues: (1) SIS implementation, (2) SIS risks and failures, (3) finding appropriate SISs, and (4) sustaining SIS and strategic advantage.

Most SISs are large-scale systems whose construction may take months or even years. In later chapters we will discuss at more length various important issues relating to SIS implementation: Chapter 9 covers the development process of such systems, which starts with generic IS planning. Chapter 13 addresses the methodologies of how to justify strategic information systems, whose sometimes-intangible benefits may be difficult to value. Finally, Chapter 14 discusses in detail the general topic of systems development and implementation.

The magnitude and complexity of the continuous changes occurring both in technology and in the business environment may result in partial or even complete SIS failures. When SISs succeed, they may result in huge benefits and profits. When they fail, the cost can be extremely high. In some cases, SIS failure can be so high that a company may even go bankrupt as a result. For example, FoxMeyer, a large distributor of drugs in the United States, filed for bankruptcy in 1996 after failing to implement a SIS that cost several times its projected cost and processed far fewer orders per hour than its predecessor (McHugh, 2000). The failure occurred despite the use of a major IT consulting firm and the leading enterprise resource planning (ERP) software.



Identifying appropriate strategic information systems is not a simple task. Two major approaches exist: One approach is to start with known problems or areas where improvements can provide strategic advantage, decide on a strategy, and then build the appropriate IT support. This is a *reactive approach*. It is basically what Rosenbluth International did. The second approach is to start with available IT technologies, such as Web-based EDI or e-procurement, and try to match the technologies with the organization's current or proposed business models. This is a *proactive approach*. In either case a SWOT (strengths, weaknesses, opportunities, threats) analysis or an application portfolio analysis tool such as an Internet portfolio map (Tjan, 2001) can be used to decide what systems to implement and in what order.

Sustaining SIS and Strategic Advantage

Strategic information systems are designed to establish a profitable and sustainable position against the forces that determine industry competition. A **sustainable strategic advantage** is a strategic advantage that can be maintained for some length of time. During the period from 1970 through the late 1990s, businesses implemented numerous successful IT-based strategic systems that lasted many years. These SISs enabled the companies that owned them to enjoy a competitive advantage for several years before competitors imitated their systems. For example, Federal Express's package-tracking system gave FedEx a competitive advantage for three to five years before it was copied by UPS, DHL, and others.

However, in the first decade of the twenty-first century, it has become increasingly difficult to *sustain* an advantage for an extended period. Due to advances in systems development, outward systems can now be quickly duplicated, sometimes in months rather than years. Also, innovations in technology may make even new systems obsolete rather quickly.

Therefore, the major problem that companies now face is how to sustain their competitive advantage. Ross et al. (1996) suggest the three IT assets—people, technology, and “shared” risk and responsibility—as a way to develop sustainable competitiveness. Porter (1996) expanded his classic competitive forces model to include strategies such as growth and internal efficiency that facilitate sustainability. Here we present some ways to accomplish competitive sustainability with the help of IT.

One popular approach is to use *inward systems* that are not visible to competitors. Companies such as General Motors and American Airlines, for example, use intelligent systems to gain strategic advantage, but the details of those systems are secret because they are in inward systems. It is known that several companies (such as John Deere Corp.) are using neural computing for investment decisions, but again the details are not known. The strategic advantage from use of such inward systems is sustainable as long as the systems remain a secret, or as long as competitors do not develop similar or better systems.

If a company uses outward systems to sustain competitive advantage, one way to protect those systems is to patent them, as Rosenbluth, Amazon.com, and Priceline did. Another approach to sustaining competitive advantage is to develop a comprehensive, innovative, and expensive system that is very difficult to duplicate. This is basically what Rosenbluth did, as did Caterpillar Corporation.

Finally, experience indicates that information systems, by themselves, can rarely provide a sustainable competitive advantage. Therefore, a modified approach that combines SISs with structural changes in the business may be likely to provide a sustainable strategic advantage. For example, Barnes & Noble not only started to sell on the Web but also created a completely independent organization to do so (*bn.com*). This strategy can work very well if the online and offline parts of a company can work in synergy. Barnes & Noble made a strategic move to regain market share lost to Amazon.com. Frequently this approach is implemented through business process reengineering and organizational transformation, which are described in Chapter 9.

MANAGERIAL ISSUES

1. **Risk in implementing strategic information systems.** The investment involved in implementing an SIS is high. Frequently these systems represent a major step forward and utilize new technology. Considering the contending business forces, the probability of success, and the cost of investment, a company considering a new strategic information system should undertake a formal risk analysis.
2. **Planning.** Planning for an SIS is a major concern of organizations (Earl, 1993). Exploiting IT for competitive advantage can be viewed as one of four major activities of SIS planning. The other three (which will be discussed later in the book) are aligning investment in IS with business goals (Chapter 9), directing efficient and effective management of IS resources (Chapters 13 and 15), and developing technology policies and architecture (Chapter 9).
3. **Sustaining competitive advantage.** As companies become larger and more sophisticated, they develop sufficient resources to quickly duplicate the successful systems of their competitors. For example, Alamo Rent-a-Car now offers a frequent-renter card similar to the one offered by National car rental.

Sustaining strategic systems is becoming more difficult and is related to the issue of being a risk-taking leader versus a follower in developing innovative systems.



4. **Ethical issues.** Gaining competitive advantage through the use of IT may involve actions that are unethical, illegal, or both. Companies use IT to monitor the activities of other companies, which may invade the privacy of individuals working there. In using business intelligence (e.g., spying on competitors), companies may engage in tactics such as pressuring competitors' employees to reveal information or using software that is the intellectual property of other companies without the knowledge of these other companies. Companies may post questions and place remarks about their competitors with Internet newsgroups. Many such actions are technically not illegal, due to the fact that the Internet is new and its legal environment is not well developed as yet, but many people would certainly find them unethical.



ON THE WEB SITE... Additional resources, including an interactive running case; quizzes; SIS frameworks; cases, tables, and figures; updates; additional exercises; links; and demos and activities can be found on the book's Web site.

KEY TERMS

Alliance strategy (p. ●●●)	Growth strategy (p. ●●●)	Strategic information system (SIS) (p. ●●●)
Competitive advantage (p. ●●●)	Increase switching costs strategy (p. ●●●)	Strategic management (p. ●●●)
Competitive forces model (p. ●●●)	Innovation strategy (p. ●●●)	Support activities (p. ●●●)
Competitive intelligence (p. ●●●)	Lock in customers or suppliers strategy (p. ●●●)	Sustainable strategic advantage (p. ●●●)
Cost leadership strategy (p. ●●●)	Niche strategy (p. ●●●)	Time strategy (p. ●●●)
Customer-orientation strategy (p. ●●●)	Operational effectiveness strategy (p. ●●●)	Value chain model (p. ●●●)
Differentiation strategy (p. ●●●)	Primary activities (p. ●●●)	Value system (p. ●●●)
Entry-barriers strategy (p. ●●●)		
Global business drivers (p. ●●●)		

CHAPTER HIGHLIGHTS (Numbers Refer to Learning Objectives)

- 1 Strategic information systems (SISs) support or shape competitive strategies.
- 1 SIS can be outward (customer) oriented or inward (organization) oriented.
- 1 Information technology can be used to support a variety of strategic objectives, including creation of innovative applications, changes in business processes, links with business partners, reduction of costs, acquiring competitive intelligence, and others.
- 2 The Internet has changed the nature of competition, altering the traditional relationships between customers, suppliers, and firms within an industry.
- 3 Cost leadership, differentiation, and niche were Porter's first strategies for gaining a competitive advantage, but today many other strategies exist. All of the competitive strategies can be supported by IT.
- 4 Porter's value chain model can be used to identify areas in which IT can provide strategic advantage.
- 5 Interorganizational information systems offer businesses opportunities to work together in partnerships to achieve strategic objectives.
- 6 Multinational corporations and international traders need a special IT approach to support their business strategies.

- 6 Strategic information systems can be found in all types of organizations around the globe.
- 7 Some SISs are expensive and difficult to justify, and others turn out to be unsuccessful. Therefore, careful planning and implementation are essential.
- 8 Acquiring competitive advantage is hard, and sustaining it can be just as difficult because of the innovative nature of technology advances.

QUESTIONS FOR REVIEW

1. What is an SIS?
2. What is a competitive strategy and how is it related to competitive advantage?
3. What has been the impact of the digital economy on competition?
4. List eight ways IT can support the objectives of strategic management.
5. List the five forces in Porter's competitive forces model.
6. What has been the impact of the Internet on Porter's competitive forces model?
7. List 12 strategies for competitive advantage.
8. List the primary and support activities of Porter's value chain model.
9. What are the potential uses of Porter's value chain model in analyzing competitive advantage?
10. What are vertical consortia? What are horizontal consortia?
11. Compare the value chain to the value system.
12. Describe the global business drivers model.
13. Describe two approaches for identifying appropriate SISs for implementation.
14. List two reasons why it is difficult for businesses to sustain a competitive advantage.

QUESTIONS FOR DISCUSSION

1. A major objective of the Rosenbluth strategy was to create a very close relationship with the customer. Relate this objective to Porter's two models.
2. What is the importance of competitive intelligence in SIS? What role does the Internet play in intelligence gathering?
3. Discuss the relationship between the critical organizational responses of Chapter 1 and a *differentiation* strategy.
4. Give two examples that show how IT can help a defending company *reduce* the impact of the five forces in Porter's model.
5. Give two examples of how attacking companies can use IT to *increase* the impact of the five forces in Porter's model.
6. Why might it be difficult to justify an SIS?
7. Explain what unique aspects are provided by the global business drivers model.
8. Discuss the idea that an information system by itself can rarely provide a sustainable competitive advantage.

EXERCISES

1. Review the applications in Section 3.6 and relate them to Porter's five forces.
2. One area of intensive competition is selling cars online (see Slater, 1999). Examine the strategy of the players cited in the paper (available at *cio.com*). Identify the related new business models and relate them to the strategies promoted in this chapter.
3. Study the Web sites of Amazon.com and Barnes & Noble online (*bn.com*). Also, find some information about the competition between the two. Analyze Barnes & Noble's defense strategy using Porter's model. Prepare a report.
4. Identify the major competitors of Rosenbluth International. Visit three other travel agent Web sites, and compare their strategies and offerings to those of Rosenbluth.

GROUP ASSIGNMENTS

1. Assign group members to each of the major car rental companies. Find out their latest strategies regarding customer service. Visit their Web sites, and compare the findings. Have each group prepare a presentation on why its company should get the title of “best customer service provider.” Also, each group should use Porter’s forces model to convince the class that its company is the best competitor in the car rental industry.
2. The competition in retailing online is growing rapidly as evidenced in goods such as books, toys, and CDs. Assign groups to study online competition in the above industries and more. Identify successes and failures. Compare the various industries. What generalizations can you make?
3. Assign group members to each of the major airlines. Read Callon’s (1996) chapter on competition in the airline industry. Visit the Web sites of the major airlines. Explain how they deal with “buyers.” What information technologies are used in the airlines’ strategy implementation? Have each group make a presentation explaining why its airline has the best strategy.
4. Assign each group member to a company to which he or she has access, and have each member prepare a value-chain chart. The objective is to discover how specific IT applications are used to facilitate the various activities. Compare these charts across companies in different industries.
5. Assign members to UPS, FedEx, DHL, and the U.S. Postal Service. Have each group study the e-commerce strategies of one company. Then have members present the company, explaining why it is the best.



Minicase 1 Net Readiness at Cisco Systems

Cisco Systems (*cisco.com*) richly deserves its self-designated title of “the worldwide leader in networking for the Internet.” Virtually all of the data packets that swirl through the Internet pass through a Cisco-manufactured router on their way to their destination. However, Cisco doesn’t see itself as a computer hardware company. Instead, Cisco considers its main product to be networking solutions. Through initiatives such as its Internet Business Solutions Group, Cisco provides businesses with the software, support, service, training, and, yes, hardware, they need to create an information infrastructure to become e-businesses. In 2003, Cisco sells its products in over 100 countries and employs 34,500 employees. In fiscal year 2002, Cisco Systems had almost \$19 billion of revenue and ranked 95 on the Fortune 500.

How does Cisco fulfill its vision to be a complete network solution provider? Three key strategic information systems that embody many of the principles discussed in this chapter enable Cisco to reach up and down its value system. Cisco has built a network linking its customers, prospects, business partners, suppliers, and employees in a seamless value chain (Hartman and Sifonis, 2000, p. 239). The SISs that support that seamless value chain include the three described below.

Cisco Connection Online (CCO) is its customer-facing SIS. The Cisco Web site (*cisco.com*) is the gateway for customers to price and configure orders, place orders, and check order status. CCO also offers customers the opportunity to help

themselves to the information they need to do business with Cisco. And they do access it: CCO is accessed over 1.5 million times each month by its 150,000 active registered users. Customers use CCO to get answers to questions, diagnose network problems, and collaborate with other customers and Cisco staff. Currently Cisco is working with its major customers to integrate their enterprise applications directly into Cisco’s back-end systems. The goals of this project are to provide better and speedier customer service, lock in customers, and generate operating expense savings of \$350 million per year.

Manufacturing Connection Online (MCO) is an extranet application that links Cisco’s partners up and down its supply chain. Its purpose is to provide real-time manufacturing information to Cisco’s suppliers and employees in support of the manufacturing, supply, and logistics functions. MCO delivers forecast data, real-time inventory data, purchase orders, and related information through a secure connection and a graphical user interface. One of the most successful aspects of MCO is direct fulfillment. The old process had all products coming to Cisco for storage and then shipment to the customer. MCO’s connections to Cisco’s suppliers allows Cisco to forward a customer’s order to a third-party supplier, who ships it directly to the customer. By pushing information down the supply chain instead of product up the supply chain, Cisco is able to reduce shipping time, save money, and make customers happy.

INTERNET EXERCISES

1. McKesson Drugs is the largest wholesale drug distributor in the world. Visit the company Web site (*mckesson.com*). What can you learn about its strategy toward retailers? What is its strategy toward its customers? What e-commerce initiatives are evidenced?
2. Enter the Web site of Dell Computer (*dell.com*) and document the various services available to customers. Then enter IBM's site (*ibm.com*). Compare the services provided to PC buyers at each company. Discuss the differences.
3. Research the online toys competition. Visit the sites of *toysrus.com*, *lego.com*, *KBKids.com*, and also check toy sales online by *sears.com*, *amazon.com*, and *walmart.com*. Finally, examine *dogtoys.com*. Prepare a report with your findings.
4. Enter some EDGAR-related Web sites (*edgar-online.com*, *hottools.com*, *edgar.stern.nyu.edu*). Prepare a list of the documents that are available, and discuss the benefits one can derive in using this database for conducting a competitive intelligence (see Kambil and Ginsburg, 1998).



Cisco Employee Connection (CEC) is Cisco's inward-looking SIS, an intranet that addresses the unique needs of every Cisco employee. CEC offers ubiquitous communications (e.g., distribution of marketing materials, major corporate announcements), streamlined business processes (e.g., travel expense reimbursement), and integrated business systems (e.g., scheduling meetings, a problem-reporting system).

One application that illustrates CEC's benefits to both Cisco and its employees is Metro, a travel-expense reporting system. Assume an employee uses a corporate credit card to charge an expense. Metro displays all expenses on a current credit card statement, and the employee can then move all relevant charges to an expense report. In pre-Metro days, a travel reimbursement took four to five weeks; Metro reimburses the employee in two to three days.

Cisco has benefited richly from these strategic information systems. For example:

- Eighty percent of technical support requests are filled electronically, reducing help desk labor costs and almost always with a customer satisfaction rate that exceeds that of human intervention.
- Providing technical support to customers over the Internet has enabled Cisco to save more than \$200 million annually, more money than what some of its competitors spend on research and development.
- CCO metrics show 98 percent accurate, on-time repair shipments, and customer satisfaction increased by 25 percent between 1995 and 2000.
- By outsourcing 70 percent of its production means, Cisco has quadrupled output without the time and investment required to build new plants.

- MCO has allowed Cisco to lower business costs in processing orders (from \$125 per order to less than \$5), improved employee productivity, and reduced order cycle times.
- Metro not only reimburses employees faster, it increases employee productivity and saves Cisco auditing costs. Today Cisco employs only two auditors to audit expenses for 15,000 Metro users per month.
- Cisco estimates total annual savings from CEC at \$58 million, including \$25 million in employee training savings and \$16 million in employee communication.

A recent Cisco advertising campaign featured children and adults from all over the world asking the viewer, "Are you ready?" for the Internet. Cisco not only promotes Net readiness through its advertising, but also lives Net readiness by applying network connectivity throughout the company to maintain its competitiveness in network technology.

Questions for Minicase 1

1. How does each of Porter's five forces apply to Cisco?
2. The case emphasizes benefits to Cisco. How do suppliers benefit? How do customers benefit?
3. Are the initiatives in place at Cisco available only to such a high-tech company? Specifically, what difficulties would a more traditional company face in becoming Net ready?
4. How can Cisco use the knowledge it has acquired from internal implementation of these systems to fulfill its goal to be a network solution provider to its customers?

Sources: Hartman and Sifonis (2000); *newsroom.cisco.com*.



Minicase 2

Aeronautica Civil: Achieving Competitive Advantage in a Noncompetitive Industry

As noted in the chapter, competitiveness in government agencies can sometimes be expressed as “competing against yourself.” Essentially, an organization sets goals that are significantly higher than current performance and puts processes and systems in place to meet those goals, thus effectively competing against its former performance.

Aeronautica Civil (aerocivil.gov.co) is Colombia’s air-control agency. A division of the Colombian Ministry of Transportation, Aeronautica Civil is responsible for overseeing and developing Colombia’s air transportation system, including 73 airports and 3,000 officers. The agency is responsible for efficiently managing the movement of more than 10 million passengers and 957,000 aircraft take-offs and landings each year.

In its review of computer systems for the Y2K problem, Aeronautica Civil became aware of significant deficiencies in the control of its financial operations. Billing was consistently in a three-month backlog, processing a customer statement took three days, bank accounts were being reconciled manually, and closing the monthly balance sheet was taking three months. Something needed to change, and the business drivers behind that change were:

- Increase the company’s revenues and improve accounts receivable turnover.
- Prevent economic losses from bad debts plus generate and control revenue from other sources.
- Minimize resources wasted in responding to claims.
- Allow for procurement controls and control of fixed assets.

After a three-month evaluation process of ERP vendors, Aeronautica Civil selected consultant J.D. Edwards to develop and implement a system that could address the problems in the agency’s financial operations and improve its performance. The system was successfully implemented in only nine months. Key factors in that implementation success were the full commitment of Aeronautica Civil’s executives toward the initiative and an implementation team that included some of the best professionals in each of the agency’s financial and administrative areas.

Success was defined as meeting many of the goals defined for the project. In comparison, and in competition, with its former self, now billing is up-to-date, customer

statements are processed in two minutes, bank accounts are reconciled automatically every day, and the balance sheet is closed by the twentieth of the following month. More generally, these are the results: Management of accounts receivable and collections has been significantly improved. Managers have access to timely and reliable information for decision making. Decision-making and immediate response capabilities are more efficient, a critical factor in an air transport agency. Costs and execution times have been reduced. And operations and corruption control have been automated.

Today the new, more competitive Aeronautica Civil projects “an image of continuous modernization, better service, efficiency, control, and transparency among its customers and other governmental entities. Aeronautica Civil has become a model government-owned company, and a prototype of systematization for aeronautics companies in other countries” (J.D. Edwards, 2002c, p. 2). Aeronautica Civil is one of many examples of not-for-profit or government agencies who have implemented a strategic information system to become more competitive in an industry in which the normal rules of competition do not apply.

Questions for Minicase 2

1. Who is Aeronautica Civil competing against? What other approaches to measuring competitiveness can not-for-profit and government agencies use in measuring competitiveness?
2. Can profit-making organizations use the approach adopted by Aeronautica Civil? Why or why not?
3. What were some of the keys to success for Aeronautica Civil?
4. How did Aeronautica Civil measure competitive success? Specifically, compare “before” and “after” on the performance measures identified in this case.
5. Use the Internet to find another, similar organization that is competing against itself to achieve competitive advantage.

Source: J.D. Edwards (2002c).

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