

Chapter 3

Information Systems, Organizations, and Strategy

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. Which features of organizations do managers need to know about to build and use information systems successfully? What is the impact of information systems on organizations?
2. How does Porter's competitive forces model help companies develop competitive strategies using information systems?
3. How do the value chain and value web models help businesses identify opportunities for strategic information system applications?
4. How do information systems help businesses use synergies, core competencies, and network-based strategies to achieve competitive advantage?
5. What are the challenges posed by strategic information systems and how should they be addressed?

Interactive Sessions:

How Much Do Credit Card Companies Know About You?

Is the iPad a Disruptive Technology?

CHAPTER OUTLINE

3.1 ORGANIZATIONS AND INFORMATION SYSTEMS

What Is an Organization?
Features of Organizations

3.2 HOW INFORMATION SYSTEMS IMPACT ORGANIZATIONS AND BUSINESS FIRMS

Economic Impacts
Organizational and Behavioral Impacts
The Internet and Organizations
Implications for the Design and Understanding of Information Systems

3.3 USING INFORMATION SYSTEMS TO ACHIEVE COMPETITIVE ADVANTAGE

Porter's Competitive Forces Model
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The Business Value Chain Model
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3.4 USING SYSTEMS FOR COMPETITIVE ADVANTAGE: MANAGEMENT ISSUES

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3.5 HANDS-ON MIS PROJECTS

Management Decision Problems
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Improving Decision Making: Using Web Tools to Configure and Price an Automobile

LEARNING TRACK MODULE

The Changing Business Environment for Information Technology

VERIZON OR AT&T—WHICH COMPANY HAS THE BEST DIGITAL STRATEGY?

Verizon and AT&T are the two largest telecommunications companies in the United States. In addition to voice communication, their customers use their networks to surf the Internet; send e-mail, text, and video messages; share photos; watch videos and high-definition TV; and conduct videoconferences around the globe. All of these products and services are digital.

Competition in this industry is exceptionally intense and fast-changing. Both companies are trying to outflank one another by refining their wireless, landline, and high-speed Internet networks and expanding the range of products, applications, and services available to customers. Wireless services are the most profitable. AT&T is staking its growth on the wireless market by aggressively marketing leading-edge high-end devices such as the iPhone. Verizon has bet on the reliability, power, and range of its wireless and landline networks and its renowned customer service.

For a number of years, Verizon has tried to blunt competition by making heavy technology investments in both its landline and wireless networks. Its wireless network is considered the most far-reaching and reliable in the United States. Verizon is now pouring billions of dollars into a rollout of fourth-generation (4G) cellular technology capable of supporting highly data-intensive applications such as downloading large streams of video and music through smart phones and other network appliances. Returns from Verizon's 4G investment are still uncertain.

Verizon's moves appear more risky financially than AT&T's, because its up-front costs are so high. AT&T's strategy is more conservative. Why not partner with other companies to capitalize on their technology innovations? That was the rationale for AT&T contracting with Apple Computer to be the exclusive network for its iPhone. Even though AT&T subsidizes some of the iPhone's cost to consumers, the iPhone's streamlined design, touch screen, exclusive access to the iTunes music service, and over 250,000 downloadable applications have made it an instant hit. AT&T has also sought to provide cellular services for other network appliances such as Amazon's Kindle e-book reader and netbooks.

The iPhone has been AT&T's primary growth engine, and the Apple relationship made the carrier the U.S. leader in the smartphone carrier marketplace. AT&T has over 43 percent of U.S. smartphone customers, compared with 23 percent for Verizon. Smart-phone customers are highly desirable because they typically pay higher monthly rates for wireless data service plans.

The iPhone became so wildly popular that users overstrained AT&T's networks, leaving many in dense urban areas such as New York and San Francisco with sluggish service or dropped calls. To handle the surging demand, AT&T could upgrade its wireless network, but that would cripple profits. Experts contend that AT&T would have to spend \$5 billion to \$7 billion to bring its network up to



Verizon's quality. To curb excessive use, AT&T moved to a tiered pricing model for new iPhone users, with data charges based on how much data customers actually use.

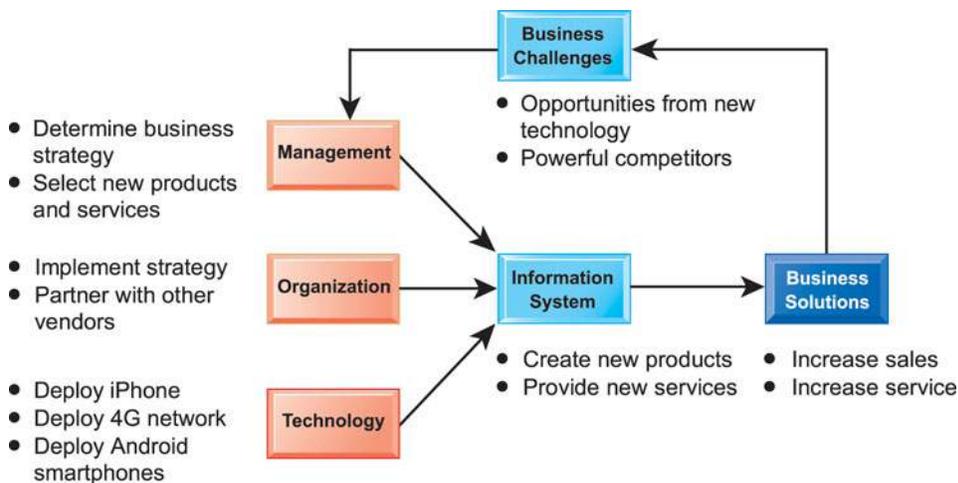
Adding to AT&T's woes, its monopoly on the iPhone may be ending. Apple reached an agreement with Verizon in 2010 to make an iPhone that is compatible with Verizon's network. Allowing Verizon to offer iPhone service will more than double Apple's market for this device, but will undoubtedly drive some AT&T iPhone customers to Verizon in the hope of finding better network service. Verizon is further hedging its bets by offering leading-edge smartphones based on Google's Android operating system that compete well against the iPhone. With or without the iPhone, if Verizon's Android phone sales continue to accelerate, the competitive balance will shift again.

Sources: Roger Cheng, "For Telecom Firms, Smartphones Rule," *The Wall Street Journal*, July 19, 2010; Brad Stone and Jenna Wortham, "Even Without iPhone, Verizon Is Gaining," *The New York Times*, July 15, 2010; Roben Farzad, "AT&T's iPhone Mess," *Bloomberg Businessweek*, April 25, 2010; Niraj Sheth, "AT&T Prepares Network for Battle," *The Wall Street Journal*, March 31, 2010; and Amol Sharma, "AT&T, Verizon Make Different Calls," *The Wall Street Journal*, January 28, 2009.

The story of Verizon and AT&T illustrates some of the ways that information systems help businesses compete—and also the challenges of sustaining a competitive advantage. The telecommunications industry in which both companies operate is extremely crowded and competitive, with telecommunications companies vying with cable companies, new upstarts, and each other to provide a wide array of digital services as well as voice transmission. To meet the challenges of surviving and prospering in this environment, each of these companies focused on a different competitive strategy using information technology.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. Both companies identified opportunities to use information technology to offer new products and services. AT&T offered enhanced wireless services for the iPhone, while Verizon initially focused on high-capacity, high-quality network services. AT&T's strategy emphasized keeping costs low while capitalizing on innovations from other technology vendors. Verizon's strategy involved high up-front costs to build a high-capacity network infrastructure, and it also focused on providing a high level of network reliability and customer service.

This case study clearly shows how difficult it is to sustain a competitive advantage. Exclusive rights to use the highly popular iPhone on its network brought AT&T millions of new customers and enhanced its competitive position. But its competitive advantage is likely to erode if it is forced to invest heavily to upgrade its networks, if Apple allows Verizon to offer a version of the iPhone, or if Verizon smartphones are competitive with the iPhone. Changes in service pricing plans may also affect the competitive balance among the various wireless carriers.

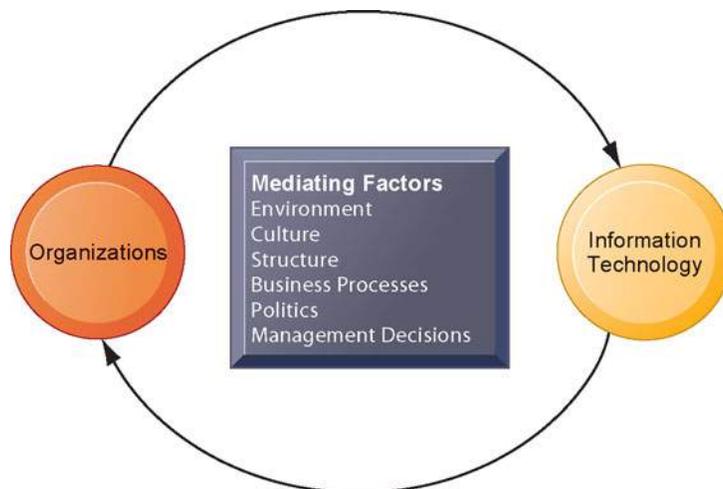


3.1 ORGANIZATIONS AND INFORMATION SYSTEMS

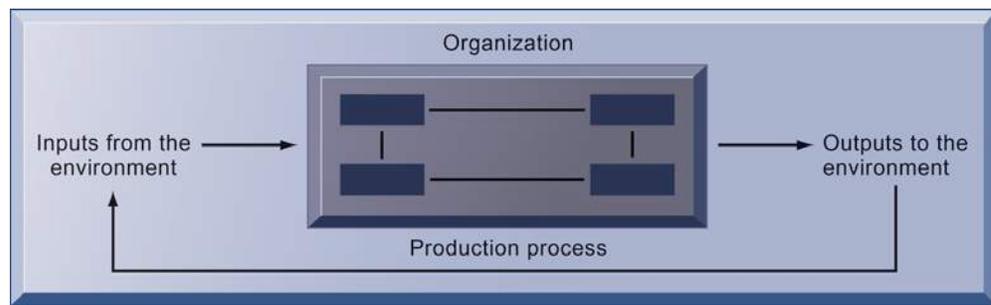
Information systems and organizations influence one another. Information systems are built by managers to serve the interests of the business firm. At the same time, the organization must be aware of and open to the influences of information systems to benefit from new technologies.

The interaction between information technology and organizations is complex and is influenced by many mediating factors, including the organization’s structure, business processes, politics, culture, surrounding environment, and management decisions (see Figure 3-1). You will need to understand how information systems can change social and work life in your firm. You will not be able to design new systems successfully or understand existing systems without understanding your own business organization.

FIGURE 3-1 THE TWO-WAY RELATIONSHIP BETWEEN ORGANIZATIONS AND INFORMATION TECHNOLOGY



This complex two-way relationship is mediated by many factors, not the least of which are the decisions made—or not made—by managers. Other factors mediating the relationship include the organizational culture, structure, politics, business processes, and environment.

FIGURE 3-2 THE TECHNICAL MICROECONOMIC DEFINITION OF THE ORGANIZATION

In the microeconomic definition of organizations, capital and labor (the primary production factors provided by the environment) are transformed by the firm through the production process into products and services (outputs to the environment). The products and services are consumed by the environment, which supplies additional capital and labor as inputs in the feedback loop.

As a manager, you will be the one to decide which systems will be built, what they will do, and how they will be implemented. You may not be able to anticipate all of the consequences of these decisions. Some of the changes that occur in business firms because of new information technology (IT) investments cannot be foreseen and have results that may or may not meet your expectations. Who would have imagined fifteen years ago, for instance, that e-mail and instant messaging would become a dominant form of business communication and that many managers would be inundated with more than 200 e-mail messages each day?

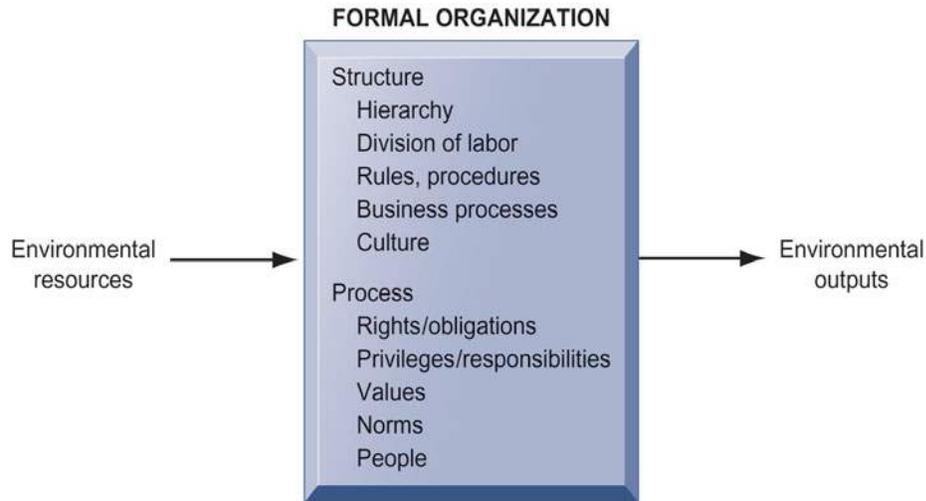
WHAT IS AN ORGANIZATION?

An **organization** is a stable, formal social structure that takes resources from the environment and processes them to produce outputs. This technical definition focuses on three elements of an organization. Capital and labor are primary production factors provided by the environment. The organization (the firm) transforms these inputs into products and services in a production function. The products and services are consumed by environments in return for supply inputs (see Figure 3-2).

An organization is more stable than an informal group (such as a group of friends that meets every Friday for lunch) in terms of longevity and routineness. Organizations are formal legal entities with internal rules and procedures that must abide by laws. Organizations are also social structures because they are a collection of social elements, much as a machine has a structure—a particular arrangement of valves, cams, shafts, and other parts.

This definition of organizations is powerful and simple, but it is not very descriptive or even predictive of real-world organizations. A more realistic behavioral definition of an organization is that it is a collection of rights, privileges, obligations, and responsibilities that is delicately balanced over a period of time through conflict and conflict resolution (see Figure 3-3).

In this behavioral view of the firm, people who work in organizations develop customary ways of working; they gain attachments to existing relationships; and they make arrangements with subordinates and superiors about how work will be done, the amount of work that will be done, and under

FIGURE 3-3 THE BEHAVIORAL VIEW OF ORGANIZATIONS

The behavioral view of organizations emphasizes group relationships, values, and structures.

what conditions work will be done. Most of these arrangements and feelings are not discussed in any formal rulebook.

How do these definitions of organizations relate to information systems technology? A technical view of organizations encourages us to focus on how inputs are combined to create outputs when technology changes are introduced into the company. The firm is seen as infinitely malleable, with capital and labor substituting for each other quite easily. But the more realistic behavioral definition of an organization suggests that building new information systems, or rebuilding old ones, involves much more than a technical rearrangement of machines or workers—that some information systems change the organizational balance of rights, privileges, obligations, responsibilities, and feelings that have been established over a long period of time.

Changing these elements can take a long time, be very disruptive, and requires more resources to support training and learning. For instance, the length of time required to implement effectively a new information system is much longer than usually anticipated simply because there is a lag between implementing a technical system and teaching employees and managers how to use the system.

Technological change requires changes in who owns and controls information, who has the right to access and update that information, and who makes decisions about whom, when, and how. This more complex view forces us to look at the way work is designed and the procedures used to achieve outputs.

The technical and behavioral definitions of organizations are not contradictory. Indeed, they complement each other: The technical definition tells us how thousands of firms in competitive markets combine capital, labor, and information technology, whereas the behavioral model takes us inside the individual firm to see how that technology affects the organization's inner workings. Section 3.2 describes how each of these definitions of organizations can help explain the relationships between information systems and organizations.

FEATURES OF ORGANIZATIONS

All modern organizations have certain characteristics. They are bureaucracies with clear-cut divisions of labor and specialization. Organizations arrange specialists in a hierarchy of authority in which everyone is accountable to someone and authority is limited to specific actions governed by abstract rules or procedures. These rules create a system of impartial and universal decision making. Organizations try to hire and promote employees on the basis of technical qualifications and professionalism (not personal connections). The organization is devoted to the principle of efficiency: maximizing output using limited inputs. Other features of organizations include their business processes, organizational culture, organizational politics, surrounding environments, structure, goals, constituencies, and leadership styles. All of these features affect the kinds of information systems used by organizations.

Routines and Business Processes

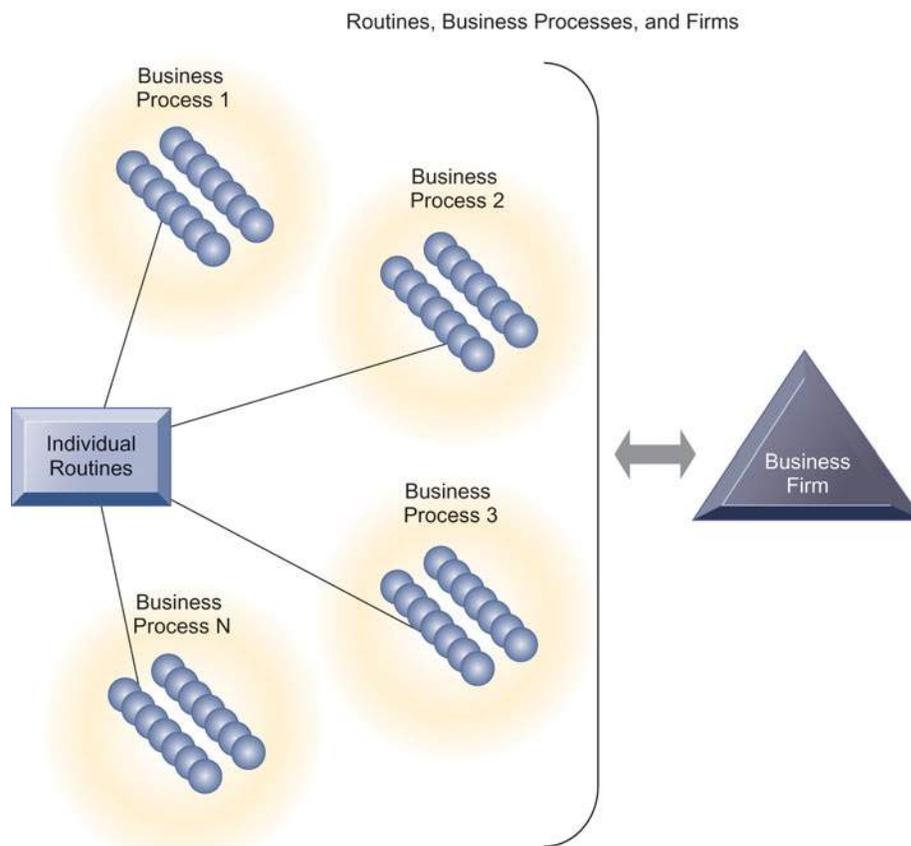
All organizations, including business firms, become very efficient over time because individuals in the firm develop **routines** for producing goods and services. Routines—sometimes called *standard operating procedures*—are precise rules, procedures, and practices that have been developed to cope with virtually all expected situations. As employees learn these routines, they become highly productive and efficient, and the firm is able to reduce its costs over time as efficiency increases. For instance, when you visit a doctor's office, receptionists have a well-developed set of routines for gathering basic information from you; nurses have a different set of routines for preparing you for an interview with a doctor; and the doctor has a well-developed set of routines for diagnosing you. *Business processes*, which we introduced in Chapters 1 and 2, are collections of such routines. A business firm in turn is a collection of business processes (Figure 3-4).

Organizational Politics

People in organizations occupy different positions with different specialties, concerns, and perspectives. As a result, they naturally have divergent viewpoints about how resources, rewards, and punishments should be distributed. These differences matter to both managers and employees, and they result in political struggle for resources, competition, and conflict within every organization. Political resistance is one of the great difficulties of bringing about organizational change—especially the development of new information systems. Virtually all large information systems investments by a firm that bring about significant changes in strategy, business objectives, business processes, and procedures become politically charged events. Managers that know how to work with the politics of an organization will be more successful than less-skilled managers in implementing new information systems. Throughout this book, you will find many examples of where internal politics defeated the best-laid plans for an information system.

Organizational Culture

All organizations have bedrock, unassailable, unquestioned (by the members) assumptions that define their goals and products. Organizational culture encompasses this set of assumptions about what products the organization should produce, how it should produce them, where, and for whom. Generally, these cultural assumptions are taken totally for granted

FIGURE 3-4 ROUTINES, BUSINESS PROCESSES, AND FIRMS

All organizations are composed of individual routines and behaviors, a collection of which make up a business process. A collection of business processes make up the business firm. New information system applications require that individual routines and business processes change to achieve high levels of organizational performance.

and are rarely publicly announced or spoken about. Business processes—the actual way business firms produce value—are usually ensconced in the organization's culture.

You can see organizational culture at work by looking around your university or college. Some bedrock assumptions of university life are that professors know more than students, the reason students attend college is to learn, and classes follow a regular schedule. Organizational culture is a powerful unifying force that restrains political conflict and promotes common understanding, agreement on procedures, and common practices. If we all share the same basic cultural assumptions, agreement on other matters is more likely.

At the same time, organizational culture is a powerful restraint on change, especially technological change. Most organizations will do almost anything to avoid making changes in basic assumptions. Any technological change that threatens commonly held cultural assumptions usually meets a great deal of resistance. However, there are times when the only sensible way for a firm to move forward is to employ a new technology that directly opposes an existing organizational culture. When this occurs, the technology is often stalled while the culture slowly adjusts.

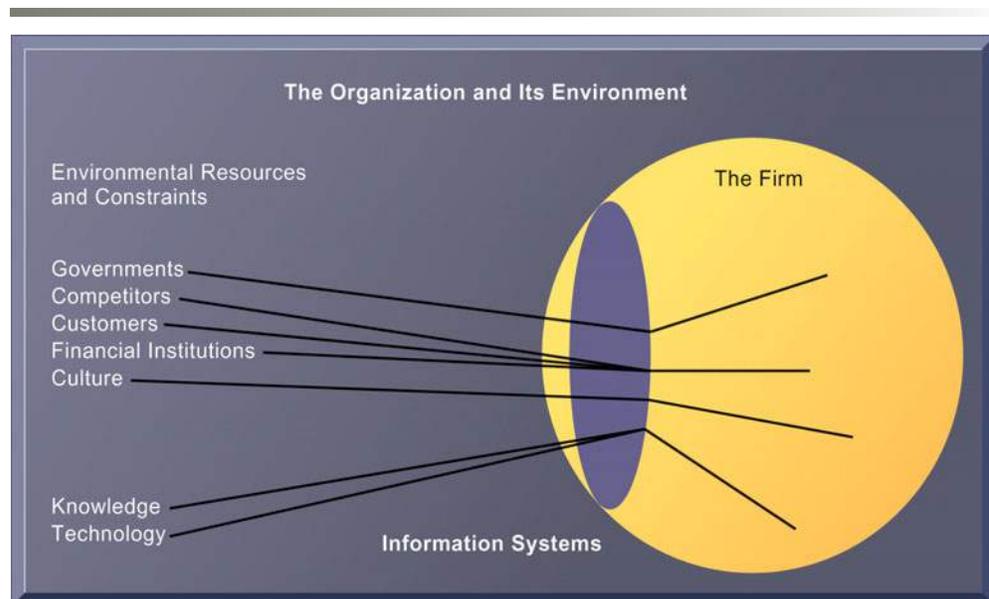
Organizational Environments

Organizations reside in environments from which they draw resources and to which they supply goods and services. Organizations and environments have a reciprocal relationship. On the one hand, organizations are open to, and dependent on, the social and physical environment that surrounds them. Without financial and human resources—people willing to work reliably and consistently for a set wage or revenue from customers—organizations could not exist. Organizations must respond to legislative and other requirements imposed by government, as well as the actions of customers and competitors. On the other hand, organizations can influence their environments. For example, business firms form alliances with other businesses to influence the political process; they advertise to influence customer acceptance of their products.

Figure 3-5 illustrates the role of information systems in helping organizations perceive changes in their environments and also in helping organizations act on their environments. Information systems are key instruments for *environmental scanning*, helping managers identify external changes that might require an organizational response.

Environments generally change much faster than organizations. New technologies, new products, and changing public tastes and values (many of which result in new government regulations) put strains on any organization's culture, politics, and people. Most organizations are unable to adapt to a rapidly changing environment. Inertia built into an organization's standard operating procedures, the political conflict raised by changes to the existing order, and the threat to closely held cultural values inhibit organizations from making significant changes. Young firms typically lack resources to sustain even short periods of troubled times. It is not surprising that only 10 percent of the Fortune 500 companies in 1919 still exist today.

FIGURE 3-5 ENVIRONMENTS AND ORGANIZATIONS HAVE A RECIPROCAL RELATIONSHIP



Environments shape what organizations can do, but organizations can influence their environments and decide to change environments altogether. Information technology plays a critical role in helping organizations perceive environmental change and in helping organizations act on their environment.

Disruptive Technologies: Riding the Wave. Sometimes a technology and resulting business innovation comes along to radically change the business landscape and environment. These innovations are loosely called “disruptive.” (Christensen, 2003). What makes a technology disruptive? In some cases, **disruptive technologies** are substitute products that perform as well or better (often much better) than anything currently produced. The car substituted for the horse-drawn carriage; the word processor for typewriters; the Apple iPod for portable CD players; digital photography for process film photography.

In these cases, entire industries are put out of business. In other cases, disruptive technologies simply extend the market, usually with less functionality and much less cost, than existing products. Eventually they turn into low-cost competitors for whatever was sold before. Disk drives are an example: small hard disk drives used in PCs extended the market for disk drives by offering cheap digital storage for small files. Eventually, small PC hard disk drives became the largest segment of the disk drive marketplace.

Some firms are able to create these technologies and ride the wave to profits; others learn quickly and adapt their business; still others are obliterated because their products, services, and business models become obsolete. They may be very efficient at doing what no longer needs to be done! There are also cases where no firms benefit, and all the gains go to consumers (firms fail to capture any profits). Table 3-1 describes just a few disruptive technologies from the past.

Disruptive technologies are tricky. Firms that invent disruptive technologies as “first movers” do not always benefit if they lack the resources to exploit the

TABLE 3-1 DISRUPTIVE TECHNOLOGIES: WINNERS AND LOSERS

| TECHNOLOGY | DESCRIPTION | WINNERS AND LOSERS |
|------------------------------------|---|--|
| Microprocessor chips (1971) | Thousands and eventually millions of transistors on a silicon chip | Microprocessor firms win (Intel, Texas Instruments) while transistor firms (GE) decline. |
| Personal computers (1975) | Small, inexpensive, but fully functional desktop computers | PC manufacturers (HP, Apple, IBM), and chip manufacturers prosper (Intel), while mainframe (IBM) and minicomputer (DEC) firms lose. |
| PC word processing software (1979) | Inexpensive, limited but functional text editing and formatting for personal computers | PC and software manufacturers (Microsoft, HP, Apple) prosper, while the typewriter industry disappears. |
| World Wide Web (1989) | A global database of digital files and “pages” instantly available | Owners of online content and news benefit, while traditional publishers (newspapers, magazines, broadcast television) lose. |
| Internet music services (1998) | Repositories of downloadable music on the Web with acceptable fidelity | Owners of online music collections (MP3.com, iTunes), telecommunications providers who own Internet backbone (AT&T, Verizon), local Internet service providers win, while record label firms and music retailers lose (Tower Records). |
| PageRank algorithm | A method for ranking Web pages in terms of their popularity to supplement Web search by key terms | Google is the winner (they own the patent), while traditional key word search engines (Alta Vista) lose. |
| Software as Web service | Using the Internet to provide remote access to online software | Online software services companies (Salesforce.com) win, while traditional “boxed” software companies (Microsoft, SAP, Oracle) lose. |

technology or fail to see the opportunity. The MITS Altair 8800 is widely regarded as the first PC, but its inventors did not take advantage of their first-mover status. Second movers, so-called “fast followers” such as IBM and Microsoft, reaped the rewards. Citibank’s ATMs revolutionized retail banking, but they were copied by other banks. Now all banks use ATMs, with the benefits going mostly to the consumers. Google was not a first mover in search, but an innovative follower that was able to maintain rights to a powerful new search algorithm called PageRank. So far it has been able to hold onto its lead while most other search engines have faded down to small market shares.

Organizational Structure

Organizations all have a structure or shape. Mintzberg’s classification, described in Table 3-2, identifies five basic kinds of organizational structure (Mintzberg, 1979).

The kind of information systems you find in a business firm—and the nature of problems with these systems—often reflects the type of organizational structure. For instance, in a professional bureaucracy such as a hospital it is not unusual to find parallel patient record systems operated by the administration, another by doctors, and another by other professional staff such as nurses and social workers. In small entrepreneurial firms you will often find poorly designed systems developed in a rush that often outgrow their usefulness quickly. In huge multidivisional firms operating in hundreds of locations you will often find there is not a single integrating information system, but instead each locale or each division has its set of information systems.

Other Organizational Features

Organizations have goals and use different means to achieve them. Some organizations have coercive goals (e.g., prisons); others have utilitarian goals (e.g., businesses). Still others have normative goals (universities, religious

TABLE 3-2 ORGANIZATIONAL STRUCTURES

| ORGANIZATIONAL TYPE | DESCRIPTION | EXAMPLES |
|----------------------------|---|--|
| Entrepreneurial structure | Young, small firm in a fast-changing environment. It has a simple structure and is managed by an entrepreneur serving as its single chief executive officer. | Small start-up business |
| Machine bureaucracy | Large bureaucracy existing in a slowly changing environment, producing standard products. It is dominated by a centralized management team and centralized decision making. | Midsized manufacturing firm |
| Divisionalized bureaucracy | Combination of multiple machine bureaucracies, each producing a different product or service, all topped by one central headquarters. | Fortune 500 firms, such as General Motors |
| Professional bureaucracy | Knowledge-based organization where goods and services depend on the expertise and knowledge of professionals. Dominated by department heads with weak centralized authority. | Law firms, school systems, hospitals |
| Adhocracy | Task force organization that must respond to rapidly changing environments. Consists of large groups of specialists organized into short-lived multidisciplinary teams and has weak central management. | Consulting firms, such as the Rand Corporation |

groups). Organizations also serve different groups or have different constituencies, some primarily benefiting their members, others benefiting clients, stockholders, or the public. The nature of leadership differs greatly from one organization to another—some organizations may be more democratic or authoritarian than others. Another way organizations differ is by the tasks they perform and the technology they use. Some organizations perform primarily routine tasks that can be reduced to formal rules that require little judgment (such as manufacturing auto parts), whereas others (such as consulting firms) work primarily with nonroutine tasks.

3.2 HOW INFORMATION SYSTEMS IMPACT ORGANIZATIONS AND BUSINESS FIRMS

Information systems have become integral, online, interactive tools deeply involved in the minute-to-minute operations and decision making of large organizations. Over the last decade, information systems have fundamentally altered the economics of organizations and greatly increased the possibilities for organizing work. Theories and concepts from economics and sociology help us understand the changes brought about by IT.

ECONOMIC IMPACTS

From the point of view of economics, IT changes both the relative costs of capital and the costs of information. Information systems technology can be viewed as a factor of production that can be substituted for traditional capital and labor. As the cost of information technology decreases, it is substituted for labor, which historically has been a rising cost. Hence, information technology should result in a decline in the number of middle managers and clerical workers as information technology substitutes for their labor (Laudon, 1990).

As the cost of information technology decreases, it also substitutes for other forms of capital such as buildings and machinery, which remain relatively expensive. Hence, over time we should expect managers to increase their investments in IT because of its declining cost relative to other capital investments.

IT also obviously affects the cost and quality of information and changes the economics of information. Information technology helps firms contract in size because it can reduce transaction costs—the costs incurred when a firm buys on the marketplace what it cannot make itself. According to **transaction cost theory**, firms and individuals seek to economize on transaction costs, much as they do on production costs. Using markets is expensive because of costs such as locating and communicating with distant suppliers, monitoring contract compliance, buying insurance, obtaining information on products, and so forth (Coase, 1937; Williamson, 1985). Traditionally, firms have tried to reduce transaction costs through vertical integration, by getting bigger, hiring more employees, and buying their own suppliers and distributors, as both General Motors and Ford used to do.

Information technology, especially the use of networks, can help firms lower the cost of market participation (transaction costs), making it worthwhile for firms to contract with external suppliers instead of using internal sources. As a result, firms can shrink in size (numbers of employees) because it is far less expensive to outsource work to a competitive marketplace rather than hire employees.

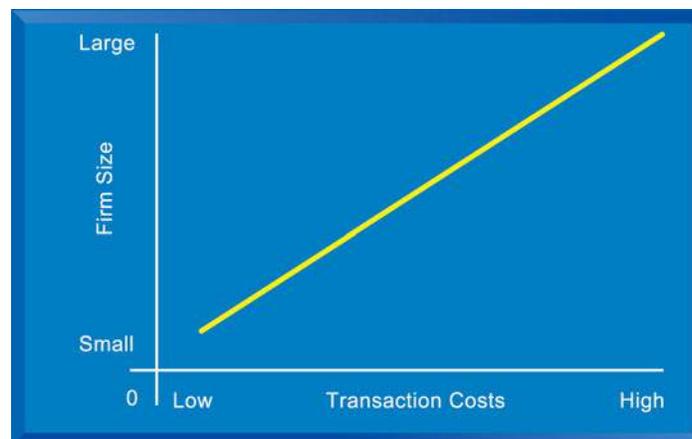
For instance, by using computer links to external suppliers, the Chrysler Corporation can achieve economies by obtaining more than 70 percent of its parts from the outside. Information systems make it possible for companies such as Cisco Systems and Dell Inc. to outsource their production to contract manufacturers such as Flextronics instead of making their products themselves.

Figure 3-6 shows that as transaction costs decrease, firm size (the number of employees) should shrink because it becomes easier and cheaper for the firm to contract for the purchase of goods and services in the marketplace rather than to make the product or offer the service itself. Firm size can stay constant or contract even as the company increases its revenues. For example, when Eastman Chemical Company split off from Kodak in 1994, it had \$3.3 billion in revenue and 24,000 full-time employees. In 2009, it generated over \$5 billion in revenue with only 10,000 employees.

Information technology also can reduce internal management costs. According to **agency theory**, the firm is viewed as a “nexus of contracts” among self-interested individuals rather than as a unified, profit-maximizing entity (Jensen and Meckling, 1976). A principal (owner) employs “agents” (employees) to perform work on his or her behalf. However, agents need constant supervision and management; otherwise, they will tend to pursue their own interests rather than those of the owners. As firms grow in size and scope, agency costs or coordination costs rise because owners must expend more and more effort supervising and managing employees.

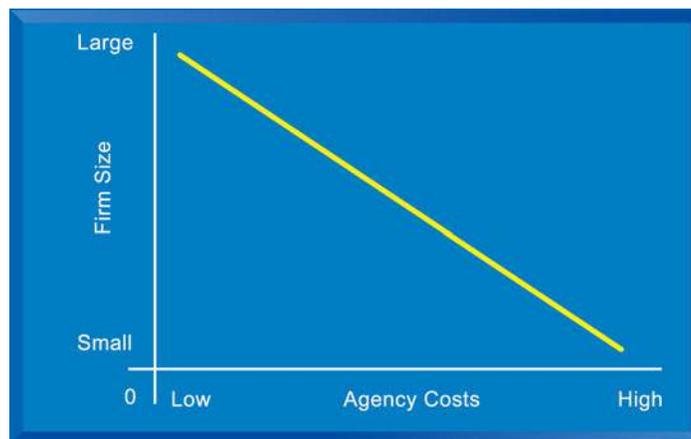
Information technology, by reducing the costs of acquiring and analyzing information, permits organizations to reduce agency costs because it becomes easier for managers to oversee a greater number of employees. Figure 3-7 shows that by reducing overall management costs, information technology enables firms to increase revenues while shrinking the number of middle managers and clerical workers. We have seen examples in earlier chapters where information technology expanded the power and scope of small organizations by enabling them to perform coordinating activities such as processing orders or keeping track of inventory with very few clerks and managers.

FIGURE 3-6 THE TRANSACTION COST THEORY OF THE IMPACT OF INFORMATION TECHNOLOGY ON THE ORGANIZATION



When the costs of participating in markets (transaction costs) were high, it made sense to build large firms and do everything inside the firm. But IT reduces the firm's market transaction costs. This means firms can outsource work using the market, reduce their employee head count, and still grow revenues, relying more on outsourcing firms and external contractors.

FIGURE 3-7 THE AGENCY COST THEORY OF THE IMPACT OF INFORMATION TECHNOLOGY ON THE ORGANIZATION



Agency costs are the costs of managing a firm's employees. IT reduces agency costs making management more efficient. Fewer managers are needed to manage employees. IT makes it possible to build very large global firms and to run them efficiently without greatly expanding management. Without IT, very large global firms would be difficult to operate because they would be very expensive to manage.

Because IT reduces both agency and transaction costs for firms, we should expect firm size to shrink over time as more capital is invested in IT. Firms should have fewer managers, and we expect to see revenue per employee increase over time.

ORGANIZATIONAL AND BEHAVIORAL IMPACTS

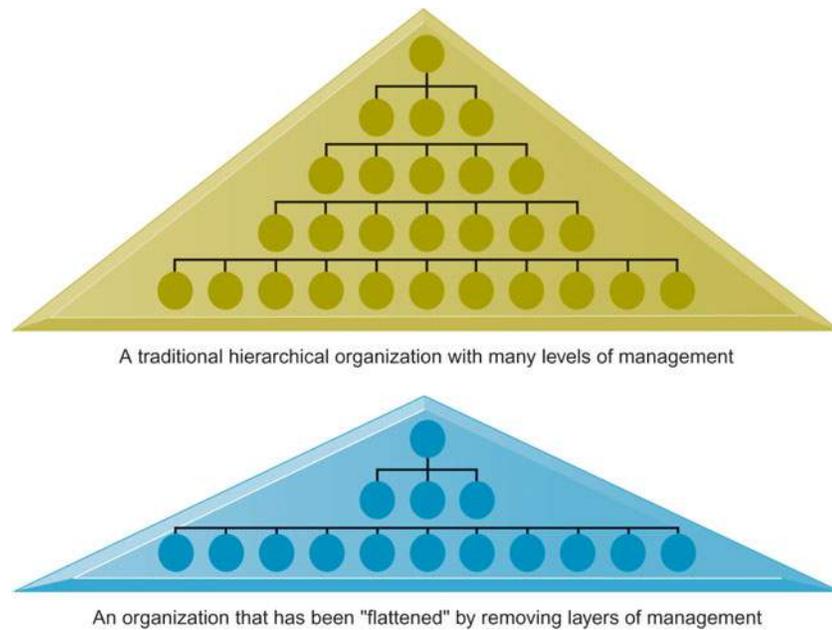
Theories based in the sociology of complex organizations also provide some understanding about how and why firms change with the implementation of new IT applications.

IT Flattens Organizations

Large, bureaucratic organizations, which primarily developed before the computer age, are often inefficient, slow to change, and less competitive than newly created organizations. Some of these large organizations have downsized, reducing the number of employees and the number of levels in their organizational hierarchies.

Behavioral researchers have theorized that information technology facilitates flattening of hierarchies by broadening the distribution of information to empower lower-level employees and increase management efficiency (see Figure 3-8). IT pushes decision-making rights lower in the organization because lower-level employees receive the information they need to make decisions without supervision. (This empowerment is also possible because of higher educational levels among the workforce, which give employees the capabilities to make intelligent decisions.) Because managers now receive so much more accurate information on time, they become much faster at making decisions, so fewer managers are required. Management costs decline as a percentage of revenues, and the hierarchy becomes much more efficient.

These changes mean that the management span of control has also been broadened, enabling high-level managers to manage and control more workers

FIGURE 3-8 FLATTENING ORGANIZATIONS

Information systems can reduce the number of levels in an organization by providing managers with information to supervise larger numbers of workers and by giving lower-level employees more decision-making authority.

spread over greater distances. Many companies have eliminated thousands of middle managers as a result of these changes.

Postindustrial Organizations

Postindustrial theories based more on history and sociology than economics also support the notion that IT should flatten hierarchies. In postindustrial societies, authority increasingly relies on knowledge and competence, and not merely on formal positions. Hence, the shape of organizations flattens because professional workers tend to be self-managing, and decision making should become more decentralized as knowledge and information become more widespread throughout the firm (Drucker, 1988).

Information technology may encourage task force-networked organizations in which groups of professionals come together—face to face or electronically—for short periods of time to accomplish a specific task (e.g., designing a new automobile); once the task is accomplished, the individuals join other task forces. The global consulting service Accenture is an example. It has no operational headquarters and no formal branches. Many of its 190,000 employees move from location to location to work on projects at client locations in 49 different countries.

Who makes sure that self-managed teams do not head off in the wrong direction? Who decides which person works on which team and for how long? How can managers evaluate the performance of someone who is constantly rotating from team to team? How do people know where their careers are headed? New approaches for evaluating, organizing, and informing workers are required, and not all companies can make virtual work effective.

Understanding Organizational Resistance to Change

Information systems inevitably become bound up in organizational politics because they influence access to a key resource—namely, information. Information systems can affect who does what to whom, when, where, and how in an organization. Many new information systems require changes in personal, individual routines that can be painful for those involved and require retraining and additional effort that may or may not be compensated. Because information systems potentially change an organization's structure, culture, business processes, and strategy, there is often considerable resistance to them when they are introduced.

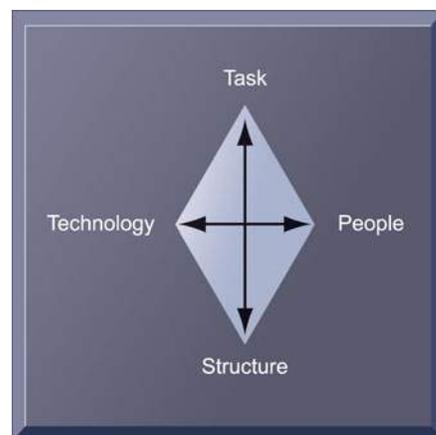
There are several ways to visualize organizational resistance. Leavitt (1965) used a diamond shape to illustrate the interrelated and mutually adjusting character of technology and organization (see Figure 3-9). Here, changes in technology are absorbed, deflected, and defeated by organizational task arrangements, structures, and people. In this model, the only way to bring about change is to change the technology, tasks, structure, and people simultaneously. Other authors have spoken about the need to “unfreeze” organizations before introducing an innovation, quickly implementing it, and “refreezing” or institutionalizing the change (Alter and Ginzberg, 1978; Kolb, 1970).

Because organizational resistance to change is so powerful, many information technology investments flounder and do not increase productivity. Indeed, research on project implementation failures demonstrates that the most common reason for failure of large projects to reach their objectives is not the failure of the technology, but organizational and political resistance to change. Chapter 14 treats this issue in detail. Therefore, as a manager involved in future IT investments, your ability to work with people and organizations is just as important as your technical awareness and knowledge.

THE INTERNET AND ORGANIZATIONS

The Internet, especially the World Wide Web, has an important impact on the relationships between many firms and external entities, and even on the

FIGURE 3-9 ORGANIZATIONAL RESISTANCE AND THE MUTUALLY ADJUSTING RELATIONSHIP BETWEEN TECHNOLOGY AND THE ORGANIZATION



Implementing information systems has consequences for task arrangements, structures, and people. According to this model, to implement change, all four components must be changed simultaneously.

Source: Leavitt (1965).

organization of business processes inside a firm. The Internet increases the accessibility, storage, and distribution of information and knowledge for organizations. In essence, the Internet is capable of dramatically lowering the transaction and agency costs facing most organizations. For instance, brokerage firms and banks in New York can now deliver their internal operating procedures manuals to their employees at distant locations by posting them on the corporate Web site, saving millions of dollars in distribution costs. A global sales force can receive nearly instant product price information updates using the Web or instructions from management sent by e-mail. Vendors of some large retailers can access retailers' internal Web sites directly to find up-to-the-minute sales information and to initiate replenishment orders instantly.

Businesses are rapidly rebuilding some of their key business processes based on Internet technology and making this technology a key component of their IT infrastructures. If prior networking is any guide, one result will be simpler business processes, fewer employees, and much flatter organizations than in the past.

IMPLICATIONS FOR THE DESIGN AND UNDERSTANDING OF INFORMATION SYSTEMS

To deliver genuine benefits, information systems must be built with a clear understanding of the organization in which they will be used. In our experience, the central organizational factors to consider when planning a new system are the following:

- The environment in which the organization must function
- The structure of the organization: hierarchy, specialization, routines, and business processes
- The organization's culture and politics
- The type of organization and its style of leadership
- The principal interest groups affected by the system and the attitudes of workers who will be using the system
- The kinds of tasks, decisions, and business processes that the information system is designed to assist

3.3 USING INFORMATION SYSTEMS TO ACHIEVE COMPETITIVE ADVANTAGE

In almost every industry you examine, you will find that some firms do better than most others. There's almost always a stand-out firm. In the automotive industry, Toyota is considered a superior performer. In pure online retail, Amazon is the leader, in off-line retail Walmart, the largest retailer on earth, is the leader. In online music, Apple's iTunes is considered the leader with more than 75 percent of the downloaded music market, and in the related industry of digital music players, the iPod is the leader. In Web search, Google is considered the leader.

Firms that "do better" than others are said to have a competitive advantage over others: They either have access to special resources that others do not, or they are able to use commonly available resources more efficiently—usually

because of superior knowledge and information assets. In any event, they do better in terms of revenue growth, profitability, or productivity growth (efficiency), all of which ultimately in the long run translate into higher stock market valuations than their competitors.

But why do some firms do better than others and how do they achieve competitive advantage? How can you analyze a business and identify its strategic advantages? How can you develop a strategic advantage for your own business? And how do information systems contribute to strategic advantages? One answer to that question is Michael Porter's competitive forces model.

PORTER'S COMPETITIVE FORCES MODEL

Arguably, the most widely used model for understanding competitive advantage is Michael Porter's **competitive forces model** (see Figure 3-10). This model provides a general view of the firm, its competitors, and the firm's environment. Earlier in this chapter, we described the importance of a firm's environment and the dependence of firms on environments. Porter's model is all about the firm's general business environment. In this model, five competitive forces shape the fate of the firm.

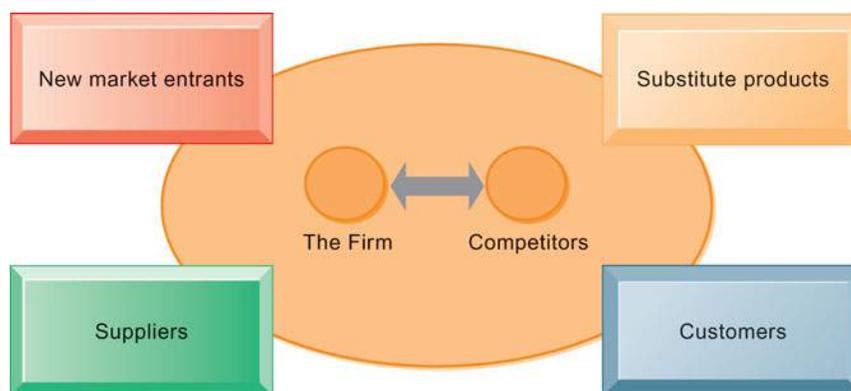
Traditional Competitors

All firms share market space with other competitors who are continuously devising new, more efficient ways to produce by introducing new products and services, and attempting to attract customers by developing their brands and imposing switching costs on their customers.

New Market Entrants

In a free economy with mobile labor and financial resources, new companies are always entering the marketplace. In some industries, there are very low barriers to entry, whereas in other industries, entry is very difficult. For instance, it is fairly easy to start a pizza business or just about any small retail business, but it is much more expensive and difficult to enter the computer chip business, which has very high capital costs and requires significant expertise and knowledge that is hard to obtain. New companies have several possible

FIGURE 3-10 PORTER'S COMPETITIVE FORCES MODEL



In Porter's competitive forces model, the strategic position of the firm and its strategies are determined not only by competition with its traditional direct competitors but also by four other forces in the industry's environment: new market entrants, substitute products, customers, and suppliers.

advantages: They are not locked into old plants and equipment, they often hire younger workers who are less expensive and perhaps more innovative, they are not encumbered by old worn-out brand names, and they are “more hungry” (more highly motivated) than traditional occupants of an industry. These advantages are also their weakness: They depend on outside financing for new plants and equipment, which can be expensive; they have a less-experienced workforce; and they have little brand recognition.

Substitute Products and Services

In just about every industry, there are substitutes that your customers might use if your prices become too high. New technologies create new substitutes all the time. Even oil has substitutes: Ethanol can substitute for gasoline in cars; vegetable oil for diesel fuel in trucks; and wind, solar, coal, and hydro power for industrial electricity generation. Likewise, the Internet telephone service can substitute for traditional telephone service, and fiber-optic telephone lines to the home can substitute for cable TV lines. And, of course, an Internet music service that allows you to download music tracks to an iPod is a substitute for CD-based music stores. The more substitute products and services in your industry, the less you can control pricing and the lower your profit margins.

Customers

A profitable company depends in large measure on its ability to attract and retain customers (while denying them to competitors), and charge high prices. The power of customers grows if they can easily switch to a competitor's products and services, or if they can force a business and its competitors to compete on price alone in a transparent marketplace where there is little **product differentiation**, and all prices are known instantly (such as on the Internet). For instance, in the used college textbook market on the Internet, students (customers) can find multiple suppliers of just about any current college textbook. In this case, online customers have extraordinary power over used-book firms.

Suppliers

The market power of suppliers can have a significant impact on firm profits, especially when the firm cannot raise prices as fast as can suppliers. The more different suppliers a firm has, the greater control it can exercise over suppliers in terms of price, quality, and delivery schedules. For instance, manufacturers of laptop PCs almost always have multiple competing suppliers of key components, such as keyboards, hard drives, and display screens.

INFORMATION SYSTEM STRATEGIES FOR DEALING WITH COMPETITIVE FORCES

What is a firm to do when it is faced with all these competitive forces? And how can the firm use information systems to counteract some of these forces? How do you prevent substitutes and inhibit new market entrants? There are four generic strategies, each of which often is enabled by using information technology and systems: low-cost leadership, product differentiation, focus on market niche, and strengthening customer and supplier intimacy.

Low-Cost Leadership

Use information systems to achieve the lowest operational costs and the lowest prices. The classic example is Walmart. By keeping prices low and shelves well



Supermarkets and large retail stores such as Walmart use sales data captured at the checkout counter to determine which items have sold and need to be reordered. Walmart's continuous replenishment system transmits orders to restock directly to its suppliers. The system enables Walmart to keep costs low while fine-tuning its merchandise to meet customer demands.

stocked using a legendary inventory replenishment system, Walmart became the leading retail business in the United States. Walmart's continuous replenishment system sends orders for new merchandise directly to suppliers as soon as consumers pay for their purchases at the cash register. Point-of-sale terminals record the bar code of each item passing the checkout counter and send a purchase transaction directly to a central computer at Walmart headquarters. The computer collects the orders from all Walmart stores and transmits them to suppliers. Suppliers can also access Walmart's sales and inventory data using Web technology.

Because the system replenishes inventory with lightning speed, Walmart does not need to spend much money on maintaining large inventories of goods in its own warehouses. The system also enables Walmart to adjust purchases of store items to meet customer demands. Competitors, such as Sears, have been spending 24.9 percent of sales on overhead. But by using systems to keep operating costs low, Walmart pays only 16.6 percent of sales revenue for overhead. (Operating costs average 20.7 percent of sales in the retail industry.)

Walmart's continuous replenishment system is also an example of an **efficient customer response system**. An efficient customer response system directly links consumer behavior to distribution and production and supply chains. Walmart's continuous replenishment system provides such an efficient customer response.

Product Differentiation

Use information systems to enable new products and services, or greatly change the customer convenience in using your existing products and services. For instance, Google continuously introduces new and unique search services on its Web site, such as Google Maps. By purchasing PayPal, an electronic payment system, in 2003, eBay made it much easier for customers to pay sellers and expanded use of its auction marketplace. Apple created the iPod, a unique portable digital music player, plus a unique online Web music service where songs can be purchased for \$.69 to \$1.29 each. Apple has continued to

innovate with its multimedia iPhone, iPad tablet computer, and iPod video player. The chapter-opening case describes how AT&T's business strategy is trying to piggyback off such digital innovations.

Manufacturers and retailers are using information systems to create products and services that are customized and personalized to fit the precise specifications of individual customers. For example, Nike sells customized sneakers through its NIKEiD program on its Web site. Customers are able to select the type of shoe, colors, material, outsoles, and even a logo of up to 8 characters. Nike transmits the orders via computers to specially-equipped plants in China and Korea. The sneakers cost only \$10 extra and take about three weeks to reach the customer. This ability to offer individually tailored products or services using the same production resources as mass production is called **mass customization**.

Table 3-3 lists a number of companies that have developed IT-based products and services that other firms have found difficult to copy, or at least a long time to copy.

Focus on Market Niche

Use information systems to enable a specific market focus, and serve this narrow target market better than competitors. Information systems support this strategy by producing and analyzing data for finely tuned sales and marketing techniques. Information systems enable companies to analyze customer buying patterns, tastes, and preferences closely so that they efficiently pitch advertising and marketing campaigns to smaller and smaller target markets.

The data come from a range of sources—credit card transactions, demographic data, purchase data from checkout counter scanners at supermarkets and retail stores, and data collected when people access and interact with Web sites. Sophisticated software tools find patterns in these large pools of data and infer rules from them to guide decision making. Analysis of such data drives one-to-one marketing that creates personal messages based on individualized preferences. For example, Hilton Hotels' OnQ system analyzes detailed data collected on active guests in all of its properties to determine the preferences of each guest and each guest's profitability. Hilton uses this information to give its most profitable customers additional privileges, such as late check-outs. Contemporary customer relationship management (CRM) systems feature analytical capabilities for this type of intensive data analysis (see Chapters 2 and 9).

TABLE 3-3 IT-ENABLED NEW PRODUCTS AND SERVICES PROVIDING COMPETITIVE ADVANTAGE

| | |
|---|--|
| Amazon: One-click shopping | Amazon holds a patent on one-click shopping that it licenses to other online retailers. |
| Online music: Apple iPod and iTunes | The iPod is an integrated handheld player backed up with an online library of over 13 million songs |
| Golf club customization: Ping | Customers can select from more than 1 million different golf club options; a build-to-order system ships their customized clubs within 48 hours. |
| Online bill payment: CheckFree.com | Fifty-two million households pay bills online in 2010. |
| Online person-to-person payment: PayPal.com | PayPal enables the transfer of money between individual bank accounts and between bank accounts and credit card accounts. |

The Interactive Session on Organizations describes how skillfully credit card companies are able to use this strategy to predict their most profitable cardholders. The companies gather vast quantities of data about consumer purchases and other behaviors and mine these data to construct detailed profiles that identify cardholders who might be good or bad credit risks. These practices have enhanced credit card companies' profitability, but are they in consumers' best interests?

Strengthen Customer and Supplier Intimacy

Use information systems to tighten linkages with suppliers and develop intimacy with customers. Chrysler Corporation uses information systems to facilitate direct access by suppliers to production schedules, and even permits suppliers to decide how and when to ship supplies to Chrysler factories. This allows suppliers more lead time in producing goods. On the customer side, Amazon.com keeps track of user preferences for book and CD purchases, and can recommend titles purchased by others to its customers. Strong linkages to customers and suppliers increase **switching costs** (the cost of switching from one product to a competing product), and loyalty to your firm.

Table 3-4 summarizes the competitive strategies we have just described. Some companies focus on one of these strategies, but you will often see companies pursuing several of them simultaneously. For example, Dell tries to emphasize low cost as well as the ability to customize its personal computers.

THE INTERNET'S IMPACT ON COMPETITIVE ADVANTAGE

Because of the Internet, the traditional competitive forces are still at work, but competitive rivalry has become much more intense (Porter, 2001). Internet technology is based on universal standards that any company can use, making it easy for rivals to compete on price alone and for new competitors to enter the market. Because information is available to everyone, the Internet raises the bargaining power of customers, who can quickly find the lowest-cost provider on the Web. Profits have been dampened. Table 3-5 summarizes some of the potentially negative impacts of the Internet on business firms identified by Porter.

TABLE 3-4 FOUR BASIC COMPETITIVE STRATEGIES

| STRATEGY | DESCRIPTION | EXAMPLE |
|--------------------------------|---|------------------------------------|
| Low-cost leadership | Use information systems to produce products and services at a lower price than competitors while enhancing quality and level of service | Walmart |
| Product differentiation | Use information systems to differentiate products, and enable new services and products | Google, eBay, Apple, Lands' End |
| Focus on market niche | Use information systems to enable a focused strategy on a single market niche; specialize | Hilton Hotels, Harrah's |
| Customer and supplier intimacy | Use information systems to develop strong ties and loyalty with customers and suppliers | Chrysler Corporation Amazon.com |

INTERACTIVE SESSION: ORGANIZATIONS

HOW MUCH DO CREDIT CARD COMPANIES KNOW ABOUT YOU?

When Kevin Johnson returned from his honeymoon, a letter from American Express was waiting for him. The letter informed Johnson that AmEx was slashing his credit limit by 60 percent. Why? Not because Johnson missed a payment or had bad credit. The letter stated: "Other customers who have used their card at establishments where you recently shopped, have a poor repayment history with American Express." Johnson had started shopping at Walmart. Welcome to the new era of credit card profiling.

Every time you make a purchase with a credit card, a record of that sale is logged into a massive data repository maintained by the card issuer. Each purchase is assigned a four-digit category code that describes the type of purchase that was made. There are separate codes for grocery stores, fast food restaurants, doctors, bars, bail and bond payments, and dating and escort services. Taken together, these codes allow credit card companies to learn a great deal about each of its customers at a glance.

Credit card companies use these data for multiple purposes. First, they use them to target future promotions for additional products more accurately. Users that purchase airline tickets might receive promotions for frequent flyer miles, for example. The data help card issuers guard against credit card fraud by identifying purchases that appear unusual compared to a cardholder's normal purchase history. The card companies also flag users who frequently charge more than their credit limit or demonstrate erratic spending habits. Lastly, these records are used by law enforcement agencies to track down criminals.

Credit card holders with debt, the ones who never fully pay off their balances entirely and thus have to pay monthly interest charges and other fees, have been a major source of profit for credit card issuers. However, the recent financial crisis and credit crunch have turned them into a mounting liability because so many people are defaulting on their payments and even filing for bankruptcy. So the credit card companies are now focusing on mining credit card data to predict cardholders posing the highest risk.

Using mathematical formulas and insights from behavioral science, these companies are developing more fine-grained profiles to help them get inside the heads of their customers. The data provide new

insights about the relationship of certain types of purchases to a customer's ability or inability to pay off credit card balances and other debt. The card-issuing companies now use this information to deny credit card applications or shrink the amount of credit available to high-risk customers.

These companies are generalizing based on certain types of purchases that may unfairly characterize responsible cardholders as risky. Purchases of secondhand clothing, bail bond services, massages, or gambling might cause card issuers to identify you as a risk, even if you maintain your balance responsibly from month to month. Other behaviors that raise suspicion: using your credit card to get your tires re-treaded, to pay for drinks at a bar, to pay for marriage counseling, or to obtain a cash advance. Charged speeding tickets raise suspicion because they may indicate an irrational or impulsive personality. In light of the sub-prime mortgage crisis, credit card companies have even begun to consider individuals from Florida, Nevada, California, and other states hardest hit by foreclosures to be risks simply by virtue of their state of residence.

The same fine-grained profiling also identifies the most reliable credit-worthy cardholders. For example, the credit card companies found that people who buy high-quality bird seed and snow rakes to sweep snow off of their roofs are very likely to pay their debts and never miss payments. Credit card companies are even using their detailed knowledge of cardholder behavior to establish personal connections with the clients that owe them money and convince them to pay off their balances.

One 49-year old woman from Missouri in the throes of a divorce owed \$40,000 to various credit card companies at one point, including \$28,000 to Bank of America. A Bank of America customer service representative studied the woman's profile and spoke to her numerous times, even pointing out one instance where she was erroneously charged twice. The representative forged a bond with the cardholder, and as a result she paid back the entire \$28,000 she owed, (even though she failed to repay much of the remainder that she owed to other credit card companies.)

This example illustrates something the credit card companies now know: when cardholders feel more comfortable with companies, as a result of a good

relationship with a customer service rep or for any other reason, they're more likely to pay their debts.

It's common practice for credit card companies to use this information to get a better idea of consumer trends, but should they be able to use it to preemptively deny credit or adjust terms of agreements? Law enforcement is not permitted to profile individuals, but it appears that credit card companies are doing just that.

In June 2008, the FTC filed a lawsuit against CompuCredit, a sub-prime credit card marketer. CompuCredit had been using a sophisticated behavioral scoring model to identify customers who they considered to have risky purchasing behaviors and lower these customers' credit limits. CompuCredit settled the suit by crediting \$114 million to the accounts of these supposedly risky customers and paid a \$2.5 million penalty.

Congress is investigating the extent to which credit card companies use profiling to determine interest rates and policies for their cardholders. The new credit card reform law signed by President

Barack Obama in May 2009 requires federal regulators to investigate this. Regulators must also determine whether minority cardholders were adversely profiled by these criteria. The new legislation also bars card companies from raising interest rates at any time and for any reason on their customers.

Going forward, you're likely to receive far fewer credit card solicitations in the mail and fewer offers of interest-free cards with rates that skyrocket after an initial grace period. You'll also see fewer policies intended to trick or deceive customers, like cash-back rewards for unpaid balances, which actually encourage cardholders not to pay what they owe. But the credit card companies say that to compensate for these changes, they'll need to raise rates across the board, even for good customers.

Sources: Betty Schiffman, "Who Knows You Better? Your Credit Card Company or Your Spouse?" *Daily Finance*, April 13, 2010; Charles Duhigg, "What Does Your Credit-Card Company Know about You?" *The New York Times*, June 17, 2009; and CreditCards.com, "Can Your Lifestyle Hurt Your Credit?" *MSN Money*, June 30, 2009. Boudette.

CASE STUDY QUESTIONS

1. What competitive strategy are the credit card companies pursuing? How do information systems support that strategy?
2. What are the business benefits of analyzing customer purchase data and constructing behavioral profiles?
3. Are these practices by credit card companies ethical? Are they an invasion of privacy? Why or why not?

MIS IN ACTION

1. If you have a credit card, make a detailed list of all of your purchases for the past six months. Then write a paragraph describing what credit card companies learned about your interests and behavior from these purchases.
2. How would this information benefit the credit card companies? What other companies would be interested?

TABLE 3-5 IMPACT OF THE INTERNET ON COMPETITIVE FORCES AND INDUSTRY STRUCTURE

| COMPETITIVE FORCE | IMPACT OF THE INTERNET |
|--|---|
| Substitute products or services | Enables new substitutes to emerge with new approaches to meeting needs and performing functions |
| Customers' bargaining power | Availability of global price and product information shifts bargaining power to customers |
| Suppliers' bargaining power | Procurement over the Internet tends to raise bargaining power over suppliers; suppliers can also benefit from reduced barriers to entry and from the elimination of distributors and other intermediaries standing between them and their users |
| Threat of new entrants | The Internet reduces barriers to entry, such as the need for a sales force, access to channels, and physical assets; it provides a technology for driving business processes that makes other things easier to do |
| Positioning and rivalry among existing competitors | Widens the geographic market, increasing the number of competitors, and reducing differences among competitors; makes it more difficult to sustain operational advantages; puts pressure to compete on price |

The Internet has nearly destroyed some industries and has severely threatened more. For instance, the printed encyclopedia industry and the travel agency industry have been nearly decimated by the availability of substitutes over the Internet. Likewise, the Internet has had a significant impact on the retail, music, book, retail brokerage, software, telecommunications, and newspaper industries.

However, the Internet has also created entirely new markets, formed the basis for thousands of new products, services, and business models, and provided new opportunities for building brands with very large and loyal customer bases. Amazon, eBay, iTunes, YouTube, Facebook, Travelocity, and Google are examples. In this sense, the Internet is “transforming” entire industries, forcing firms to change how they do business.

The Interactive Session on Technology provides more detail on the transformation of the content and media industries. For most forms of media, the Internet has posed a threat to business models and profitability. Growth in book sales other than textbooks and professional publications has been sluggish, as new forms of entertainment continue to compete for consumers’ time. Newspapers and magazines have been hit even harder, as their readerships diminish, their advertisers shrink, and more people get their news for free online. The television and film industries have been forced to deal with pirates who are robbing them of some of their profits.

When Apple announced the launch of its new iPad tablet computer, leaders in all of these media saw not only a threat but also a significant opportunity. In fact, the iPad and similar mobile devices may be the savior—if traditional media can strike the right deal with technology providers like Apple and Google. And the iPad may be a threat for companies that fail to adjust their business models to a new method of providing content to users.

THE BUSINESS VALUE CHAIN MODEL

Although the Porter model is very helpful for identifying competitive forces and suggesting generic strategies, it is not very specific about what exactly to do, and it does not provide a methodology to follow for achieving competitive advantages. If your goal is to achieve operational excellence, where do you start? Here’s where the business value chain model is helpful.

The **value chain model** highlights specific activities in the business where competitive strategies can best be applied (Porter, 1985) and where information systems are most likely to have a strategic impact. This model identifies specific, critical leverage points where a firm can use information technology most effectively to enhance its competitive position. The value chain model views the firm as a series or chain of basic activities that add a margin of value to a firm’s products or services. These activities can be categorized as either primary activities or support activities (see Figure 3-11 on p. 105).

Primary activities are most directly related to the production and distribution of the firm’s products and services, which create value for the customer. Primary activities include inbound logistics, operations, outbound logistics, sales and marketing, and service. Inbound logistics includes receiving and storing materials for distribution to production. Operations transforms inputs into finished products. Outbound logistics entails storing and distributing finished products. Sales and marketing includes promoting and selling the firm’s products. The service activity includes maintenance and repair of the firm’s goods and services.

INTERACTIVE SESSION: TECHNOLOGY

IS THE IPAD A DISRUPTIVE TECHNOLOGY?

Tablet computers have come and gone several times before, but the iPad looks like it will be different. It has a gorgeous 10-inch color display, a persistent Wi-Fi Internet connection, potential use of high-speed cellular networks, functionality from over 250,000 applications available on Apple's App Store, and the ability to deliver video, music, text, social networking applications, and video games. Its entry-level price is just \$499. The challenge for Apple is to convince potential users that they need a new, expensive gadget with the functionality that the iPad provides. This is the same challenge faced by the iPhone when it was first announced. As it turned out, the iPhone was a smashing success that decimated the sales of traditional cell phones throughout the world. Will the iPad do likewise as a disruptive technology for the media and content industries? It looks like it is on its way.

The iPad has some appeal to mobile business users, but most experts believe it will not supplant laptops or netbooks. It is in the publishing and media industries where its disruptive impact will first be felt.

The iPad and similar devices (including the Kindle Reader) will force many existing media businesses to change their business models significantly. These companies may need to stop investing in their traditional delivery platforms (like newsprint) and increase their investments in the new digital platform. The iPad will spur people to watch TV on the go, rather than their television set at home, and to read their books, newspapers, and magazines online rather than in print.

Publishers are increasingly interested in e-books as a way to revitalize stagnant sales and attract new readers. The success of Amazon's Kindle has spurred growth in e-book sales to over \$91 million wholesale in the first quarter of 2010. Eventually, e-books could account for 25 to 50 percent of all books sold. Amazon, the technology platform provider and the largest distributor of books in the world, has exercised its new power by forcing publishers to sell e-books at \$9.95, a price too low for publishers to profit. Publishers are now refusing to supply new books to Amazon unless it raises prices, and Amazon is starting to comply.

The iPad enters this marketplace ready to compete with Amazon over e-book pricing and

distribution. Amazon has committed itself to offering the lowest possible prices, but Apple has appealed to publishers by announcing its intention to offer a tiered pricing system, giving publishers the opportunity to participate more actively in the pricing of their books. Apple has agreed with publishers to charge \$12 to \$14 for e-books, and to act as an agent selling books (with a 30% fee on all e-book sales) rather than a book distributor. Publishers like this arrangement, but worry about long-term pricing expectations, hoping to avoid a scenario where readers come to expect \$9.99 e-books as the standard.

Textbook publishers are also eager to establish themselves on the iPad. Many of the largest textbook publishers have struck deals with software firms like ScrollMotion, Inc. to adapt their books for e-book readers. In fact, Apple CEO Steve Jobs designed the iPad with use in schools in mind, and interest on the part of schools in technology like the iPad has been strong. ScrollMotion already has experience using the Apple application platform for the iPhone, so the company is uniquely qualified to convert existing files provided by publishers into a format readable by the iPad and to add additional features, like a dictionary, glossary, quizzes, page numbers, a search function, and high-quality images.

Newspapers are also excited about the iPad, which represents a way for them to continue charging for all of the content that they have been forced to make available online. If the iPad becomes as popular as other hit products from Apple, consumers are more likely to pay for content using that device. The successes of the App Store on the iPhone and of the iTunes music store attest to this. But the experience of the music industry with iTunes also gives all print media reason to worry. The iTunes music store changed the consumer perception of albums and music bundles. Music labels used to make more money selling 12 songs on an album than they did selling popular singles. Now consumers have drastically reduced their consumption of albums, preferring to purchase and download one song at a time. A similar fate may await print newspapers, which are bundles of news articles, many of which are unread.

Apple has also approached TV networks and movie studios about offering access to some of their top shows and movies for a monthly fee, but as of yet the

bigger media companies have not responded to Apple's overture. Of course, if the iPad becomes sufficiently popular, that will change, but currently media networks would prefer not to endanger their strong and lucrative partnerships with cable and satellite TV providers. (See the chapter-ending case study.)

And what about Apple's own business model? Apple previously believed content was less important than the popularity of its devices. Now, Apple understands that it needs high-quality content from all the types of media it offers on its devices to be truly successful. The company's new goal is to make deals with each media industry to distribute the content that users want to watch at a price agreed to by the content owners and the platform owners (Apple). The old attitudes of Apple ("Rip, burn,

distribute"), which were designed to sell devices are a thing of the past. In this case of disruptive technology, even the disruptors have been forced to change their behaviors.

Sources: Ken Auletta, "Publish or Perish," *The New Yorker*, April 26, 2010; Yukari Iwatani Kane and Sam Schechner, "Apple Races to Strike Content Deals Ahead of iPad Release," *The Wall Street Journal*, March 18, 2010; Motoko Rich, "Books on iPad Offer Publishers a Pricing Edge," *The New York Times*, January 28, 2010; Jeffrey A. Trachtenberg and Yukari Iwatani Kane, "Textbook Firms Ink Deals for iPad," *The Wall Street Journal*, February 2, 2010; Nick Bilton, "Three Reasons Why the iPad Will Kill Amazon's Kindle," *The New York Times*, January 27, 2010; Jeffrey A. Trachtenberg, "Apple Tablet Portends Rewrite for Publishers," *The Wall Street Journal*, January 26, 2010; Brad Stone and Stephanie Clifford, "With Apple Tablet, Print Media Hope for a Payday," *The New York Times*, January 26, 2010; Yukari Iwatani Kane, "Apple Takes Big Gamble on New iPad," *The Wall Street Journal*, January 25, 2010; and Anne Eisenberg, "Devices to Take Textbooks Beyond Text," *The New York Times*, December 6, 2009.

CASE STUDY QUESTIONS

1. Evaluate the impact of the iPad using Porter's competitive forces model.
2. What makes the iPad a disruptive technology? Who are likely to be the winners and losers if the iPad becomes a hit? Why?
3. Describe the effects that the iPad is likely to have on the business models of Apple, content creators, and distributors.

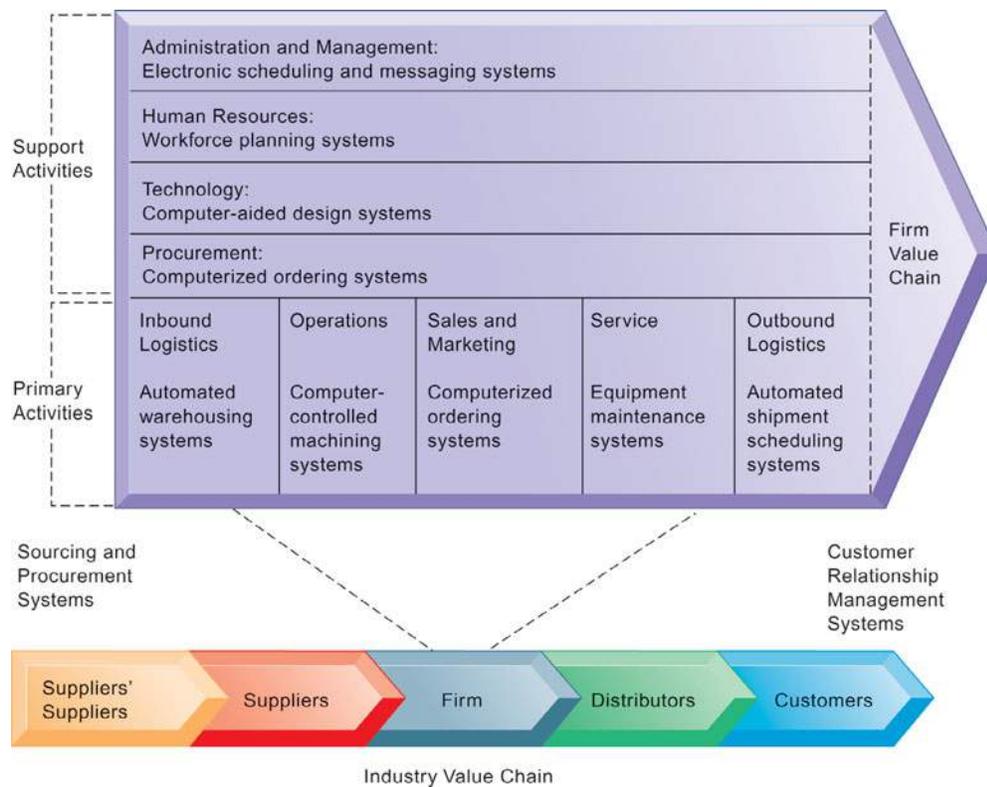
MIS IN ACTION

Visit Apple's site for the iPad and the Amazon.com site for the Kindle. Review the features and specifications of each device. Then answer the following questions:

1. How powerful is the iPad? How useful is it for reading books, newspapers or magazines, for surfing the Web, and for watching video? Can you identify any shortcomings of the device?
2. Compare the capabilities of the Kindle to the iPad. Which is a better device for reading books? Explain your answer.
3. Would you like to use an iPad or Kindle for the books you use in your college courses or read for pleasure instead of traditional print publications? Why or why not?

Support activities make the delivery of the primary activities possible and consist of organization infrastructure (administration and management), human resources (employee recruiting, hiring, and training), technology (improving products and the production process), and procurement (purchasing input).

Now you can ask at each stage of the value chain, "How can we use information systems to improve operational efficiency, and improve customer and supplier intimacy?" This will force you to critically examine how you perform value-adding activities at each stage and how the business processes might be improved. You can also begin to ask how information systems can be used to improve the relationship with customers and with suppliers who lie outside the firm's value chain but belong to the firm's extended value chain where they are absolutely critical to your success. Here, supply chain management systems

FIGURE 3-11 THE VALUE CHAIN MODEL

This figure provides examples of systems for both primary and support activities of a firm and of its value partners that can add a margin of value to a firm's products or services.

that coordinate the flow of resources into your firm, and customer relationship management systems that coordinate your sales and support employees with customers, are two of the most common system applications that result from a business value chain analysis. We discuss these enterprise applications in detail later in Chapter 9.

Using the business value chain model will also cause you to consider benchmarking your business processes against your competitors or others in related industries, and identifying industry best practices. **Benchmarking** involves comparing the efficiency and effectiveness of your business processes against strict standards and then measuring performance against those standards. Industry **best practices** are usually identified by consulting companies, research organizations, government agencies, and industry associations as the most successful solutions or problem-solving methods for consistently and effectively achieving a business objective.

Once you have analyzed the various stages in the value chain at your business, you can come up with candidate applications of information systems. Then, once you have a list of candidate applications, you can decide which to develop first. By making improvements in your own business value chain that your competitors might miss, you can achieve competitive advantage by attaining operational excellence, lowering costs, improving profit margins, and forging a closer relationship with customers and suppliers. If your competitors are making similar improvements, then at least you will not be at a competitive disadvantage—the worst of all cases!

Extending the Value Chain: The Value Web

Figure 3-11 shows that a firm's value chain is linked to the value chains of its suppliers, distributors, and customers. After all, the performance of most firms depends not only on what goes on inside a firm but also on how well the firm coordinates with direct and indirect suppliers, delivery firms (logistics partners, such as FedEx or UPS), and, of course, customers.

How can information systems be used to achieve strategic advantage at the industry level? By working with other firms, industry participants can use information technology to develop industry-wide standards for exchanging information or business transactions electronically, which force all market participants to subscribe to similar standards. Such efforts increase efficiency, making product substitution less likely and perhaps raising entry costs—thus discouraging new entrants. Also, industry members can build industry-wide, IT-supported consortia, symposia, and communications networks to coordinate activities concerning government agencies, foreign competition, and competing industries.

Looking at the industry value chain encourages you to think about how to use information systems to link up more efficiently with your suppliers, strategic partners, and customers. Strategic advantage derives from your ability to relate your value chain to the value chains of other partners in the process. For instance, if you are Amazon.com, you want to build systems that:

- Make it easy for suppliers to display goods and open stores on the Amazon site
- Make it easy for customers to pay for goods
- Develop systems that coordinate the shipment of goods to customers
- Develop shipment tracking systems for customers

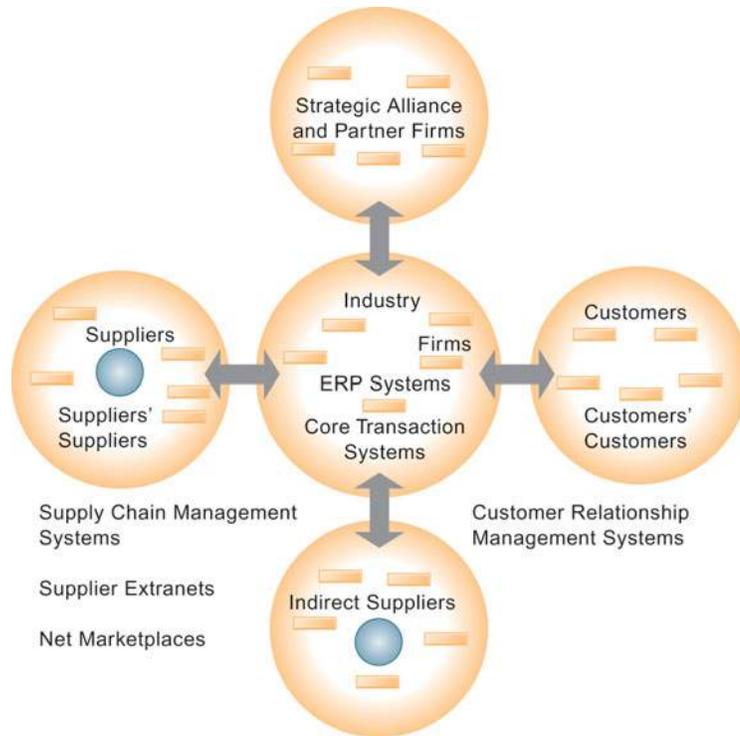
Internet technology has made it possible to create highly synchronized industry value chains called value webs. A **value web** is a collection of independent firms that use information technology to coordinate their value chains to produce a product or service for a market collectively. It is more customer driven and operates in a less linear fashion than the traditional value chain.

Figure 3-12 shows that this value web synchronizes the business processes of customers, suppliers, and trading partners among different companies in an industry or in related industries. These value webs are flexible and adaptive to changes in supply and demand. Relationships can be bundled or unbundled in response to changing market conditions. Firms will accelerate time to market and to customers by optimizing their value web relationships to make quick decisions on who can deliver the required products or services at the right price and location.

SYNERGIES, CORE COMPETENCIES, AND NETWORK-BASED STRATEGIES

A large corporation is typically a collection of businesses. Often, the firm is organized financially as a collection of strategic business units and the returns to the firm are directly tied to the performance of all the strategic business units. Information systems can improve the overall performance of these business units by promoting synergies and core competencies.

FIGURE 3-12 THE VALUE WEB



The value web is a networked system that can synchronize the value chains of business partners within an industry to respond rapidly to changes in supply and demand.

Synergies

The idea of synergies is that when the output of some units can be used as inputs to other units, or two organizations pool markets and expertise, these relationships lower costs and generate profits. Recent bank and financial firm mergers, such as the merger of JP Morgan Chase and Bank of New York as well as Bank of America and Countrywide Financial Corporation occurred precisely for this purpose.

One use of information technology in these synergy situations is to tie together the operations of disparate business units so that they can act as a whole. For example, acquiring Countrywide Financial enabled Bank of America to extend its mortgage lending business and to tap into a large pool of new customers who might be interested in its credit card, consumer banking, and other financial products. Information systems would help the merged companies consolidate operations, lower retailing costs, and increase cross-marketing of financial products.

Enhancing Core Competencies

Yet another way to use information systems for competitive advantage is to think about ways that systems can enhance core competencies. The argument is that the performance of all business units will increase insofar as these business units develop, or create, a central core of competencies. A **core competency** is an activity for which a firm is a world-class leader. Core competencies may involve being the world's best miniature parts designer, the best package delivery service, or the best thin-film manufacturer. In general, a core competency relies on knowledge that is gained over many years of practical

field experience with a technology. This practical knowledge is typically supplemented with a long-term research effort and committed employees.

Any information system that encourages the sharing of knowledge across business units enhances competency. Such systems might encourage or enhance existing competencies and help employees become aware of new external knowledge; such systems might also help a business leverage existing competencies to related markets.

For example, Procter & Gamble, a world leader in brand management and consumer product innovation, uses a series of systems to enhance its core competencies. Some of these systems for collaboration were introduced in the Chapter 2 ending case study. An intranet called InnovationNet helps people working on similar problems share ideas and expertise. InnovationNet connects those working in research and development (R&D), engineering, purchasing, marketing, legal affairs, and business information systems around the world, using a portal to provide browser-based access to documents, reports, charts, videos, and other data from various sources. It includes a directory of subject matter experts who can be tapped to give advice or collaborate on problem solving and product development, and links to outside research scientists and entrepreneurs who are searching for new, innovative products worldwide.

Network-Based Strategies

The availability of Internet and networking technology have inspired strategies that take advantage of firms' abilities to create networks or network with each other. Network-based strategies include the use of network economics, a virtual company model, and business ecosystems.

Network Economics. Business models based on a network may help firms strategically by taking advantage of **network economics**. In traditional economics—the economics of factories and agriculture—production experiences diminishing returns. The more any given resource is applied to production, the lower the marginal gain in output, until a point is reached where the additional inputs produce no additional outputs. This is the law of diminishing returns, and it is the foundation for most of modern economics.

In some situations, the law of diminishing returns does not work. For instance, in a network, the marginal costs of adding another participant are about zero, whereas the marginal gain is much larger. The larger the number of subscribers in a telephone system or the Internet, the greater the value to all participants because each user can interact with more people. It is not much more expensive to operate a television station with 1,000 subscribers than with 10 million subscribers. The value of a community of people grows with size, whereas the cost of adding new members is inconsequential.

From this network economics perspective, information technology can be strategically useful. Internet sites can be used by firms to build communities of users—like-minded customers who want to share their experiences. This builds customer loyalty and enjoyment, and builds unique ties to customers. eBay, the giant online auction site, and iVillage, an online community for women, are examples. Both businesses are based on networks of millions of users, and both companies have used the Web and Internet communication tools to build communities. The more people offering products on eBay, the more valuable the eBay site is to everyone because more products are listed, and more competition among suppliers lowers prices. Network economics also provides strategic benefits to commercial software vendors. The value of their software and complementary software products increases as more people use them, and

there is a larger installed base to justify continued use of the product and vendor support.

Virtual Company Model. Another network-based strategy uses the model of a virtual company to create a competitive business. A **virtual company**, also known as a virtual organization, uses networks to link people, assets, and ideas, enabling it to ally with other companies to create and distribute products and services without being limited by traditional organizational boundaries or physical locations. One company can use the capabilities of another company without being physically tied to that company. The virtual company model is useful when a company finds it cheaper to acquire products, services, or capabilities from an external vendor or when it needs to move quickly to exploit new market opportunities and lacks the time and resources to respond on its own.

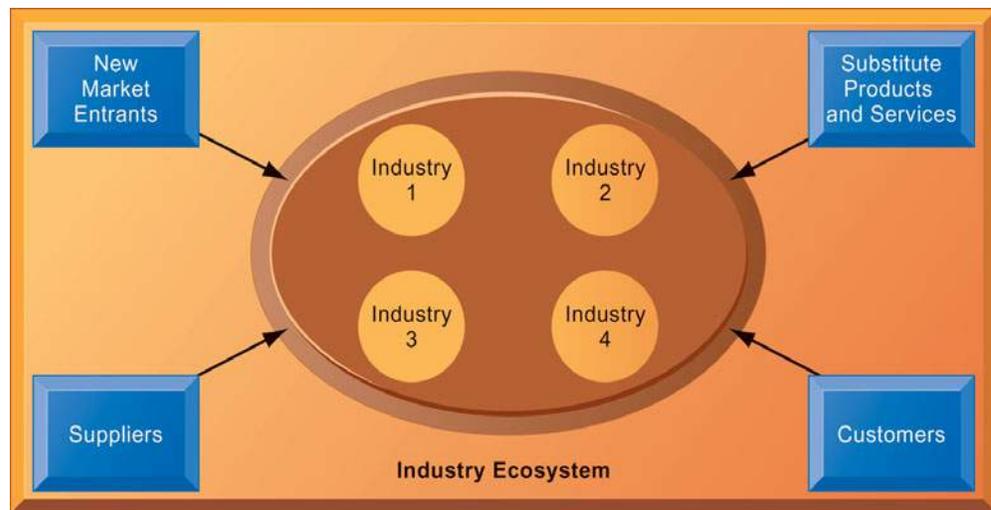
Fashion companies, such as GUESS, Ann Taylor, Levi Strauss, and Reebok, enlist Hong Kong-based Li & Fung to manage production and shipment of their garments. Li & Fung handles product development, raw material sourcing, production planning, quality assurance, and shipping. Li & Fung does not own any fabric, factories, or machines, outsourcing all of its work to a network of more than 7,500 suppliers in 37 countries all over the world. Customers place orders to Li & Fung over its private extranet. Li & Fung then sends instructions to appropriate raw material suppliers and factories where the clothing is produced. The Li & Fung extranet tracks the entire production process for each order.

Working as a virtual company keeps Li & Fung flexible and adaptable so that it can design and produce the products ordered by its clients in short order to keep pace with rapidly changing fashion trends.

Business Ecosystems: Keystone and Niche Firms. The Internet and the emergence of digital firms call for some modification of the industry competitive forces model. The traditional Porter model assumes a relatively static industry environment; relatively clear-cut industry boundaries; and a relatively stable set of suppliers, substitutes, and customers, with the focus on industry players in a market environment. Instead of participating in a single industry, some of today's firms are much more aware that they participate in industry sets—collections of industries that provide related services and products (see Figure 3-13). **Business ecosystem** is another term for these loosely coupled but interdependent networks of suppliers, distributors, outsourcing firms, transportation service firms, and technology manufacturers (Iansiti and Levien, 2004).

The concept of a business ecosystem builds on the idea of the value web described earlier, the main difference being that cooperation takes place across many industries rather than many firms. For instance, both Microsoft and Walmart provide platforms composed of information systems, technologies, and services that thousands of other firms in different industries use to enhance their own capabilities. Microsoft has estimated that more than 40,000 firms use its Windows platform to deliver their own products, support Microsoft products, and extend the value of Microsoft's own firm. Walmart's order entry and inventory management system is a platform used by thousands of suppliers to obtain real-time access to customer demand, track shipments, and control inventories.

Business ecosystems can be characterized as having one or a few keystone firms that dominate the ecosystem and create the platforms used by other niche firms. Keystone firms in the Microsoft ecosystem include Microsoft and technology producers such as Intel and IBM. Niche firms include thousands of software

FIGURE 3-13 AN ECOSYSTEM STRATEGIC MODEL

The digital firm era requires a more dynamic view of the boundaries among industries, firms, customers, and suppliers, with competition occurring among industry sets in a business ecosystem. In the ecosystem model, multiple industries work together to deliver value to the customer. IT plays an important role in enabling a dense network of interactions among the participating firms.

application firms, software developers, service firms, networking firms, and consulting firms that both support and rely on the Microsoft products.

Information technology plays a powerful role in establishing business ecosystems. Obviously, many firms use information systems to develop into keystone firms by building IT-based platforms that other firms can use. In the digital firm era, we can expect greater emphasis on the use of IT to build industry ecosystems because the costs of participating in such ecosystems will fall and the benefits to all firms will increase rapidly as the platform grows.

Individual firms should consider how their information systems will enable them to become profitable niche players in larger ecosystems created by keystone firms. For instance, in making decisions about which products to build or which services to offer, a firm should consider the existing business ecosystems related to these products and how it might use IT to enable participation in these larger ecosystems.

A powerful, current example of a rapidly expanding ecosystem is the mobile Internet platform. In this ecosystem there are four industries: device makers (Apple iPhone, RIM BlackBerry, Motorola, LG, and others), wireless telecommunication firms (AT&T, Verizon, T-Mobile, Sprint, and others), independent software applications providers (generally small firms selling games, applications, and ring tones), and Internet service providers (who participate as providers of Internet service to the mobile platform).

Each of these industries has its own history, interests, and driving forces. But these elements come together in a sometimes cooperative, and sometimes competitive, new industry we refer to as the mobile digital platform ecosystem. More than other firms, Apple has managed to combine these industries into a system. It is Apple's mission to sell physical devices (iPhones) that are nearly as powerful as today's personal computers. These devices work only with a high-speed broadband network supplied by the wireless phone carriers. In order to attract a large customer base, the iPhone had to be more than just a cell phone. Apple differentiated this product by making it a "smart phone," one

capable of running thousands of different, useful applications. Apple could not develop all these applications itself. Instead it relies on generally small, independent software developers to provide these applications, which can be purchased at the iTunes store. In the background is the Internet service provider industry, which makes money whenever iPhone users connect to the Internet.

3.4 USING SYSTEMS FOR COMPETITIVE ADVANTAGE: MANAGEMENT ISSUES

Strategic information systems often change the organization as well as its products, services, and operating procedures, driving the organization into new behavioral patterns. Successfully using information systems to achieve a competitive advantage is challenging and requires precise coordination of technology, organizations, and management.

SUSTAINING COMPETITIVE ADVANTAGE

The competitive advantages that strategic systems confer do not necessarily last long enough to ensure long-term profitability. Because competitors can retaliate and copy strategic systems, competitive advantage is not always sustainable. Markets, customer expectations, and technology change; globalization has made these changes even more rapid and unpredictable. The Internet can make competitive advantage disappear very quickly because virtually all companies can use this technology. Classic strategic systems, such as American Airlines's SABRE computerized reservation system, Citibank's ATM system, and FedEx's package tracking system, benefited by being the first in their industries. Then rival systems emerged. Amazon.com was an e-commerce leader but now faces competition from eBay, Yahoo, and Google. Information systems alone cannot provide an enduring business advantage. Systems originally intended to be strategic frequently become tools for survival, required by every firm to stay in business, or they may inhibit organizations from making the strategic changes essential for future success.

ALIGNING IT WITH BUSINESS OBJECTIVES

The research on IT and business performance has found that (a) the more successfully a firm can align information technology with its business goals, the more profitable it will be, and (b) only one-quarter of firms achieve alignment of IT with the business. About half of a business firm's profits can be explained by alignment of IT with business (Luftman, 2003).

Most businesses get it wrong: Information technology takes on a life of its own and does not serve management and shareholder interests very well. Instead of business people taking an active role in shaping IT to the enterprise, they ignore it, claim not to understand IT, and tolerate failure in the IT area as just a nuisance to work around. Such firms pay a hefty price in poor performance. Successful firms and managers understand what IT can do and how it works, take an active role in shaping its use, and measure its impact on revenues and profits.

Management Checklist: Performing a Strategic Systems Analysis

To align IT with the business and use information systems effectively for competitive advantage, managers need to perform a strategic systems analysis. To identify the types of systems that provide a strategic advantage to their firms, managers should ask the following questions:

1. What is the structure of the industry in which the firm is located?
 - What are some of the competitive forces at work in the industry? Are there new entrants to the industry? What is the relative power of suppliers, customers, and substitute products and services over prices?
 - Is the basis of competition quality, price, or brand?
 - What are the direction and nature of change within the industry? From where are the momentum and change coming?
 - How is the industry currently using information technology? Is the organization behind or ahead of the industry in its application of information systems?
2. What are the business, firm, and industry value chains for this particular firm?
 - How is the company creating value for the customer—through lower prices and transaction costs or higher quality? Are there any places in the value chain where the business could create more value for the customer and additional profit for the company?
 - Does the firm understand and manage its business processes using the best practices available? Is it taking maximum advantage of supply chain management, customer relationship management, and enterprise systems?
 - Does the firm leverage its core competencies?
 - Is the industry supply chain and customer base changing in ways that benefit or harm the firm?
 - Can the firm benefit from strategic partnerships and value webs?
 - Where in the value chain will information systems provide the greatest value to the firm?
3. Have we aligned IT with our business strategy and goals?
 - Have we correctly articulated our business strategy and goals?
 - Is IT improving the right business processes and activities to promote this strategy?
 - Are we using the right metrics to measure progress toward those goals?

MANAGING STRATEGIC TRANSITIONS

Adopting the kinds of strategic systems described in this chapter generally requires changes in business goals, relationships with customers and suppliers, and business processes. These sociotechnical changes, affecting both social and technical elements of the organization, can be considered **strategic transitions**—a movement between levels of sociotechnical systems.

Such changes often entail blurring of organizational boundaries, both external and internal. Suppliers and customers must become intimately linked and may share each other's responsibilities. Managers will need to devise new business processes for coordinating their firms' activities with those of customers, suppliers, and other organizations. The organizational change requirements surrounding new information systems are so important that they merit attention throughout this text. Chapter 14 examines organizational change issues in more detail.

3.5 HANDS-ON MIS PROJECTS

The projects in this section give you hands-on experience identifying information systems to support a business strategy, analyzing organizational factors affecting the information systems of merging companies, using a database to improve decision making about business strategy, and using Web tools to configure and price an automobile.

Management Decision Problems

1. Macy's, Inc., through its subsidiaries, operates approximately 800 department stores in the United States. Its retail stores sell a range of merchandise, including adult and children's apparel, accessories, cosmetics, home furnishings, and housewares. Senior management has decided that Macy's needs to tailor merchandise more to local tastes, that the colors, sizes, brands, and styles of clothing and other merchandise should be based on the sales patterns in each individual Macy's store. For example, stores in Texas might stock clothing in larger sizes and brighter colors than those in New York, or the Macy's on Chicago's State Street might include a greater variety of makeup shades to attract trendier shoppers. How could information systems help Macy's management implement this new strategy? What pieces of data should these systems collect to help management make merchandising decisions that support this strategy?
2. Today's US Airways is the result of a merger between US Airways and America West Airlines. Before the merger, US Airways dated back to 1939 and had very traditional business processes, a lumbering bureaucracy, and a rigid information systems function that had been outsourced to Electronic Data Systems. America West was formed in 1981 and had a younger workforce, a more freewheeling entrepreneurial culture, and managed its own information systems. The merger was designed to create synergies from US Airways' experience and strong network on the east coast of the United States with America West's low-cost structure, information systems, and routes in the western United States. What features of organizations should management have considered as it merged the two companies and their information systems? What decisions need to be made to make sure the strategy works?

Improving Decision Making: Using a Database to Clarify Business Strategy

Software skills: Database querying and reporting; database design

Business skills: Reservation systems; customer analysis

In this exercise, you'll use database software to analyze the reservation transactions for a hotel and use that information to fine-tune the hotel's business strategy and marketing activities.

The Presidents' Inn is a small three-story hotel on the Atlantic Ocean in Cape May, New Jersey, a popular northeastern U.S. resort. Ten rooms overlook side streets, 10 rooms have bay windows that offer limited views of the ocean, and the remaining 10 rooms in the front of the hotel face the ocean. Room rates are based on room choice, length of stay, and number of guests per room. Room rates are the same for one to four guests. Fifth and sixth guests must pay an additional \$20 charge each per day. Guests staying for seven days or more receive a 10-percent discount on their daily room rates.

Business has grown steadily during the past 10 years. Now totally renovated, the inn uses a romantic weekend package to attract couples, a vacation package

to attract young families, and a weekday discount package to attract business travelers. The owners currently use a manual reservation and bookkeeping system, which has caused many problems. Sometimes two families have been booked in the same room at the same time. Management does not have immediate data about the hotel's daily operations and income.

In MyMISLab, you will find a database for hotel reservation transactions developed in Microsoft Access. A sample is shown below, but the Web site may have a more recent version of this database for this exercise.

Develop some reports that provide information to help management make the business more competitive and profitable. Your reports should answer the following questions:

- What is the average length of stay per room type?
- What is the average number of visitors per room type?
- What is the base income per room (i.e., length of visit multiplied by the daily rate) during a specified period of time?
- What is the strongest customer base?

After answering these questions, write a brief report describing what the database information reveals about the current business situation. Which specific business strategies might be pursued to increase room occupancy and revenue? How could the database be improved to provide better information for strategic decisions?

Improving Decision Making: Using Web Tools to Configure and Price an Automobile

Software skills: Internet-based software

Business skills: Researching product information and pricing

In this exercise, you'll use software at Web sites for selling cars to find product information about a car of your choice and use that information to make an important purchase decision. You'll also evaluate two of these sites as selling tools.

You are interested in purchasing a new Ford Focus. (If you are personally interested in another car, domestic or foreign, investigate that one instead.) Go to the Web site of CarsDirect (www.carsdirect.com) and begin your investigation. Locate the Ford Focus. Research the various specific automobiles available in that model and determine which you prefer. Explore the full details about the specific car, including pricing, standard features, and options. Locate and read at least two reviews if possible. Investigate the safety of that model

| ID | Guest First Name | Guest Last Name | Room | Room Type | Arrival Date | Departure Date | No of Guests |
|----|------------------|-----------------|------------|------------|--------------|----------------|--------------|
| 1 | Barry | Lloyd | Hayes | Bay-window | 12/1/2010 | 12/4/2010 | 2 |
| 2 | Michael | Lunsford | Cleveland | Ocean | 12/1/2010 | 12/9/2010 | 3 |
| 3 | Kim | Kyuong | Coolidge | Bay-window | 12/4/2010 | 12/7/2010 | 1 |
| 4 | Edward | Holt | Washington | Ocean | 12/1/2010 | 12/3/2010 | 4 |
| 5 | Thomas | Collins | Lincoln | Ocean | 12/9/2010 | 12/13/2010 | 2 |
| 6 | Paul | Bodkin | Coolidge | Bay-window | 12/1/2010 | 12/3/2010 | 2 |
| 7 | Randall | Battenburg | Washington | Ocean | 12/4/2010 | 12/12/2010 | 2 |
| 8 | Calvin | Nowotney | Lincoln | Ocean | 12/2/2010 | 12/4/2010 | 1 |
| 9 | Homer | Gonzalez | Lincoln | Ocean | 12/5/2010 | 12/7/2010 | 5 |
| 10 | David | Sanchez | Jefferson | Bay-window | 12/5/2010 | 12/7/2010 | 2 |
| 11 | Buster | Whisler | Jackson | Ocean | 12/5/2010 | 12/8/2010 | 2 |
| 12 | Julia | Martines | Reagan | Bay-window | 12/10/2010 | 12/15/2010 | 1 |
| 13 | Samuel | Kim | Truman | Side | 12/20/2010 | 12/30/2010 | 3 |
| 14 | Arthur | Gottfried | Garfield | Side | 12/13/2010 | 12/15/2010 | 2 |
| 15 | Darlene | Shore | Arthur | Ocean | 12/24/2010 | 12/31/2010 | 5 |

based on the U.S. government crash tests performed by the National Highway Traffic Safety Administration if those test results are available. Explore the features for locating a vehicle in inventory and purchasing directly. Finally, explore the other capabilities of the CarsDirect site for financing.

Having recorded or printed the information you need from CarsDirect for your purchase decision, surf the Web site of the manufacturer, in this case Ford (www.ford.com). Compare the information available on Ford's Web site with that of CarsDirect for the Ford Focus. Be sure to check the price and any incentives being offered (which may not agree with what you found at CarsDirect). Next, find a local dealer on the Ford site so that you can view the car before making your purchase decision. Explore the other features of Ford's Web site.

Try to locate the lowest price for the car you want in a local dealer's inventory. Which site would you use to purchase your car? Why? Suggest improvements for the sites of CarsDirect and Ford.

LEARNING TRACK MODULE

The following Learning Track provides content relevant to topics covered in this chapter.

1. The Changing Business Environment for Information Technology

Review Summary

1. *Which features of organizations do managers need to know about to build and use information systems successfully? What is the impact of information systems on organizations?*

All modern organizations are hierarchical, specialized, and impartial, using explicit routines to maximize efficiency. All organizations have their own cultures and politics arising from differences in interest groups, and they are affected by their surrounding environment. Organizations differ in goals, groups served, social roles, leadership styles, incentives, types of tasks performed, and type of structure. These features help explain differences in organizations' use of information systems.

Information systems and the organizations in which they are used interact with and influence each other. The introduction of a new information system will affect organizational structure, goals, work design, values, competition between interest groups, decision making, and day-to-day behavior. At the same time, information systems must be designed to serve the needs of important organizational groups and will be shaped by the organization's structure, business processes, goals, culture, politics, and management. Information technology can reduce transaction and agency costs, and such changes have been accentuated in organizations using the Internet. New systems disrupt established patterns of work and power relationships, so there is often considerable resistance to them when they are introduced.

2. *How does Porter's competitive forces model help companies develop competitive strategies using information systems?*

In Porter's competitive forces model, the strategic position of the firm, and its strategies, are determined by competition with its traditional direct competitors, but they are also greatly affected by new market entrants, substitute products and services, suppliers, and customers. Information systems help companies compete by maintaining low costs, differentiating products or services, focusing on market niche, strengthening ties with customers and suppliers, and increasing barriers to market entry with high levels of operational excellence.

3. *How do the value chain and value web models help businesses identify opportunities for strategic information system applications?*

The value chain model highlights specific activities in the business where competitive strategies and information systems will have the greatest impact. The model views the firm as a series of primary and support activities that add value to a firm's products or services. Primary activities are directly related to production and distribution, whereas support activities make the delivery of primary activities possible. A firm's value chain can be linked to the value chains of its suppliers, distributors, and customers. A value web consists of information systems that enhance competitiveness at the industry level by promoting the use of standards and industry-wide consortia, and by enabling businesses to work more efficiently with their value partners.

4. *How do information systems help businesses use synergies, core competencies, and network-based strategies to achieve competitive advantage?*

Because firms consist of multiple business units, information systems achieve additional efficiencies or enhance services by tying together the operations of disparate business units. Information systems help businesses leverage their core competencies by promoting the sharing of knowledge across business units. Information systems facilitate business models based on large networks of users or subscribers that take advantage of network economics. A virtual company strategy uses networks to link to other firms so that a company can use the capabilities of other companies to build, market, and distribute products and services. In business ecosystems, multiple industries work together to deliver value to the customer. Information systems support a dense network of interactions among the participating firms.

5. *What are the challenges posed by strategic information systems and how should they be addressed?*

Implementing strategic systems often requires extensive organizational change and a transition from one sociotechnical level to another. Such changes are called strategic transitions and are often difficult and painful to achieve. Moreover, not all strategic systems are profitable, and they can be expensive to build. Many strategic information systems are easily copied by other firms so that strategic advantage is not always sustainable.

Key Terms

Agency theory, 90
 Benchmarking, 105
 Best practices, 105
 Business ecosystem, 109
 Competitive forces model, 95
 Core competency, 107
 Disruptive technologies, 87
 Efficient customer response system, 97
 Mass customization, 98
 Network economics, 108
 Organization, 82

Primary activities, 102
 Product differentiation, 96
 Routines, 84
 Strategic transitions, 112
 Support activities, 104
 Switching costs, 99
 Transaction cost theory, 89
 Value chain model, 102
 Value web, 106
 Virtual company, 109

Review Questions

- Which features of organizations do managers need to know about to build and use information systems successfully? What is the impact of information systems on organizations?
 - Define an organization and compare the technical definition of organizations with the behavioral definition.
 - Identify and describe the features of organizations that help explain differences in organizations' use of information systems.
 - Describe the major economic theories that help explain how information systems affect organizations.
 - Describe the major behavioral theories that help explain how information systems affect organizations.
 - Explain why there is considerable organizational resistance to the introduction of information systems.

- Describe the impact of the Internet and disruptive technologies on organizations.
2. How does Porter's competitive forces model help companies develop competitive strategies using information systems?
 - Define Porter's competitive forces model and explain how it works.
 - Describe what the competitive forces model explains about competitive advantage.
 - List and describe four competitive strategies enabled by information systems that firms can pursue.
 - Describe how information systems can support each of these competitive strategies and give examples.
 - Explain why aligning IT with business objectives is essential for strategic use of systems.
 3. How do the value chain and value web models help businesses identify opportunities for strategic information system applications?
 - Define and describe the value chain model.
 - Explain how the value chain model can be used to identify opportunities for information systems.
 - Define the value web and show how it is related to the value chain.
 4. How do information systems help businesses use synergies, core competences, and network-based strategies to achieve competitive advantage?
 - Explain how information systems promote synergies and core competencies.
 - Describe how promoting synergies and core competencies enhances competitive advantage.
 - Explain how businesses benefit by using network economics.
 - Define and describe a virtual company and the benefits of pursuing a virtual company strategy.
 5. What are the challenges posed by strategic information systems and how should they be addressed?
 - List and describe the management challenges posed by strategic information systems.
 - Explain how to perform a strategic systems analysis.

Discussion Questions

1. It has been said that there is no such thing as a sustainable strategic advantage. Do you agree? Why or why not?
2. It has been said that the advantage that leading-edge retailers such as Dell and Walmart have over their competition isn't technology; it's their management. Do you agree? Why or why not?
3. What are some of the issues to consider in determining whether the Internet would provide your business with a competitive advantage?

Collaboration and Teamwork: Identifying Opportunities for Strategic Information Systems

With your team of three or four students, select a company described in *The Wall Street Journal*, *Fortune*, *Forbes*, or another business publication. Visit the company's Web site to find additional information about that company and to see how the firm is using the Web. On the basis of this information, analyze the business. Include a description of the organization's features, such as important business processes, culture, structure, and environment, as well as its

Video Cases

Video Cases and Instructional Videos illustrating some of the concepts in this chapter are available. Contact your instructor to access these videos.

business strategy. Suggest strategic information systems appropriate for that particular business, including those based on Internet technology, if appropriate. If possible, use Google Sites to post links to Web pages, team communication announcements, and work assignments; to brainstorm; and to work collaboratively on project documents. Try to use Google Docs to develop a presentation of your findings for the class.

Will TV Succumb to the Internet?

CASE STUDY

The Internet has transformed the music industry. Sales of CDs in retail music stores have been steadily declining while sales of songs downloaded through the Internet to iPods and other portable music players are skyrocketing. Moreover, the music industry is still contending with millions of people illegally downloading songs for free. Will the television industry experience a similar fate?

Widespread use of high-speed Internet access, powerful PCs with high-resolution display screens, iPhones, iPads, other mobile handhelds, and leading-edge file-sharing services have made downloading of video content from movies and television shows faster and easier than ever. Free and often illegal downloads of some TV shows are abundant. But the Internet is also providing new ways for television studios to distribute and sell their content, and they are trying to take advantage of that opportunity.

YouTube, which started up in February 2005, quickly became the most popular video-sharing Web site in the world. Even though YouTube's original mission was to provide an outlet for amateur filmmakers, clips of copyrighted Hollywood movies and television shows soon proliferated on the YouTube Web site. It is difficult to gauge how much proprietary content from TV shows winds up on YouTube without the studios' permission. Viacom claimed in a 2008 lawsuit that over 150,000 unauthorized clips of its copyrighted television programs had appeared on YouTube.

YouTube tries to discourage its users from posting illegal clips by limiting the length of videos to 10 minutes each and by removing videos when requested by their copyright owner. YouTube has also implemented Video ID filtering and digital fingerprinting technology that allows copyright owners to compare the digital fingerprints of their videos with material on YouTube and then flag infringing material. Using this technology, it is able to filter many unauthorized videos before they appear on the YouTube Web site. If infringing videos do make it online, they can be tracked using Video ID.

The television industry is also striking back by embracing the Internet as another delivery system for its content. Television broadcast networks such as NBC Universal, Fox, and CNN have put television shows on their own Web sites. In March 2007, NBC Universal, News Corp (the owner of Fox

Broadcasting), and ABC Inc. formed Hulu.com, a Web site offering streaming video of television shows and movies from NBC, Fox, ABC, Comedy Central, PBS, USA Network, Bravo, FX, Speed, Sundance, Oxygen, Onion News Network, and other networks. Hulu also syndicates its hosting to other sites, including AOL, MSN, Facebook, MySpace, Yahoo!, and Fancast.com, and allows users to embed Hulu clips in their Web site. The site is supported by advertising commercials, and much of its content is free to viewers. CBS's TV.com and Joost are other popular Web television sites.

Content from all of these sites is viewable over iPhones. Hulu has blocked services such as Boxee that try to bring Hulu to TV screens, because that would draw subscribers away from cable and satellite companies, diminishing their revenue.

According to Hulu CEO Jason Kilar, Hulu has successfully brought online TV into the mainstream. It dominates the market for online full-episode TV viewing, with more than 44 million monthly visitors, according to the online measurement firm comScore. Monthly video streams more than tripled in 2009, reaching over 900 million by January 2010.

What if there are so many TV shows available for free on the Web that "Hulu households" cancel their cable subscriptions to watch free TV online? Cable service operators have begun worrying, especially when the cable networks posted some of their programming on the Web. By 2010, nearly 800,000 U.S. households had "cut the cord," dumping their cable, satellite, or high-speed television services from telecom companies such as Verizon's FiOS or AT&T's U-verse. In their place, they turned to Web-based videos from services such as Hulu, downloadable shows from iTunes, by-mail video subscription services such as Netflix, or even old-style over-the-air broadcast programming. Although the "cord cutters" represent less than 1 percent of the 100 million U.S. households subscribing to a cable/satellite/telco television service, the number of cord-cutting U.S. households is predicted to double to about 1.6 million. What if this trend continues?

In July 2009, cable TV operator Comcast Corporation began a trial program to bring some of Time Warner's network shows, including TBS's *My Boys* and TNT's *The Closer*, to the Web. Other cable networks, including A&E and the History Channel, participated in the Comcast test.

By making more television shows available online, but only for cable subscribers, the cable networks hope to preserve and possibly expand the cable TV subscription model in an increasingly digital world. “The vision is you can watch your favorite network’s programming on any screen,” noted Time Warner Chief Executive Jeff Bewkes. The system used in the Comcast-Time Warner trial is interoperable with cable service providers’ systems to authenticate subscribers.

The same technology might also allow cable firms to provide demographic data for more targeted ads and perhaps more sophisticated advertising down the road. Cable programmers stand to earn more advertising revenue from their online content because viewers can’t skip ads on TV programs streamed from the Web as they do with traditional TV. Web versions of some television shows in the Comcast–Time Warner trial program, including TNT’s *The Closer*, will carry the same number of ads as seen on traditional TV, which amounts to more than four times the ad load on many Internet sites, including Hulu. Many hour-long shows available online are able to accommodate five or six commercial breaks, each with a single 30-second ad. NBC Universal Digital Entertainment has even streamed episodes of series, including *The Office*, with two ads per break. According to research firm eMarketer, these Web-video ads will generate \$1.5 billion in ad revenue in 2010 and \$2.1 billion in 2011.

For all its early success, Hulu is experiencing growing pains. Although it had generated more than \$100 million in advertising revenue within two years, it is still unprofitable. Hulu’s content suppliers receive 50 to 70 percent of the advertising revenue Hulu generates from their videos. Some of these media companies have complained that this revenue is very meager, even though use of Hulu has skyrocketed. One major supplier, Viacom, withdrew its programming from Hulu after failing to reach a satisfactory agreement on revenue-sharing, depriving Hulu viewers of such popular shows as *The Daily Show with Jon Stewart* and *The Colbert Report*.

Other companies supplying Hulu’s content have pressured the company to earn even more advertising dollars and to set up a subscription service requiring consumers to pay a monthly fee to watch at least some of the shows on the site. On June 29, 2010, Hulu launched such a service, called HuluPlus. For \$9.99 per month, paid subscribers get the entire current season of *Glee*, *The Office*, *House* and other shows from broadcasters ABC, Fox, and NBC, as well as all the past seasons of several series. Hulu will

continue to show a few recent episodes for free online. Paying subscribers will get the same number of ads as users of the free Web site in order to keep the subscription cost low. Paying subscribers are also able to watch shows in high definition and on multiple devices, including mobile phones and videogame consoles as well as television screens.

Will all of this work out for the cable industry? It’s still too early to tell. Although the cable programming companies want an online presence to extend their brands, they don’t want to cannibalize TV subscriptions or viewership ratings that generate advertising revenue. Customers accustomed to YouTube and Hulu may rebel if too many ads are shown online. According to Oppenheimer analyst Tim Horan, cable companies will start feeling the impact of customers canceling subscriptions to view online video and TV by 2012. Edward Woo, an Internet and digital media analyst for Wedbush Morgan Securities in Los Angeles, predicts that in a few years, “it should get extremely interesting.” Hulu and other Web TV and video sites will have much deeper content, and the technology to deliver that content to home viewers will be more advanced.

Sources: Ryan Nakashima, “Hulu Launches \$10 Video Subscription Service,” Associated Press, June 29, 2010; Ben Patterson, “Nearly 800,000 U.S. TV Households ‘Cut the Cord,’ Report Says,” Yahoo! News, April 13, 2010; Brian Stelter and Brad Stone, “Successes (and Some Growing Pains) at Hulu,” *The New York Times*, March 31, 2010; Brian Stelter, “Viacom and Hulu Part Ways,” *The New York Times*, March 2, 2010; Reinhardt Krause, “Cable TV Leaders Plot Strategy Vs. Free Programs on the Web,” *Investors Business Daily*, August 18, 2009; Sam Schechner and Vishesh Kumar, “TV Shows Bring Ads Online,” *The Wall Street Journal*, July 16, 2009; and Kevin Hunt, “The Coming TV-Delivery War: Cable vs. Internet,” *The Montana Standard*, July 18, 2009.

CASE STUDY QUESTIONS

1. What competitive forces have challenged the television industry? What problems have these forces created?
2. Describe the impact of disruptive technology on the companies discussed in this case.
3. How have the cable programming and delivery companies responded to the Internet?
4. What management, organization, and technology issues must be addressed to solve the cable industry’s problems?
5. Have the cable companies found a successful new business model to compete with the Internet? Why or why not?
6. If more television programs were available online, would you cancel your cable subscription? Why or why not?