

3

Information Systems, Organizations, and Strategy

LEARNING OBJECTIVES

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

- 3-1** Which features of organizations do managers need to know about to build and use information systems successfully?
- 3-2** What is the impact of information systems on organizations?
- 3-3** How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?
- 3-4** What are the challenges posed by strategic information systems, and how should they be addressed?
- 3-5** How will MIS help my career?

CHAPTER CASES

- N26: A Bank Without Branches
- Shipping Wars
- Singapore as a Smart Nation
- Offline, Online, and Back: The Evolution of the UK Grocery Market

VIDEO CASES

- GE Becomes a Digital Firm: The Emerging Industrial Internet
- National Basketball Association: Competing on Global Delivery with Akamai OS Streaming

MyLab MIS

Discussion Questions: 3-5, 3-6, 3-7; Hands-On MIS Projects: 3-8, 3-9, 3-10, 3-11;
eText with Conceptual Animations

N26: A Bank Without Branches

N26, a mobile bank, was founded in 2013 by Valentin Stalf and Maximilian Tayenthal. Since its launch, N26 has built a network of more than 5 million customers in 24 European countries. In 2019, N26 began operation in the United States in partnership with Axos Bank, and in 2020 it applied for a banking license in Brazil. In total, N26 has raised close to \$800 million from investors and, with a market value of \$3.5 billion as of May 2020, it is one of the most valuable and well-funded fintech startups in Europe.

Traditional banks typically employ a distributed IT landscape. Banks usually operate numerous self-developed software applications, but many of these are only partially adaptable to changing processes and needs. An online bank, however, has the scope to optimally design its IT landscape and customer interaction processes based on current needs—such as compatibility with a mobile app—without having to take legacy systems into consideration. N26 is one of the few fintech banks that is hosted entirely in the cloud on a single system. N26 is able to take advantage of a modern technology stack and has over 100 microservices running in production in different software languages and frameworks. For instance, in connection with its expansion into the United States and Brazil, N26 software engineers introduced a new layer for the configuration of geographic regions into their software application and infrastructure architecture. In the modern mobile economy, this can be an important competitive advantage.

Stalf and Tayenthal conceived N26 as offering simple and customer-centric processes that could be used anywhere in the world. All of the bank's processes can be carried out completely online, from identification via video chat to opening an account. In its advertising, N26 boasts that an account can be opened within 8 minutes. And N26 aims to grow further: the number of customers worldwide was expected to double in 2020 from 5 to 10 million, with COVID-19 hastening the adoption of digital banking. N26 has responded by accelerating the development of various new features, such as an instant banking feature that allows customers to add a digital version of a new card to their mobile wallet, giving them immediate access to contactless payments.

N26 previously introduced Cash26 to further improve their services in cash-based operations. This service allows customers to deposit or withdraw cash at



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checkout across a network of partner companies: the N26 app generates a barcode that controls the withdrawal or deposit, and this is simply scanned at the partner company's checkout to complete the transaction.

Banks have always been an attractive target for criminals, and their IT systems get more than their fair share of cyberattacks. N26 is investing heavily in the development of security systems, including the use of artificial intelligence, to combat phishing, a common problem in online banking, as well as other forms of cyberattack. It has also increased the number of customer service personnel to over 600 people in order to be able to offer better customer support. It expects to operate at a break-even level by the end of 2021.

Sources: Nadine Schimroszik, "German Fintech N26 Eyes More Fundraising before IPO in 2022—CEO," Reuters.com, December 17, 2020; Trotz Corona-Krise: "Smartphone-Bank N26 wächst weiter," *Der Standard*, August 11, 2020; N26 Corporation, "N26 Raises More Than \$100M in Extension of Its Series D Funding," Press Release, n26.com, May 4, 2020; "Smartphone-Bank N26 hat mehr als fünf Millionen Kunden," *Der Standard*, January 23, 2020; Ben Linders, "Scaling Infrastructure as Code at Challenger Bank N26," www.infoq.com, January 2, 2020; N26 Corporation, "The N26 History," n26.com, September 11, 2019; Jürgen Stüber, "Onlinebank Revolut greift mit Bitcoin-Handel N26 an," Gründerszene, December 7, 2019; Christian Gattringer, "Die Online Bank N26 ist mit Gratiskonten zum Milliardenwert geworden—bald kommt sie in die Schweiz," Neue Zürcher Zeitung, July 18, 2019; Valentin Stalf, Maximilian Tayenthal, "N26 startet in den USA!," n26.com, July 11, 2019; Jauernig Henning, "Phishing-Attacken und schlechter Service bei N26," Spiegel Online, March 28, 2019; Horst von Buttler, "N26 wird gefeiert, die Deutsche Bank bedauert," Capital, January 12, 2019; OTS, "N26 gibt Finanzierungsrunde in Höhe von 300 Millionen US-Dollar bekannt," APA-OTS, January 10, 2019; Emilie Rauschütz, "Ein Meilenstein bei N26—500 Angestellte," N26 Magazine, mag.n26.com, October 16, 2018; Raj Saxena, "Tech at N26—The Bank in the Cloud," medium.com, May 22, 2018; Andreas Dörnfelder, "Seine Bank gewinnt gerade Kunden wie kaum eine zweite in Europa," orange.handelsblatt.com, March 20, 2018.

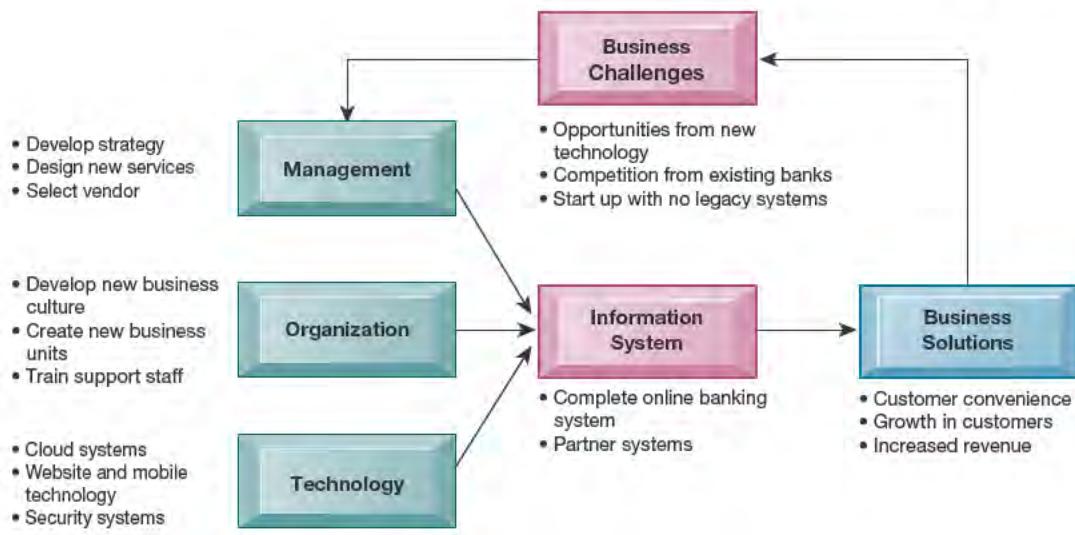
Case contributed by Bernd Schenk, University of Liechtenstein

N26's strategy illustrates some of the ways that information systems help businesses compete as well as the challenges of finding the right mixture of technology to establish a unique position in the market.

At each stage of the value chain, operational efficiency and customer intimacy can be improved by using information technology. Furthermore, value chain analysis points to opportunities for further development for N26. The bank should focus on operations to further improve services by focusing on customers' needs and improve sales and marketing by initiating customer referral campaigns. They should also take advantage of existing complementary technologies (such as wearables) that customers already own and are familiar with.

The chapter-opening diagram calls attention to important points raised by this case and chapter. N26's business model is based on using the latest technology to create new services and improve customer satisfaction. N26 is using information technology both to increase security and to create a completely virtual bank that does not have physical branches.

Here are some questions to think about: What are the components of N26's business strategy? How much does technology support that strategy?



3-1 Which features of organizations do managers need to know about to build and use information systems successfully?

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.

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 15 years ago, for instance, that email and instant messaging would become a dominant form of business communication and that many managers would be inundated with more than 200 email 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).

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.

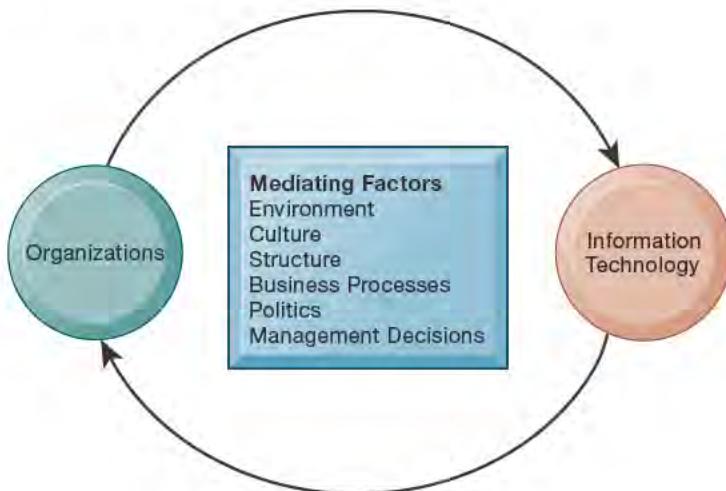
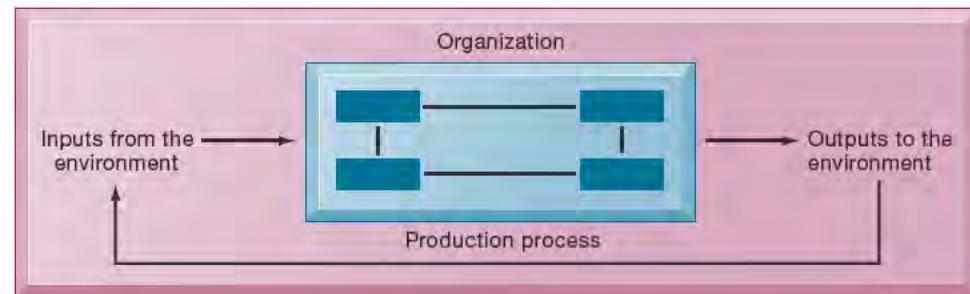


FIGURE 3.2 THE TECHNICAL MICROECONOMIC DEFINITION OF THE ORGANIZATION

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.



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 routine-ness. Organizations are formal legal entities with internal rules and procedures that must abide by laws. Organizations are also social structures because they are collections 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 a collection of rights, privileges, obligations, and responsibilities delicately balanced over a period of time through conflict and conflict resolution (see Figure 3.3).

FIGURE 3.3 THE BEHAVIORAL VIEW OF ORGANIZATIONS

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



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 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 a new information system effectively 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 share 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

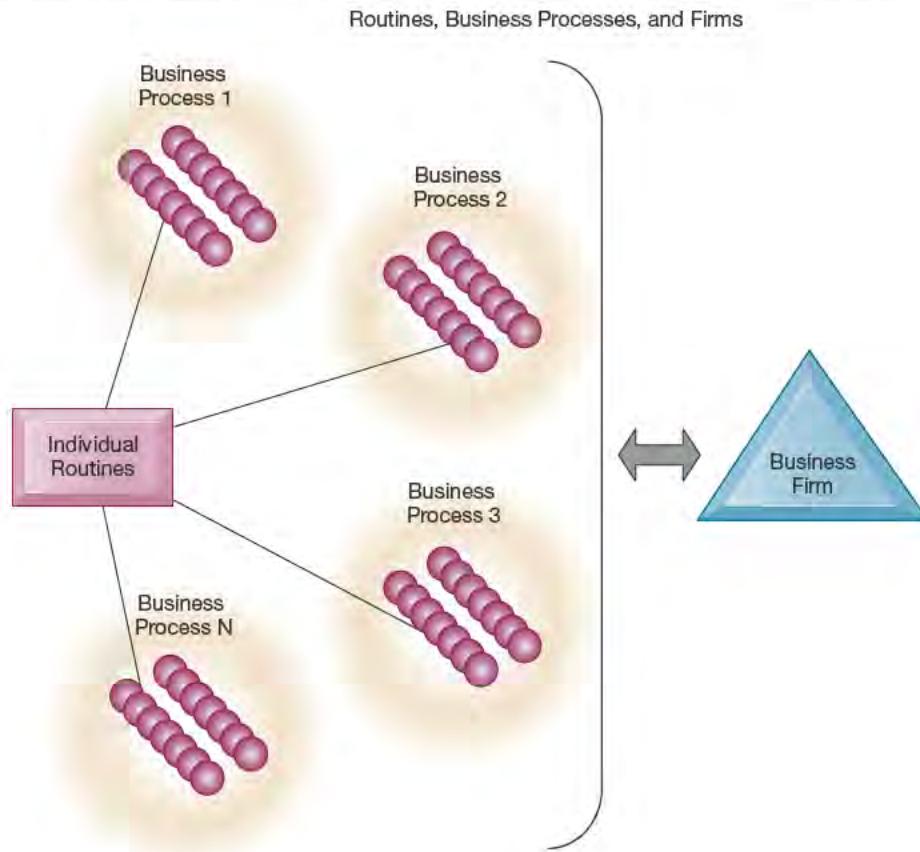
People in organizations occupy different positions with different specialties, concerns, and perspectives. As a result, they naturally have divergent viewpoints about how resources, rewards, and punishments should be distributed. These differences matter to both managers and employees, and they result in political struggles 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 who know how to work with the politics of an organization will be more successful than less-skilled managers in implementing new information systems.

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

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.



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.

Disruptive Technologies: Riding the Wave Sometimes a technology and resulting business innovation come along to radically change the business landscape and environment. These innovations are loosely called “disruptive” (Christensen, 2003; Christensen, Raynor, and McDonald, 2015). What makes a technology disruptive? In some cases, **disruptive technologies** are substitute products that

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.

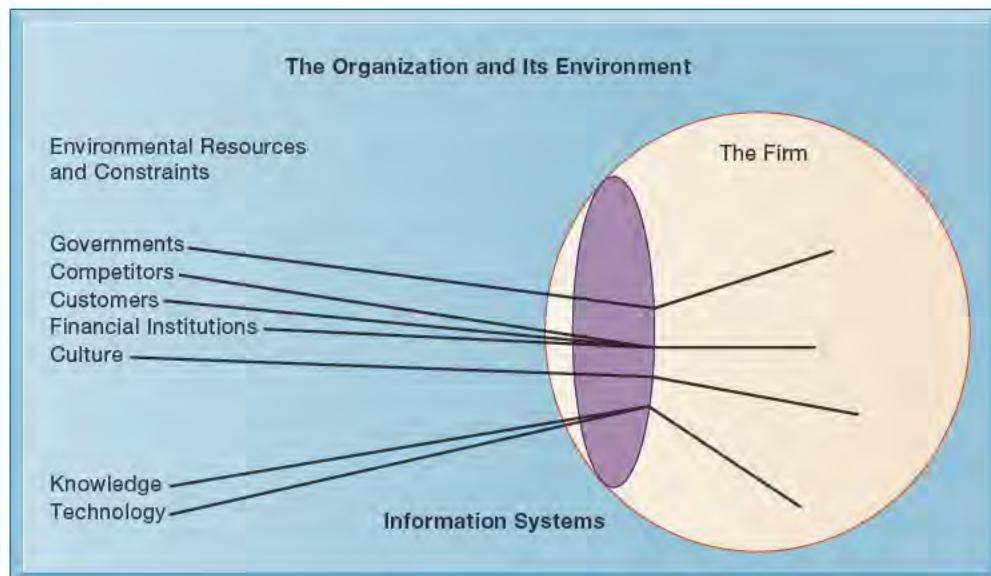


TABLE 3.1 DISRUPTIVE TECHNOLOGIES: WINNERS AND LOSERS

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.
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, and broadcast television) lose.
Internet music, video, TV services (1998)	Repositories of downloadable music, video, and TV broadcasts on the web	Owners of Internet platforms, telecommunications providers owning Internet backbone (ATT, Verizon), and local Internet service providers win, while content owners and physical retailers (Tower Records, Blockbuster) 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.

perform as well as or better (often much better) than anything currently produced. The car substituted for the horse-drawn carriage, the word processor for typewriters, streaming music services for portable CD players, and digital photography for process film photography. Table 3.1 describes just a few disruptive technologies from the past.

In these cases, entire industries were 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.

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). Moreover, not all change or technology is disruptive (King and Baatartogtokh, 2015). Managers of older businesses often do make the right decisions and find ways to continue competing. Disruptive technologies are tricky. Firms that invent disruptive technologies as "first movers" do not always benefit if they lack the resources to exploit the 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. Barclays' ATMs revolutionized retail banking, but they were copied by other banks. Now all banks use ATMs, with the benefits going mostly to the consumers.

Organizational Structure

All organizations have a structure or shape. Mintzberg's classification, described in Table 3.2, identifies five basic kinds of organizational structure (Mintzberg, 1971).

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

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.	Midsize 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

and social workers. In small entrepreneurial firms, you will often find poorly designed systems developed in a rush that quickly outgrow their usefulness. In huge multidivisional firms operating in hundreds of locations, you will frequently find there is not a single integrating information system, but instead each locale or each division has its own 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 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 What is the impact of information systems on organizations?

Information systems have become integral, online, interactive tools deeply involved in the minute-to-minute operations and decision making of large organizations. Over the past 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.

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 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, automakers such as Ford, Toyota, and Honda can achieve economies by obtaining more than 70 percent of their parts from the outside. Information systems make it possible for companies such as Apple to outsource assembly of iPhones to contract manufacturers such as Foxconn instead of making their products themselves.

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 2019, it generated \$9.3 billion in revenue with only 14,500 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. 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 coordinated activities such as processing orders or keeping track of inventory with very few clerks and managers.

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.

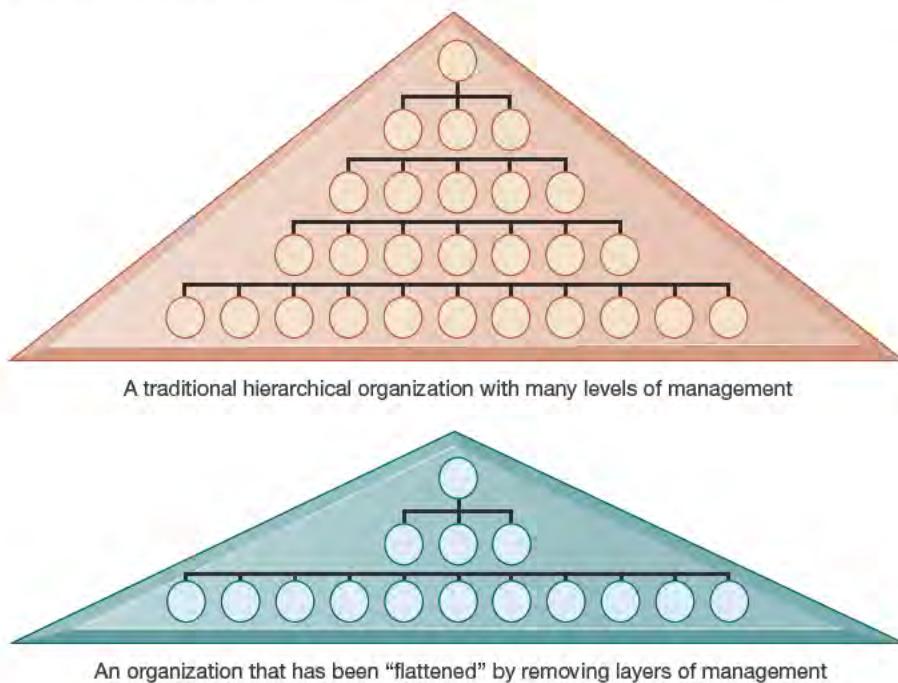
IT Flattens Organizations

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 3.6). 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 more 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.

FIGURE 3.6 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.



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

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. Many of its 492,000 employees move from location to location to work on projects at client locations in more than 50 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. Research on organizational resistance to innovation suggests that four factors are paramount: the nature of the IT innovation, the organization's structure, the culture of people in the organization, and the tasks affected by the innovation (see Figure 3.7). Here, changes in technology are absorbed, interpreted, 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 (Kolb and Frohman, 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.

FIGURE 3.7 ORGANIZATIONAL RESISTANCE TO INFORMATION SYSTEM INNOVATIONS

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.



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 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, a global sales force can receive nearly instant product price information updates using the web or instructions from management sent by email or text messaging on smartphones or mobile laptops. Vendors of some large retailers can access retailers' internal websites 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 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 How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?

In almost every industry you examine, you will find that some firms do better than most others. There's almost always a standout 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 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 3.8). 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

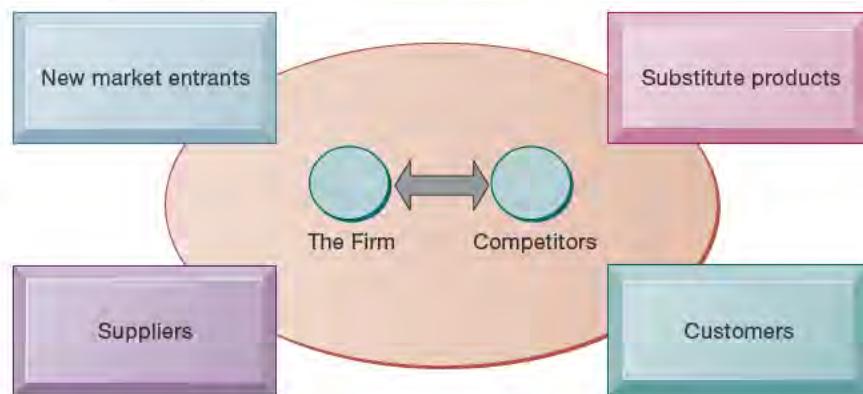
All firms share market space with other competitors who are continuously devising new, more-efficient ways to produce by introducing new products and services, and attempting to attract customers by developing their brands and imposing switching costs on their customers.

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 are hard to obtain. New companies have several possible

FIGURE 3.8 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 weaknesses: 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. Ethanol can substitute for gasoline in cars; vegetable oil for diesel fuel in trucks; and wind, solar, and hydro power for industrial electricity generation. Likewise, Internet and wireless telephone service can substitute for traditional telephone service. And, of course, an Internet music service that allows you to stream music tracks to an iPad or smartphone has become 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



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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.

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 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.

INTERACTIVE SESSION ORGANIZATIONS

Shipping Wars

Shipping and delivery have been vital to the success of e-commerce, both for retailers and for the shipping companies themselves. FedEx, UPS, and the United States Postal Service (USPS) have earned many billions of dollars handling the massive amount of products ordered from Amazon and other e-commerce sites. Convenient and seamless online ordering and shipping processes, along with free or low-cost delivery or two-day delivery, are a source of competitive advantage for online merchants over traditional brick-and-mortar retailers.

Especially important in logistics is the “last mile,” which refers to the last step in a delivery that takes the package to the customer’s doorstep. Instead of using the USPS, FedEx, or UPS for the last mile, Amazon is building a fleet of delivery vans and expanding its fleet of Boeing 737 and 767 airplanes for this purpose. Amazon Air is a cargo airline operating exclusively to transport Amazon packages. By 2021, Amazon Air will have at least 70 cargo aircraft operating out of over 20 air gateways in the United States. Amazon additionally expanded its airport hub operations, building a \$1.5 billion hub at Cincinnati/Northern Kentucky International Airport. Amazon also has operations at Fort Worth Alliance Airport and Chicago Rockford International Airport.

Amazon taking over the “last mile” will drain billions of dollars of business away from the US Post Office (which handles 62 percent of Amazon’s packages), UPS (handling 21 percent), and FedEx (handling 8 percent). Amazon is not trying to replace these shippers but does want to gain some control over logistics in order to guarantee that Amazon Prime members get their two-day shipping on time and that it has capability to handle very large sales volumes during the holidays or bad weather periods. Amazon will also save on costs. According to Morgan Stanley, Amazon saves \$2 to \$4 per package, amounting to \$2 billion annually, when it uses its own fleet. Additionally, having total control over the entire shipping process makes it possible for Amazon to provide a better customer experience. It is easier to track lost packages and respond immediately to customer inquiries if Amazon does not have to work through another shipper. Amazon’s shipping policies have been a principal driver of its rapid retail growth.

When Amazon announced one-day shipping for Prime members in April 2019, FedEx canceled its express delivery contract with Amazon, redefining its business strategy. Management believes FedEx doesn’t really need Amazon to flourish, since Amazon accounted for less than 1.3 percent of FedEx’s \$70 billion in consolidated annual revenues and had been one of FedEx’s least profitable customers on a margin basis. Management also believed that working with Amazon was cannibalizing FedEx’s own business. The direction FedEx has chosen calls for focusing on its ground delivery service and establishing new partnerships with other retailers and brands to serve the broader e-commerce market.

For example, in June 2019 FedEx and Dollar General announced a strategic alliance to offer new, convenient access to FedEx drop-off and pickup services at thousands of Dollar General stores. The effort is designed to increase access to FedEx for all customers, particularly those living in rural communities where Dollar General has a large footprint. FedEx and Dollar General began rolling out the service in more than 1,500 Dollar General stores in late summer 2019, and will be in more than 8,000 stores by the end of 2020. The Dollar General alliance will expand the FedEx Retail Convenience Network to more than 62,000 retail locations. That move will put more than 90 percent of Americans within 5 miles of a FedEx hold retail location. Customers will be able to drop off prepackaged and prelabeled FedEx Express or FedEx Ground shipments at Dollar General stores and pick up packages sent to their neighborhood Dollar General stores.

FedEx thinks it can overtake Amazon and become the fastest, most cost-efficient e-commerce delivery service. In December 2018 FedEx announced its Extra Hours’ Delivery Options for Retail Customers, which will provide next-day and overnight shipping to e-commerce customers. FedEx is also initiating package delivery seven days a week to further compete with Amazon.

How does United Parcel Service (UPS) stack up in this competitive arena? Unlike FedEx, UPS is deepening its ties to Amazon. It wants to stay neutral, whereas FedEx has broken away from Amazon in favor of courting the brick-and-mortar retailers. UPS is

also relying more on the U.S. Postal Service, especially for Sunday deliveries. FedEx is now delivering on its own about 2 million packages per day that it had formerly handed to the U.S. Postal Service for last-mile delivery. By handling an increased volume of packages on its own, FedEx believes it can make better use of its more than 600 sorting and delivery facilities around the United States to help retailers with shipments from stores to residences. However, analysts such as Morgan Stanley's Ravi Shanker are not sure

that increasing the volume of short-haul deliveries will generate the kind of returns FedEx is seeking.

Which company will win the retail shipping wars? The outcome could determine the future direction of the entire e-commerce retail industry.

Sources: Bloomberg, "FedEx Has a Plan to Battle Amazon Shipping, CEO Says," January 30, 2020; Greg Petro, "Amazon Versus FedEx: The Retail Shipping Wars," *Forbes*, June 28, 2019; and Shep Hyken, "Look Out FedEx and UPS—Is Amazon Going to Disrupt the Shipping Industry? *Forbes*, January 17, 2019.

CASE STUDY QUESTIONS

1. Why is shipping so important for e-commerce? Explain your answer.
2. Compare the shipping strategies of Amazon, FedEx, and UPS? How are they related to each company's business model?
3. Will FedEx succeed in its push into ground shipping? Why or why not?

The Interactive Session on Organizations provides another example of low-cost leadership strategy—the struggle among the major shipping companies such as FedEx, UPS, and now Amazon, for dominance of the e-commerce package shipping and delivery business.

Product Differentiation

Use information systems to enable new products and services or greatly change the customer convenience in using your existing products and services (see Table 3.3). Big Tech firms like Google, Facebook, Amazon, Apple, and others are pouring billions of dollars into research and deployment of new services, and enhancements to their most valuable services and products in order to differentiate them from potential competitors. For instance, Google has updated its Google Assistant to enable more natural continuous conversations and smart displays that can display the output of Assistant to screens. Google added Assistant support to its core Google Maps service to make interaction with Maps more natural, and released a Machine Language Kit for developers that supports text recognition, face detection, image labeling, and landmark recognition. The continual stream of innovations flowing from Big Tech companies ensures their products are unique and difficult to copy.

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 NIKE BY YOU program on its website. Customers are able to select the type of shoe, colors, material, and personalized text. Nike transmits the orders via computers to specially equipped plants in China and Korea. The sneakers 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**.

More and more companies are differentiating their products not just by the features of the products themselves but also by the entire experience of

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 iTunes	Apple sells music from an online library of more than 50 million songs.
Golf club customization: Ping	Customers can have clubs custom-fit and built to their individual specifications.
Online person-to-person payment: PayPal	PayPal enables the transfer of money between individual bank accounts and between bank accounts and credit card accounts.

buying and using the product. This is called the “customer experience,” and **customer experience management** (management of interactions with customers throughout the entire business relationship) has become an important competitive strategy.

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 websites. 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 checkouts. Contemporary customer relationship management (CRM) systems feature analytical capabilities for this type of intensive data analysis (see Chapters 2 and 9).

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. We discuss the tools and technologies for data analysis in Chapters 6 and 12.

Strengthen Customer and Supplier Intimacy

Use information systems to tighten linkages with suppliers and develop intimacy with customers. Toyota, Ford, and other automobile manufacturers use information systems to facilitate direct access by suppliers to production schedules and even permit suppliers to decide how and when to ship supplies to their factories. This allows suppliers more lead time in producing goods. On the customer side, Amazon keeps track of user preferences for book 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, Walmart has traditionally pursued a low-cost leadership strategy, but it also offers unique new services through its supercenters and more targeted marketing.

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 damped. Table 3.5 summarizes some of the potentially negative impacts of the Internet on business firms identified by Porter.

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, YouTube, Facebook, Travelocity, and Google are examples. In this sense, the Internet is “transforming” entire industries, forcing firms to change how they do business.

Smart Products and the Internet of Things

The growing use of sensors in industrial and consumer products, often called the Internet of Things (IoT), is an excellent example of how the Internet is changing competition within industries and creating new products and services. Under Armour and other sports and fitness companies are pouring money into wearable health trackers and fitness equipment that use sensors to report users' activities to remote corporate computing centers where the data can be analyzed. Farm tractors from John Deere, Kubota, and Mahindra are loaded with field radar, GPS transceivers, and hundreds of sensors keeping track of the equipment. GE is creating a new business helping its aircraft and wind turbine clients improve operations by examining the data generated from the many thousands of sensors in the equipment. The result is what are referred to as “smart products”—products that are a part of a larger set of information-intensive services sold by firms (Gandhi and Gervet, 2016; Porter and Heppelmann, 2014; Iansiti and Lakhani, 2014).

Smart products offer new functionality, greater reliability, and more intense use of products while providing detailed information that can be used to improve both the products and the customer experience. They expand

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	Uber, Nike, Apple
Focus on market niche	Use information systems to enable a focused strategy on a single market niche; specialize	Hilton Hotels
Customer and supplier intimacy	Use information systems to develop strong ties and loyalty with customers and suppliers	Toyota Corporation, Amazon

TABLE 3.5 IMPACT OF THE INTERNET ON COMPETITIVE FORCES AND INDUSTRY STRUCTURE

COMPETITIVE FORCE	IMPACT OF THE INTERNET
Substitute products or services	Enables 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	Reduces barriers to entry, such as the need for a sales force, access to channels, and physical assets; 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

opportunities for product and service differentiation. When you buy a wearable digital health product, you not only get the product itself, you also get a host of services. Smart products increase rivalry among firms that will either innovate or lose customers to competitors. Smart products generally raise switching costs and inhibit new entrants to a market because existing customers are trapped in the dominant firm's software environment. Finally, smart products may decrease the power of suppliers of physical components if, as many believe, the physical product becomes less important than the software and hardware that make it run. The Interactive Session on Technology case explores the use of sensors and other smart products to create a "smart nation".

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 3.9).

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.

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

INTERACTIVE SESSION TECHNOLOGY

Singapore as a Smart Nation

Singapore is a small island at the southern tip of the Malay Peninsula with a population of about 5.8 million. Over the second half of the last century, this tiny dot on the map has become well-known for its astonishing economic development—it is now one of the countries with the highest GDP per capita in the world.

The next step in Singapore's evolution is its plan to use information technology to transform itself into a "smart nation." A smart nation or city uses electronic data collection sensors, large scale data centers, and analytic software for initiatives that address a variety of urban challenges. Singapore's Smart Nation initiative aims to make Singapore a sustainable modern city, countering the pressures of increasing urban density and an aging population. Recently, Singapore has also launched a national artificial intelligence strategy, which its government has identified as a key step in the development of its Smart Nation program.

As one of the smallest countries in the world, Singapore does not have much room to expand its transport infrastructure. The Singapore government announces traffic-related indexes, traffic alerts, and traffic snapshots in national and regional views by consolidating data provided by the weather and the transport departments, collected by surveillance cameras on traffic hotspots, sensors on vehicles, commuters' fare cards, and the Electronic Road Pricing System (Singapore's electronic toll collection scheme for alleviating traffic jams). Before travelers hit the road, they now can consult the Realtime Singapore Traffic Watch website or third-party mobile apps for traffic conditions and commute details such as bus arrival timings. Singapore is also testing on-demand driverless vehicles.

Housing planning in Singapore must consider its sunny, hot, and humid climate. Virtual Singapore creates simulations to design a comfortable green living environment that balances the needs of a large population in a limited space. It offers a dynamic 3D city model and data hub, available for the general public, government bureaus, businesses, and research institutes to conduct long-term planning and virtual experiments. Smart Towns are equipped with solar energy panels and smart lights, which light up or dim depending on whether they detect passers-by, thus saving energy. This smart lighting system won first place at the IDC Smart City Asia Pacific Awards 2020 in the category of smart building/smart tech parks. The Automated Meter Reading scheme will allow residents

to access water usage data with just a few taps on their smartphones. The Pneumatic Waste Conveyance System aims to deliver household waste to sealed containers through underground vacuum tunnels and use sensors to adjust the service cycle of trash-collection trucks. The authority uses drones to survey mosquito breeding hotspots to prevent outbreaks of dengue fever.

Patients in Singapore can obtain medical advice from healthcare professionals without leaving home through the Smart Health Video Consultation system, which is made possible by the wide coverage of stable, high-speed household Internet connections and the high level of smartphone penetration. Patients in Singapore may perform rehabilitation exercises anytime and anywhere using a TeleRehab kit. It has been designed to be easy to operate—a patient just needs to access the app in the tablet PC provided in the kit, put the limb and neck sensors on correctly, and perform the rehab exercises (by following the video demos on the tablet) using the appropriate exercise bands with different levels of resistance. If necessary, they can consult their therapist in real time during office hours using video-conferencing. To keep its senior citizens healthy and active, Singapore has introduced RoboCoach, a robot fitness trainer that replicates human movements using motion-sensor technology and gives instructions in one of four languages or dialects.

There are other infrastructural projects in progress, such as CODEX (a data exchange platform for internal data-sharing among government agencies), NDI (a digital identification program of citizens and businesses that allows pre-filled form information to be shared with authorized public or private parties), Moments of Life (a one-stop portal for parents to fill out and submit applications for their newborns), and the Smart Nation Sensor Platform (a scheme to collect different types of data, such as air quality, on a territory-wide scale). The private sector, research institutions, and individuals contribute ideas and launch projects.

Singapore was named the Smart City of 2018 at the Smart City Expo World Congress for its outstanding performance and for setting a model for the world by involving its people, the private sector, and government agencies in implementing its blueprints for a smart nation. Its projects have demonstrated the city's willingness to improve the quality of life of its residents, and all signs indicate that its tech strategies will continue to enrich their lives in the future.

However, smart cities and smart nations are not without their issues. Critics point out that in the last ten years smart city and smart nation projects have failed to deliver on many of their objectives, such as reducing urban automobile congestion and pollution despite grand promises with budgets to match. They also take many years to implement the technology, let alone the solutions. The initiatives are often ignored by citizens who fail to see the benefits in their daily lives, especially for poor, elderly, and less tech-savvy citizens, and they pose extraordinary privacy and security issues as well.

Sources: IDC Smart City Asia Pacific Awards, "2020 Winners," www.idc.com, May 20, 2020; Integrated Health Information Systems, Ihis.com.sg, accessed January 8, 2020; Smart Nation Singapore, "Smart Nation Initiatives/Strategic National Projects," Smartnation.sg, accessed January 8, 2020; Eileen Yu, "Singapore Wants Widespread AI Use in Smart Nation Drive," Zdnet.com, November 14, 2019; Tham Yuen-C, "What Is Codex? The Tech Behind Singapore's Smart Nation," Govinsider.asia, April 24, 2019; Kevin McSpadden, "Critics of SG Smart City and All Smart Cities Worldwide—5 Critiques of the Smart City Push," Yahoo News, September 2018; "Finance and Policy AP: Can Investment of \$100m in AI Get Singapore's 'Smart Nation' Vision Back on Track?" Smartcitiesworldforums.com, May 8, 2017; Kevin Kwang, "Commentary: Singapore's Smart Nation Vision Blurry Without a Success Story," Channel News Asia, August 15, 2017; Maros Krivý, "Towards a Critique of Cybernetic Urbanism: The Smart City and the Society of Control," Journal of Planning Theory, April 27, 2016; Boyd Cohen, "The Smartest Cities in the World 2015: Methodology," www.fastcompany.com, November 20, 2014.

CASE STUDY QUESTIONS

1. What are the factors driving the Smart Nation initiative?
2. Describe the smart city initiatives of an urban center in your country or region.
3. What are the possible downsides to the Smart Nation project?

Case contributed by Joyce Chan, City University of Hong Kong

(improving products and the production process), and procurement (purchasing input).

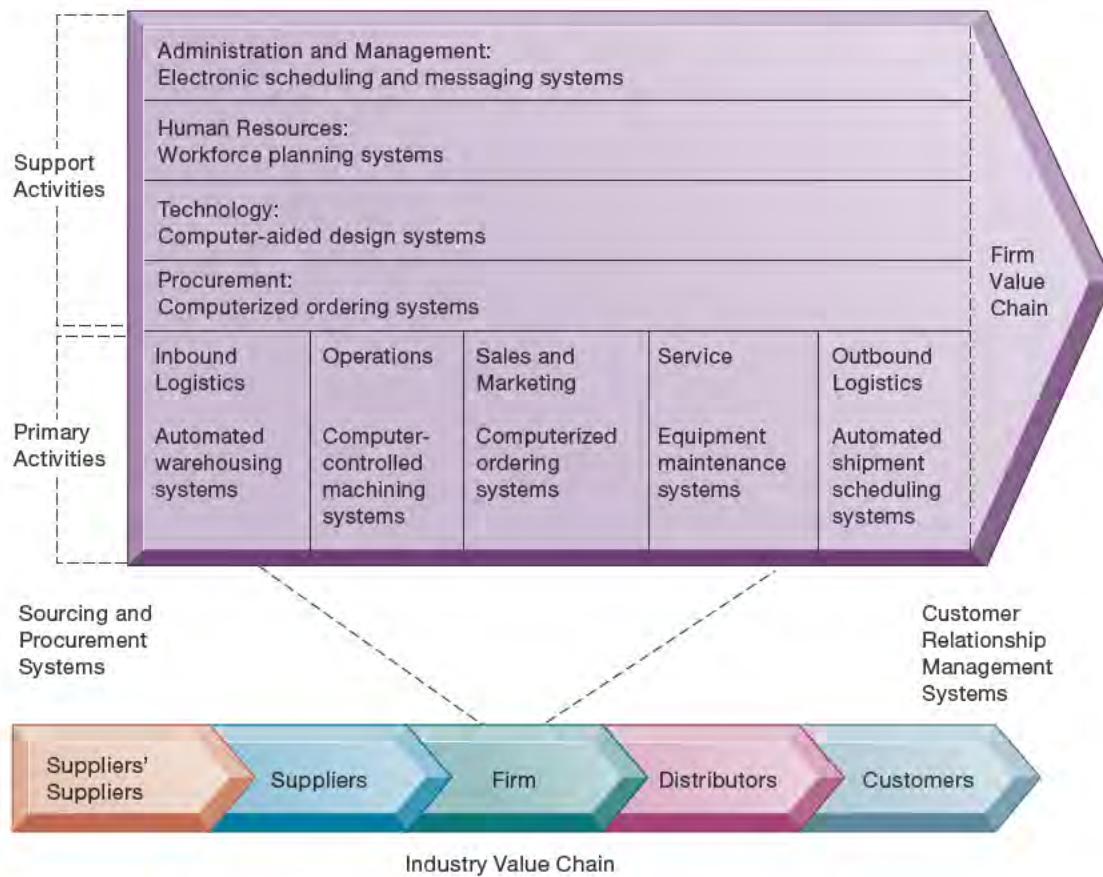
Now you can ask at each stage of the value chain, "How can we use information systems to improve operational efficiency and improve customer and supplier intimacy?" This will force you to critically examine how you perform value-adding activities at each stage and how the business processes might be 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 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

FIGURE 3.9 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 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!

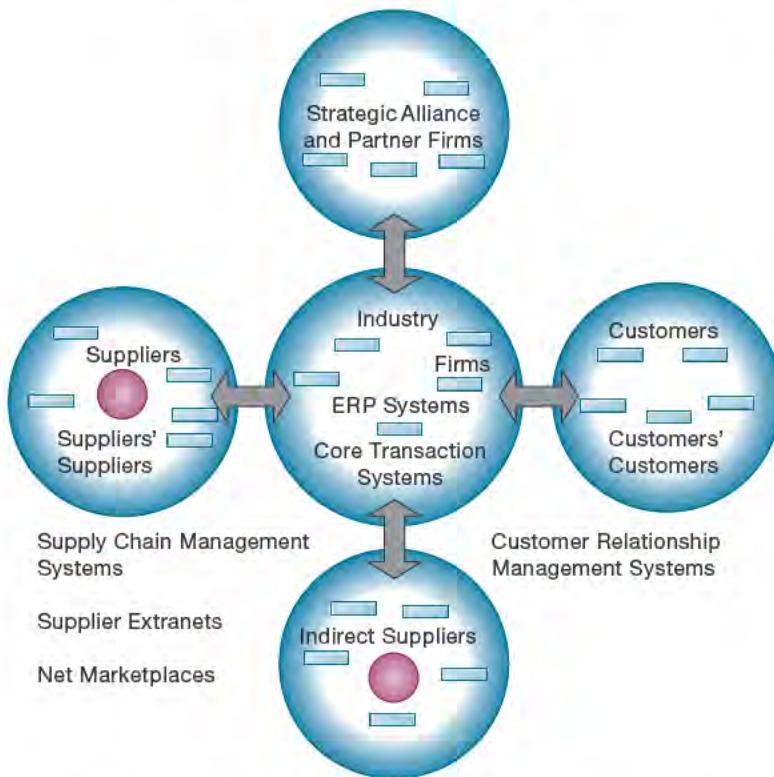
Extending the Value Chain: The Value Web

Figure 3.9 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 industrywide 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 industrywide, IT-supported consortia, symposia, and communications networks to coordinate activities concerning government agencies, foreign competition, and competing industries.

FIGURE 3.10 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.



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 3.10 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.

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. Bank and financial firm mergers such as the merger of 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 by helping people working on similar problems share ideas and expertise. Employees working in research and development (R&D), engineering, purchasing, marketing, legal affairs, and business information systems around the world can share documents, reports, charts, videos, and other data from various sources online and locate employees with special expertise. P&G systems also can link to research scientists and entrepreneurs outside the company who are searching for new, innovative products worldwide.

Network-Based Strategies

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 **Network economics** refers to market situations where the economic value being produced depends on the number of people using a product. For certain products and markets, the real economic value comes from the fact that other people use the product. In these situations, "network effects" are at work. For instance, what's the value of a telephone if it is not connected to millions of others? Email has value because it allows us to communicate with millions of others. Business models that are based on network effects have been highly successful on the Internet, including social networks, software, messaging apps, and on-demand companies like Uber and Airbnb.

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. The value of Facebook to users increases greatly as more people use the social network.

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, is an example. This business is based on a network of millions of users, and has built an online community by using the Internet. 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 organizationally 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 15,000 suppliers in 40 countries all over the world. Customers place orders with 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.

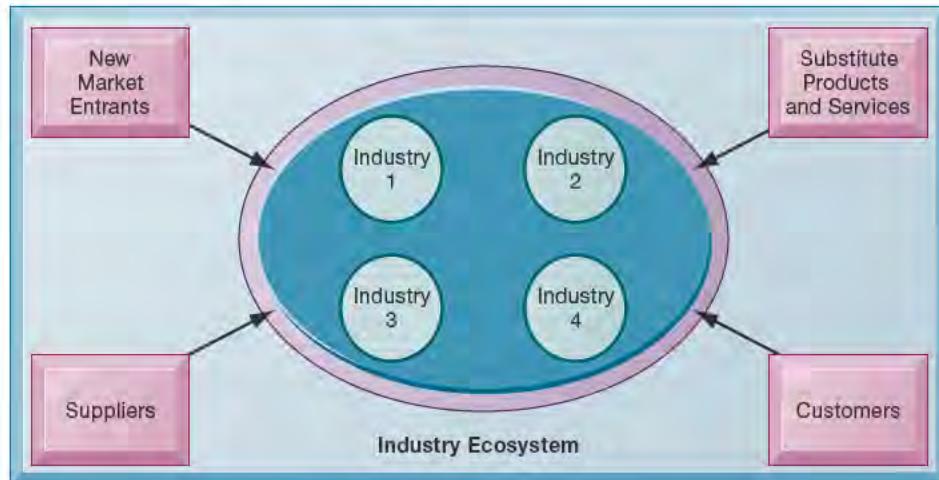
Business Ecosystems and Platforms The Internet and the emergence of digital firms call for some modification of the industry competitive forces model. The traditional Porter model assumes a relatively static industry environment; relatively clear-cut industry boundaries; and a relatively stable set of suppliers, substitutes, and customers. Instead of participating in a single industry, some of today's firms participate in industry sets—collections of industries that provide related services and products that deliver value to the customer (see Figure 3.11). **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).

An example of a business ecosystem is the mobile Internet platform. In this ecosystem there are four industries: device makers (Apple iPhone, Samsung, 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 mobile digital platform ecosystem, creating value for consumers that none of them could achieve acting alone.

Business ecosystems typically have one or only a few keystone firms that dominate the ecosystem and create the **platforms** used by other niche firms.

FIGURE 3.11 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.



For instance, both Microsoft and Facebook provide platforms composed of information systems, technologies, and services that thousands of other firms in different industries use to enhance their own capabilities (Van Alstyne et al., 2016). Facebook is a platform used by billions of people and millions of businesses to interact and share information as well as to buy, market, and sell numerous products and services. More firms are trying to use information systems to develop into keystone firms by building IT-based platforms that other firms can use. Alternatively, firms should consider how their information systems will enable them to become profitable niche players in the larger ecosystems created by keystone firms.

3-4 What are the challenges posed by strategic information systems, and how should they be addressed?

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 advantages disappear very quickly because virtually all companies can use this technology. Classic strategic systems, such as American Airlines's SABRE computerized reservation system, Barclays' ATM system, and FedEx's package tracking system, benefited by being the first in their industries. Then rival systems emerged. Amazon was an e-commerce leader but now faces competition from eBay, Walmart, 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 businesspeople 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, value webs, ecosystems, or platforms?
 - 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?

3-5 | How will MIS help my career?



Here is how Chapter 3 and this book can help you find a job as an entry-level business development representative.

The Company

Superior Data Quality, a fast-growing Australia-based company providing software and services to help large companies manage their data and data quality, is looking for an entry-level business development representative. The company's data quality and data management tools and services help firms correct, standardize, and enhance customer data by capturing accurate address, email, and phone information; removing duplicate data in corporate systems; analyzing data to discover relationships; restructuring and standardizing data; and monitoring data to ensure ongoing quality control and standardization. The company has 12,000 clients worldwide, 450 employees, and offices throughout the United States, Europe, and Asia.

Position Description

The business development representative will help the company's sales team meet aggressive growth targets. The company provides classroom and on-the-job training on how to communicate with prospects and customers, how to identify appropriate markets for its solutions, how to write a sales plan, and how to use tools such as Salesforce.com. Job responsibilities include:

- Researching targeted accounts to generate potential business opportunities.
- Supporting customer acquisition and sales strategies.
- Implementing tactics for successful execution of marketing campaigns.
- Building and managing a pipeline of sales leads through prospecting and qualifying marketing-generated leads.
- Reporting on the success of campaigns and lead generation activities.

Job Requirements

- Bachelor's degree
- Strong interest in a sales career
- Exceptional communication, interpersonal, analytical, and problem-solving skills
- Ability to multitask in fast-paced environment

Interview Questions

1. What do you know about data quality and data management? Have you any work experience in these areas? Have you ever encountered a data quality problem? If so, can you describe how the problem was solved?
2. Have you ever worked with Salesforce.com? What do you know about it? How have you used the software?
3. Can you give us an example of a marketing or sales-related problem or other business problem that you helped solve? Do you have any examples of your writing and analysis work?
4. Have you had much face-to-face contact with customers? Can you describe what work you did with customers?

Author Tips

1. Review the discussion of IT and business strategy in Chapter 3 and also the section on data management, including data quality, in Chapter 6.
2. Use the web to find out more about tools and services for promoting data quality and data management and research the company's specific offerings in this area.
3. Review the company's LinkedIn profile and posts in addition to other social media channels. Are there consistent themes across these channels on which the company seems to focus? Be prepared to show that you understand the kinds of business challenges facing this company.
4. Learn what you can about Salesforce.com related to the responsibilities outlined for this job. Inquire about exactly how you would be using Salesforce.com in your work.
5. Consider inquiring what kinds of problems with customers' data quality you would be most likely to encounter on the job.

REVIEW SUMMARY

3-1 Which features of organizations do managers need to know about to build and use information systems successfully?

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.

3-2 What is the impact of information systems on organizations?

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.

3-3 How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics 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.

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 industrywide consortia and by enabling businesses to work more efficiently with their value partners.

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.

3-4 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 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, 119
Benchmarking, 132
Best practices, 132
Business ecosystem, 137
Competitive forces model, 123
Core competency, 135
Customer experience management, 128
Disruptive technologies, 116
Efficient customer response system, 125
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Switching costs, 128
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Value chain model, 130
Value web, 134
Virtual company, 136

MyLab MIS

To complete the problems with MyLab MIS, go to the EOC Discussion Questions in MyLab MIS.

Review Questions

3-1 Which features of organizations do managers need to know about to build and use information systems successfully?

- How is interaction between information technology and organizations influenced by mediating factors?
- How do the definitions of organizations relate to their use of information systems technology?

3-2 What is the impact of information systems on organizations?

- Describe how information technology can help an organization contract in size.
- List the four most common factors underpinning organizational resistance to innovation.
- Explain how the Internet is radically changing key business practices.
- Identify three key organizational factors to consider when planning a new system.

3-3 How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics 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.
- 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.
- Explain how the value web helps businesses identify opportunities for strategic information systems.
- Describe how the Internet has changed competitive forces and 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 and ecosystems.
- Define and describe a virtual company and the benefits of pursuing a virtual company strategy.

3-4 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

- 3-5** MyLab MIS It has been said that there is no such thing as a sustainable strategic advantage. Do you agree? Why or why not?
- 3-6** MyLab MIS It has been said that the advantage that leading-edge retailers such as Dell and Walmart have over their competition isn't
- 3-7** MyLab MIS technology; it's their management. Do you agree? Why or why not?
- What are some of the issues to consider in determining whether the Internet would provide your business with a competitive advantage?

Hands-On MIS Projects

The projects in this section give you hands-on experience identifying information systems to support a business strategy and to solve a customer retention problem, using a database to improve decision making about business strategy, and using web tools to configure and price an automobile. Visit MyLab MIS to access this chapter's Hands-On MIS Projects.

Management Decision Problems

- 3-8** Dolce is an Italian company selling high-end turnkey kitchen designs—designer stoves, refrigerators, microwave ovens, and other appliances as well as worktops and kitchen cabinets. To compete better globally, Dolce has decided to let customers design their own kitchens through a web-based interface. The client needs to insert the exact measurements and make requests for appliances and furniture materials, and then the order will go to the Italian factory, where the kitchen's parts will be assembled, packaged, and sent to the client. How can Dolce take advantage of information systems to succeed with this concept?
- 3-9** Habibi Watches sells trendy watches and other apparel online in the United Arab Emirates. As a purchase requires registration, the company has been able to acquire a lot of customer data. Information regarding a customer's previous purchases and email and home addresses is therefore easily obtainable. How can information systems help Habibi Watches attract more attention from existing customers? How can management decisions be made regarding quality of customer service, product quality, etc. using information systems?

Improving Decision Making: Using a Database to Clarify Business Strategy

Software skills: Database querying and reporting; database design

Business skills: Reservation systems; customer analysis

- 3-10** In this exercise, you will 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.

In MyLab MIS, you will find a database for hotel reservation transactions developed in Microsoft Access with information about the President's Inn in Cape May, New Jersey. At the Inn, 10 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 person per day. Guests staying for seven days or more receive a 10 percent discount on their daily room rates. The owners currently use a manual reservation and bookkeeping system, which has caused many problems. Use the database to develop reports on average length of stay, average visitors per room, base revenue per room (i.e., length of visit multiplied by the daily rate), and strongest customer base. After answering these questions, write a brief report about the Inn's current business situation and suggest future strategies.

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

Software skills: Internet-based software

Business skills: Researching product information and pricing

- 3-11** In this exercise, you will use software at car websites to find product information about a car of your choice and use that information to make an important purchase decision. You will also evaluate two of these sites as selling tools.

You are interested in purchasing a new Ford Escape (or some other car of your choice). Go to the website of CarsDirect (www.carsdirect.com) and begin your investigation. Locate the Ford Escape. Research the various Escape models, and choose one you prefer in terms of price, features, and safety ratings. Locate and read at least two reviews. Surf the website of the manufacturer, in this case Ford (www.ford.com). Compare the information available on Ford's website with that of CarsDirect for the Ford Escape. Try to locate the lowest price for the car you want in a local dealer's inventory. Suggest improvements for CarsDirect.com and Ford.com.

Collaboration and Teamwork Project

Identifying Opportunities for Strategic Information Systems

- 3-12** With your team of three or four other students, select a company described in the *The Financial Times*, *Fortune*, *Forbes*, or another business publication or do your research on the web. Visit the company's website 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 business strategy. Suggest strategic information systems appropriate for that particular business, including those based on Internet technology, if appropriate. If possible, use Google Docs and Google Drive or Google Sites to brainstorm, organize, and develop a presentation of your findings for the class.

Offline, Online, and Back: The Evolution of the UK Grocery Market

CASE STUDY

The UK grocery market is predicted to grow by 12.5 percent through 2024, and according to the food and grocery research organization IGD, it is expected to reach a value of £217.7 billion. The main grocery stores operating in Great Britain are Tesco, which, as of December 2020, had a market share of 27 percent; Sainsbury, 15.7 percent; ASDA, 14.1 percent; and Morrisons, 10.3 percent. Together, they cover over 65 percent of the grocery market and are considered the “Big Four” in the United Kingdom. Tesco reached its peak in 2007, when it held 31.1 percent of the UK grocery market share. Worldwide, the company operates around 7,000 stores across Europe and Asia.

In the United Kingdom, Tesco focused on implementing a strategy that enabled the company to offer the lowest costs and achieve cost leadership. This drew price-sensitive customers away from its competitors and increased its market share. Tesco adopted the following strategies to maintain this cost leadership: (1) high utilization of assets through production of large outputs and spreading fixed costs over large quantities, (2) minimal direct and indirect costs in the production and distribution stages, and (3) strict control over the supply chain to ensure low costs. This strategy was viable for Tesco; as a big company, it could take advantage of economies of scale in the market.

However, due to the popularity of discount supermarkets such as Aldi and Lidl, Tesco has recently been struggling to maintain its cost leadership. Consumer behavior has changed in the United Kingdom due to economic recession and inflation, leading customers to shift to budget supermarkets for their grocery purchases. Over the last several years, Tesco's market share has fallen slightly; by contrast, Aldi and Lidl have continuously been increasing their market share over the last few years. In December 2020, Aldi was the fifth largest grocery chain in the United Kingdom with a market share of 7.7 percent.

Besides the physical supermarkets, Tesco initially operated two online platforms: Tesco.com for grocery home deliveries and Tesco Direct for household goods and clothing. However, in May 2018, Tesco

announced Tesco Direct's closure in an unexpected move. Tesco Direct had been launched in 2006, and it had cost the company £25–£30 million. According to Charles Wilson, the then CEO of Tesco's UK chain, closing one of the websites would help them to focus their investment in one platform to offer better service and more products to customers. Although the closure cost 500 jobs, it was not a huge surprise, considering that Tesco had, by its own admission, faced challenges in making it profitable. Tesco's attempt to compete with huge online retailers such as Amazon and Argos had failed because it had been unable to make profits after covering the costs of marketing and order fulfillment.

Besides this setback, Tesco must also contend with the threat from discount supermarkets. By June 2019, Aldi had opened 830 stores in the United Kingdom since 1990, when its first store was launched. Aldi reported £11.3 billion in revenue for 2018, an 11 percent increase over the previous year. Similarly, Lidl reached a total of 760 stores by June 2019 and also plans to continue to grow over the next five years. Customers were skeptical at the beginning, but once they saw the low-price products, they switched their buying preferences to these discount supermarkets.

The COVID-19 crisis served as a further boost to the discount sector. According to some estimates, customers who switched from the Big Four supermarkets save over £2.2 billion annually by shopping at Aldi. Aldi UK's most successful year was 2017, when it generated £10 billion in annual sales for the first time.

Experts argue that the main reasons these discount supermarkets have been successful is rising inflation and the stagnation in wages, and the atmosphere of uncertainty brought about by the COVID-19 crisis. The services offered by Aldi are similar to those that the “Big Four” provide their customers, but Aldi has the advantage of lower prices and is still considered a discounter, which is especially attractive for customers during inflation. Surveys show that Aldi also gets very good ratings in customer satisfaction. During the COVID-19 crisis, Aldi announced the opening of 100 new stores and

further investment in a new online ordering service. Aldi is trying out new formats of home delivery; for example, “click-and-collect” enables shoppers to order groceries and pick them up at a nearby store. Furthermore, a partnership with the courier firm Deliveroo allows for rapid grocery delivery service within half an hour.

Ever since the two discount supermarkets came to the United Kingdom from Germany, they have forced the big grocery stores to rethink their approach. Thanks to their low-price grocery strategy, Aldi and Lidl have changed the UK supermarket industry for some time to come. Big supermarkets like Tesco and Sainsbury already offer online grocery shopping, but they faced difficulties making a profit from their e-commerce operations. With Aldi and Lidl's entry into this market, these challenges will only increase.

In the beginning of 2016, Aldi opened its first online store for the UK market. The discount retailer made its opening move by investing £35 million to launch an online website for selling wine, which was followed by non-food “special buys.” According to Kantar Retail analyst Bryan Roberts, this move is a smart way of reaching customers who don't have access to an Aldi.

Lidl founded the Lidl Digital Logistics, and experts expect this supermarket to enter the grocery delivery market too. So far, Lidl has sold wine and some non-food items online in parts of Europe, but not groceries. Lidl's approach to entering the digital market is quite innovative: recently, they launched a chatbot designed to help customers in their choice of wine based on what they are eating.

The public love for the discounters signifies a major threat for big supermarkets looking to keep their market share, both on- and offline. To take the fight to Aldi and Lidl, and having seen Aldi and Lidl's success in gaining market share, Tesco announced plans in 2018 to open a discount chain of 60 stores all over the United Kingdom, thus entering the fast-growing discount market. History has shown that attempts by big supermarkets to launch discount brands have largely failed. Tesco was no exception, and it has since scaled back those plans and even closed some of those stores.

With Aldi and Lidl trying to enter the e-commerce industry and Tesco trying to defeat them by entering the discount market, the war between the big and budget supermarkets has taken some interesting

turns, especially since food shopping has undergone changes too: more people prefer to buy food on a daily basis and more locally, and a high number of them prefer to buy their food online. A number of European retailers have responded to this by opening smaller stores in nearby locations, launching online stores, and testing other new models for shopping.

Tesco has been in the business of selling on the Internet for a long time now; in 1996, it became the first supermarket to launch online shopping. There are several ways Tesco is using information technology to its advantage. For instance, in 2011, while Tesco's domestic United Kingdom sales were dropping, it was a huge success in South Korea, its largest market outside the United Kingdom, as a result of its ability to adapt to local customer needs. As South Koreans are among the people with the longest working hours worldwide, Tesco introduced “virtual stores” with its Homeplus brand in the country. It displayed these virtual stores in subways and bus stations, where people could scan products' barcodes using their smartphones and purchase them online. These products were then delivered to them right after they returned home, thus saving time and effort for the consumers.

History has shown that the grocery industry needs to adapt to consumer demands and lifestyles continuously. The United Kingdom and South Korea are a study in contrasts. While people in the United Kingdom switched from domestic big supermarkets to budget supermarkets, the opposite happened in South Korea thanks to Homeplus, which turned Tesco into the country's second largest grocery retailer. Customers in the United Kingdom are price-sensitive due to economic recession and inflation, whereas customers in South Korea have embraced the technology made available to them to suit their time-sensitive lifestyle.

E-commerce is a huge opportunity for discounters, but what will happen to the grocery sector if Aldi and Lidl decide to offer their full range of products online? Perhaps more importantly, can they gain a bigger share of the grocery market at the expense of the Big Four in United Kingdom? Some experts believe that this strategy is untenable. According to retail consultant Graham Soult, the discount supermarkets' initiative of entering the online shopping market runs the same risks and problems that other supermarkets have faced. He believes that the uniqueness of these supermarkets lies in their simplicity and low

cost, which they might be putting at risk when they start to sell food and groceries online. Simply put, the complexity of the e-commerce industry might not fit their low-cost business model.

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CASE STUDY QUESTIONS

- 3-13** Analyze the cost leadership strategy of Tesco based on Porter's Competitive Forces Model. Why would it be a smart move to close one of its online shopping sites?
- 3-14** Do you think Aldi and Lidl's strategy of venturing into e-commerce is a good idea?
- 3-15** Comment on Tesco's strategy of opening a discount chain. Do you think it could recover Tesco's former market position? Explain your answer.
- 3-16** How much potential do you see for virtual stores (like the ones Tesco introduced in South Korea) in the United Kingdom?

Case contributed by Bernd Schenk, University of Liechtenstein

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