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CHAPTER

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

Technology Helps Starbucks Find Better Ways to Compete

Digital Technology Helps Crayola Brighten Its Brand

Smart Products-Coming Your Way

Grocery Wars

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; **Writing Assignments:** 3-17, 3-18; **eText with Conceptual Animations**

Technology Helps Starbucks Find Better Ways to Compete

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tarbucks is the world's largest specialty coffee retailer, with over 24,000 shops in 75 markets. Starbucks's reputation rests on its high-end specialty coffees and beverages, friendly and knowledgeable servers, and customer- friendly coffee shops. This was a winning formula for many years and has en- abled Starbucks to charge premium prices for many of its items. But Starbucks has competitors, and must constantly fine-tune its business model and business strategy to keep pace with the competitive environment.

Starbucks tried online retailing and it didn't work out. If you go to the Starbucks.com website, you'll see coffee, branded mugs, espresso machines, and brewing accesso- ries described online, but you will need to purchase these items from Starbucks stores, supermarkets, or Starbucks-designated retailers. Starbucks stopped selling online in August of 2017. Starbucks man- agement believes

there has been a "seismic shift" in retailing, and merchants need to create unique and immersive in-store experi- ences to survive. For Starbucks, products and services, for the most part, should not be sold online.

Instead, Starbucks is focusing

on improving the in-store experience. The company rolled out a new Mercato menu of freshly-made sandwiches and salads to more than 1,000 stores in 2018 and plans to expand its line of caffeinated fruit juices (Starbucks Refreshers) and nitro-brew cold drinks. Management hopes to double food sales by 2021. Starbucks is also building high-end cafes around the world under the "Reserve" brand to draw customers willing to pay more for pre- mium coffee and pastries.

Starbucks continues to enhance the customer's in-store experience through information technology. Each Starbucks store has a Wi-Fi network providing free wireless Internet access for customers. Many Starbucks customers are active users of smartphones. Starbucks launched a mobile ordering app for the iPhone and Android mobile devices in September 2015. The Starbucks Mobile Order & Pay app makes it fast and easy to pay for drinks and food.

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Customers can place their orders on the way to Starbucks stores with Mobile Order & Pay and also tip the barista. Those ordering are told the time when their beverage will be ready. There's no need to wait in line. The mobile app can also identify the songs playing in Starbucks stores and save them to a playlist on Spotify. The app helps Starbucks target products to customers more effectively, which could be especially important as the chain also adds more lunch items and cold drinks to its menu to draw in more customers after the morning coffee rush. Cold drinks now represent half of Starbucks' beverage sales.

Starbucks wants U.S. customers who use its in-store Wi-Fi network to enter their email address in the first store where they get connected. The company's software remembers the customer's device and connects it automatically thereafter. That would give Starbucks additional email addresses that it could target with more promotions.

Sources: Julie Jargon, "Starbucks Aims for More Mobile Orders," Wall Street Journal, March 21, 2018; Stacy Cowley, "Starbucks Closes Online Store to Focus on In-Person Experience," *New York Times*, October 1, 2017; "Starbucks' Mobile Order Push Meets Resistance From Ritual Seekers," Reuters, March 21, 2018; and www.starbucks.com, accessed March 28, 2018.

tarbucks illustrates some of the ways that information systems help busi-

egy and how to use technology in that strategy. Retailing today is an extremely crowded and competitive playing field, both online and in physical brick-and- mortar stores. Even though Starbucks is the world's leading specialty coffee retailer, it has many competitors, and

it is searching for ways to keep growing its business. Customers are increasingly doing more retail shopping online, but Starbucks products do not sell well on the web. They are meant for an in-person experience. They are too experiential.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. Starbucks' business model is based on an aggres- sive product differentiation strategy, intended to emphasize the high quality of its beverages and foods, efficient and helpful customer service, and the plea- sures of purchasing and consuming these items in a Starbucks store. Starbucks is using information technology to improve its in-store customer experience. Its Mobile Order & Pay app expedites order and payment for Starbucks beverages and food, and Starbucks had to redesign its payment process to take advantage of mobile technology. The free Wi-Fi network makes Starbucks stores more in- viting to visit, linger, and consume food and beverages. The mobile app enables stores to serve more customers, and enrollment in the Wi-Fi service provides additional e-mail addresses for promotional campaigns.

Here are some questions to think about: What is Starbucks' business strategy? How much has technology helped Starbucks compete? Explain your answer.

- Determine business strategy
- Design new products and services
- Target promotions
- Optimize in-store experience
- Redesign business processes
- Wi-Fi wireless network
- Smartphones
- Mobile app

Management

Organization

Technology

Business Problem

• Opportunities from new technology

• Intense competition

Information System

Mobile Order and Pay

• Expedite ordering and purchasing

• Increase product promotions

Business Solutions

• Increase revenue

• Increase service

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 sys- tems 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 com- plex 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 infor- mation systems can change social and work life in your firm. You will not be able to design new systems successfully or understand existing systems with- out 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 antici- pate 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 e-mail and instant messag- ing would become a dominant form of business communication and that many managers would be inundated with more than 200

e-mail messages each day?

What Is an Organization?

An **organization** is a stable, formal social structure that takes resources from the environment and processes them to produce outputs. This technical defini- tion focuses on three elements of an organization. Capital and labor are primary production factors provided by the environment. The organization (the firm)

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.

transforms these inputs into products and services in a production function. The products and services are consumed by environments in return for supply inputs (see Figure 3.2).

An organization is more stable than an informal group (such as a group of friends that meets every Friday for lunch) in terms of longevity and 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 par- ticular arrangement of valves, cams, shafts, and other parts.

This definition of organizations is powerful and simple, but it is not very de- scriptive or even predictive of real-world

organizations. A more realistic behav- ioral definition of an organization is a collection of rights, privileges, obligations,

FIGURE 3.2 THE TECHNICAL MICROECONOMIC DEFINITION OF THE ORGANIZATION

In the microeconomic definition of organizations, capital and labor (the primary produc- tion factors provided by the environment) are transformed by the firm through the pro- duction 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.

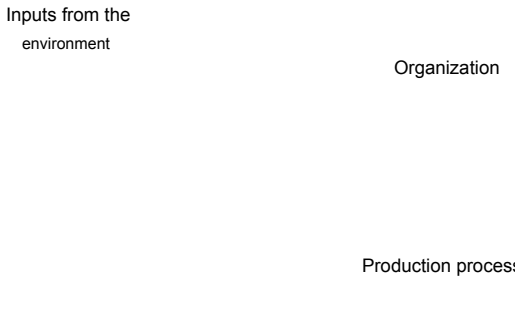
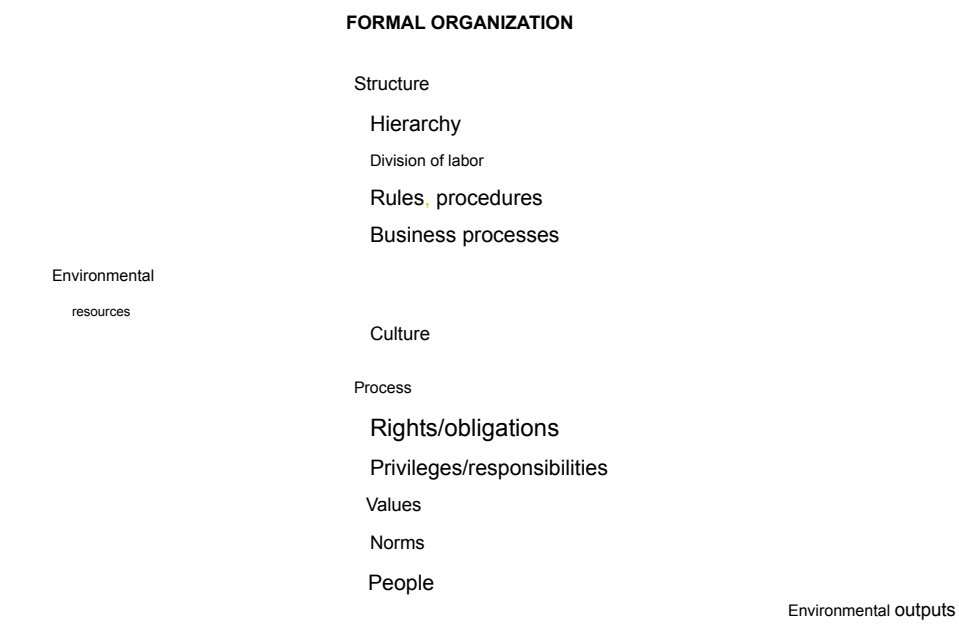


FIGURE 3.3 THE BEHAVIORAL VIEW OF ORGANIZATIONS

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



and responsibilities delicately balanced over a period of time through conflict and conflict resolution (see Figure 3.3).

In this behavioral view of the firm, people who work in organizations de- velop customary ways of working; they gain attachments to existing relation- ships; 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 condi- tions work will be done. Most of these arrangements and feelings are not dis- cussed in any formal rulebook.

How do these definitions of organizations relate to information systems tech- nology? A technical view of organizations encourages us to focus on how in- puts 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 organi- zational 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 techni- cal system and teaching employees and managers how to use the system.

Technological change requires changes in who owns and controls infor- mation, 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 contradic- tory. 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 organiza- tions 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. Throughout this book, you will find many examples where internal politics defeated the best-laid plans for an information system.

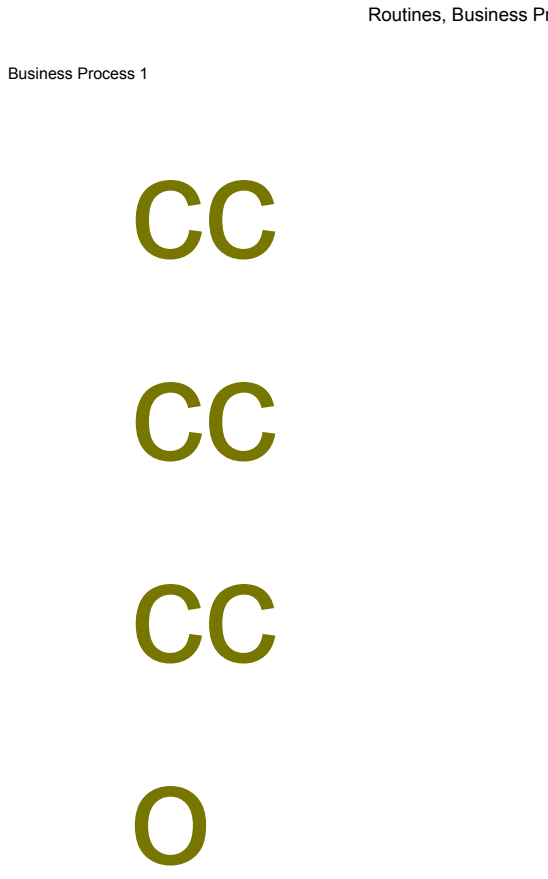
Organizational Culture

All organizations have bedrock, unassailable, unquestioned (by the members) assumptions that define their goals and products. Organizational culture encompasses this set of assumptions about what products the

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.



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 ac- tual way business firms produce value–are usually ensconced in the organi- zation's culture.

You can see organizational culture at work by looking around your univer- sity or college. Some bedrock assumptions of university life are that profes- sors 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 under- standing, 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

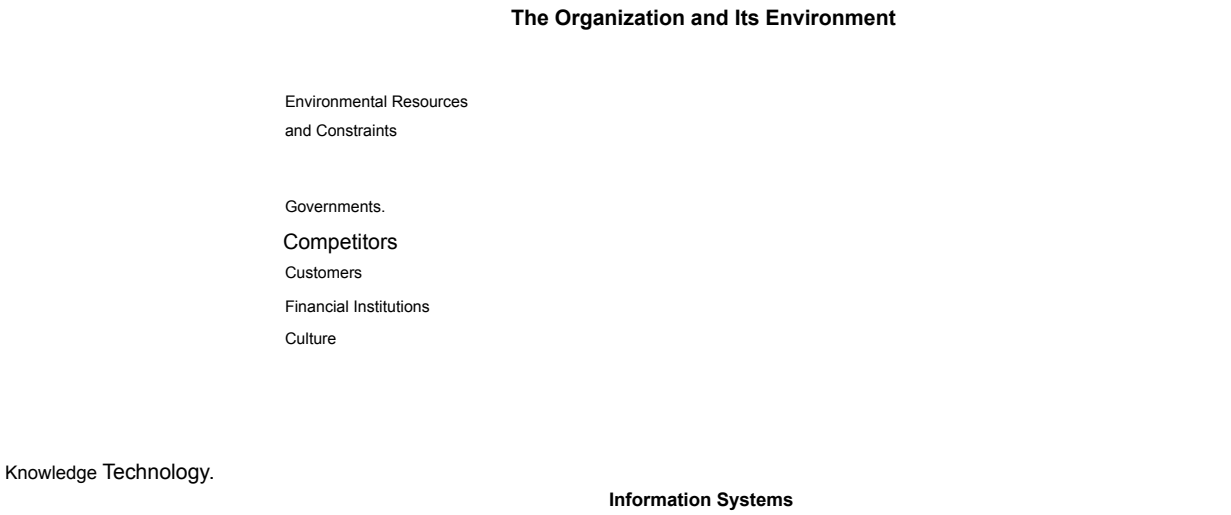
Organizations reside in environments from which they draw resources and to which they supply goods and services. Organizations and environments have a reciprocal relationship. On the one hand, organizations are open to and dependent on the social and physical environment that surrounds them. Without 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 ex- ample, 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 *environ- mental scanning*, helping managers identify external changes that might require an organizational response.

Environments generally change much faster than organizations. New tech- nologies, new products, and changing public tastes and values (many of which result in new government regulations) put strains on any organization's cul- ture, 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

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 technol- ogy plays a critical role in helping organizations perceive environmental change and in helping organizations act on their environment.



threat to closely held cultural values inhibit organizations from making signifi- cant 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 "disrup- tive" (Christensen, 2003; Christensen, Raynor, and McDonald, 2015). What makes a technology disruptive? In some cases, **disruptive technologies** are substitute products that 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, the Apple iPod and streaming music service 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 func- tionality 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 offer- ing cheap digital storage for small files. Eventually, small PC hard disk drives became the largest segment of the disk drive marketplace.

TABLE 3.1 DISRUPTIVE TECHNOLOGIES: WINNERS AND LOSERS

TECHNOLOGY	
Microprocessor chips (1971)	
Personal computers (1975)	
Digital photography (1975)	
World Wide Web (1989)	
Internet music, video, TV services (1998)	

PageRank algorithm

Software as web service

DESCRIPTION

Thousands and eventually millions of transistors on a silicon chip

Small, inexpensive, but fully functional desktop computers

Using CCD (charge-coupled device) image sensor chips to record images

A global database of digital files and "pages" instantly available

Repositories of downloadable music, video, and TV broadcasts on the web

A method for ranking web pages in terms of their popularity to supplement web search by key terms

Using the Internet to provide remote access to online software

WINNERS AND LOSERS

Microprocessor firms win (Intel, Texas Instruments), while transistor firms (GE) decline.

PC manufacturers (HP, Apple, IBM) and chip manufacturers prosper (Intel), while mainframe (IBM) and minicomputer (DEC) firms lose.

CCD manufacturers and traditional camera companies win; manufacturers of film products lose.

Owners of online content and news benefit, while traditional publishers (newspapers, magazines, and broadcast television) lose.

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.

Google is the winner (it owns the patent), while traditional key word search engines (Alta Vista) lose.

Online software services companies (Salesforce.com) win, while traditional "boxed" software companies (Microsoft, SAP, Oracle) lose.

Some firms are able to create these technologies and ride the wave to prof- its; 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 technolo- gies 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 re- wards. Citibank's ATMs revolutionized retail banking, but they were copied by other banks. Now all banks use ATMs, with the benefits going mostly to the consumers.

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 organiza- tional structure. For instance, in a professional bureaucracy such as a hospi- tal, it is not unusual to find parallel patient record systems operated by the administration, another by doctors, and another by other professional staff such as nurses and social workers. In small entrepreneurial firms, you will often find poorly designed systems developed in a rush that quickly out- grow their usefulness. In huge multidivisional firms operating in hundreds

TABLE 3.2 ORGANIZATIONAL STRUCTURES

ORGANIZATIONAL TYPE	DESCRIPTION
Entrepreneurial structure	
Machine bureaucracy	
Divisionalized bureaucracy	
Professional bureaucracy	
Adhocracy	

	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.	
Large bureaucracy existing in a slowly changing environment, producing standard products. It is dominated by a centralized management team and centralized decision making.		
	Combination of multiple machine bureaucracies, each producing a different product or service, all topped by one central headquarters.	
Knowledge-based organization where goods and services depend on the expertise and knowledge of professionals. Dominated by department heads with weak centralized authority.		
	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.	

EXAMPLES

Small start-up business

Midsize manufacturing firm

Fortune 500 firms, such as General Motors

Law firms, school systems, hospitals

Consulting firms, such as the Rand Corporation

of locations, you will frequently find there is not a single integrating infor- mation 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 orga- nizations 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, stockhold- ers, or the public. The nature of leadership differs greatly from one organiza- tion 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 manu- facturing 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 or- ganizations. 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 work- ers 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 rela- tively 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 econom- ics 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 lo- cating and communicating with distant suppliers, monitoring contract compli- ance, 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 re- sult, firms can shrink in size (numbers of employees) because it is far less expen- sive to outsource work to a competitive marketplace rather than hire employees. For instance, by using computer links to external suppliers, automakers such as Chrysler, 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 Cisco Systems and Dell Inc. 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 pur- chase 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 com- pany 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 em- ployees. In 2017, it generated $9.5 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" (em- ployees) to perform work on his or her behalf. However, agents need constant supervision and management; otherwise, they will tend to pursue their own in- terests 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 work- ers. We have seen examples in earlier chapters where information technology expanded the power and scope of small organizations by enabling them to per- form coordinated activities such as processing orders or keeping track of inven- tory 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 in- crease 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 com- puter age, are often inefficient, slow to change, and less competitive than newly

created organizations. Some of these large organizations have downsized, reduc- ing the number of employees and the number of levels in their organizational hierarchies.

Behavioral researchers have theorized that information technology facili- tates 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 be- cause lower-level employees receive the information they need to make

de- cisions 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 de- cline as a percentage of revenues, and the hierarchy becomes much more efficient.

These changes mean that the management span of control has also been broadened, enabling high-level managers to manage and control more workers 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 profes- sional workers tend to be self-managing, and decision making should become

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.

OO

A traditional hierarchical organization with many levels of management

An organization that has been "flattened" by removing layers of management

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 au- tomobile); once the task is accomplished, the individuals join other task forces. The global consulting service Accenture is an example. Many of its 373,000 em- ployees move from location to location to work on projects at client locations in more than 56 different countries.

Who makes sure that self-managed teams do not head off in the wrong direc- tion? 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.

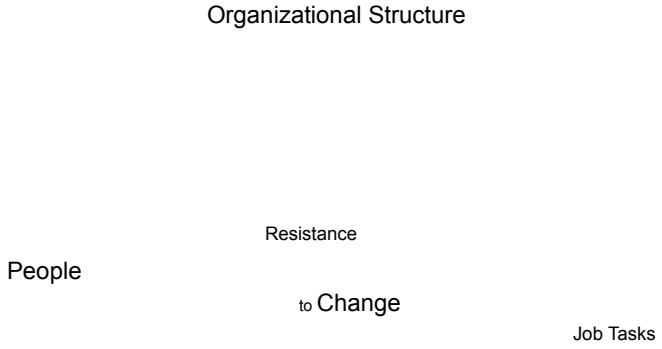
Understanding Organizational Resistance to Change

Information systems inevitably become bound up in organizational poli- tics 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 per- sonal, 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 or- ganizational resistance to innovation suggests that four factors are paramount: the nature of the IT innovation, the organization's structure, the culture of peo- ple in the organization, and the tasks affected by the innovation (see Figure 3.7).

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.



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 "un- freeze" organizations before introducing an innovation, quickly implement- ing it, and "refreezing" or institutionalizing the change (Kolb and Frohman, 1970).

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

The Internet and Organizations

The Internet, especially the World Wide Web, has an important impact on the relationships between many firms and external entities and even on the organi- zation of business processes inside a firm. The Internet increases the accessibil- ity, 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 in- structions from management sent by e-mail 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 re- plenishment 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 un- derstanding 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

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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 bet- ter than most others. There's almost always a standout firm. In the automo- tive industry, Toyota is considered a superior performer. In pure online retail, Amazon is the leader; in off-line retail, Walmart, the largest retailer on earth, is the leader. In online music, Apple's iTunes is considered the leader with more than 60 percent of the downloaded music market. 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 (effi- ciency), all of which ultimately in the long run translate into higher stock mar- ket valuations than their competitors.

But why do some firms do better than others, and how do they achieve com- petitive 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 an- swer to that question is Michael Porter's competitive forces model.

Porter's Competitive Forces Model

Arguably, the most widely used model for understanding competitive advan- tage 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 environ- ment. Earlier in this chapter, we described the importance of a firm's environ- ment 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.

FIGURE 3.8 PORTER'S COMPETITIVE FORCES MODEL

In Porter's competitive forces model, the strategic position of the firm and its strate- gies 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.

Traditional Competitors

All firms share market space with other competitors who are continuously de- vising 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 bar- riers 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 busi- ness, which has very high capital costs and requires significant expertise and knowledge that are hard to obtain. New companies have several possible ad- vantages: 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 ad- vantages 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, coal, 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 al- lows you to download music tracks to an iPad or smartphone has become a sub- stitute 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 prod- ucts and services or if they can force a business and its competitors to com- pete 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 text- book. In this case, online customers have extraordinary power over used-book firms.

Suppliers

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

Supermarkets and large re- tail stores such as Walmart use sales data captured at the checkout counter to determine which items have sold and need to be reor- dered. Walmart's continu- ous 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.

The

Drew Crew

Valmart

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SUMMER

ner Selvic

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$5

Proudly M

Betty LaRue/Alamy Stock Photo

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 technol- ogy 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 replenish- ment 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 pur- chase transaction directly to a central computer at Walmart headquarters. The computer collects the orders from all Walmart stores and transmits them to sup- pliers. 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 oper- ating costs low, Walmart pays only 16.6 percent of sales revenue for overhead. (Operating costs average 20.7 percent of sales in the retail industry.)

Walmart's continuous replenishment system is also an example of an **efficient customer response system**. An efficient customer response system directly links

consumer behavior to distribution and production and supply chains. Walmart's continuous replenishment system provides such an efficient customer response.

Product Differentiation

Use information systems to enable new products and services or greatly change the customer convenience in using your existing products and services. 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, in 2018 Google 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 recogni- tion, 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.

Crayola, not known as a tech company, is another firm that is creating new technology-based products and services to inspire children, parents, and edu- cators, and differentiate their products from competitors. (See the Interactive Session on Organizations.)

Manufacturers and retailers are using information systems to create prod- ucts and services that are customized and personalized to fit the precise specifications of individual customers. For example, Nike sells customized sneakers through its NIKEiD program on its website. Customers are able to select the type of shoe, colors, material, outsoles, and even a logo of up to eight characters. 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**.

Table 3.3 lists a number of companies that have developed IT-based products and services that other firms have found difficult to copy—or at least taken a long time to copy.

Focus on Market Niche

Use information systems to enable a specific market focus and serve this nar- row 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 buy- ing patterns, tastes, and preferences closely so that they efficiently pitch adver- tising and marketing campaigns to smaller and smaller target markets.

The data come from a range of sources–credit card transactions, demo- graphic data, purchase data from checkout counter scanners at supermarkets

TABLE 3.3 **IT-ENABLED NEW PRODUCTS AND SERVICES PROVIDING COMPETITIVE ADVANTAGE**

Amazon: One-click shopping
Online music: Apple iTunes

Golf club customization: Ping

Online person-to-person payment: PayPal

Amazon holds a patent on one-click shopping that it licenses to other online retailers.

Apple sells music from an online library of more than 45 million songs.

Customers can select from more than 1 million different golf club options; a build-to- order system ships their customized clubs within 48 hours.

PayPal enables the transfer of money between individual bank accounts and between bank accounts and credit card accounts.

INTERACTIVE SESSION

ORGANIZATIONS

Digital Technology Helps Crayola Brighten Its Brand

Crayola is one of the world's most beloved brands for children and their parents. The Easton, Pennsylvania-based company has been noted for high-quality, non-toxic crayons, markers, pencils, modeling clay, creative toys, and innovative art tools that have inspired artistic creativity in children for more than one hundred years. You can find Cray- ola products nearly everywhere, including schools, offices, supermarkets, drug stores, hospitals, theme parks, airports, gas stations, and restaurants.

The Crayola crayon box became part of the col- lective history and experiences of generations of Americans, and a symbol of the color and fun of childhood. But today, that Crayola crayon box is not as iconic as in the past. The popularity of Crayola crayons is under assault-not by Crayola's traditional competitors (Faber-Castelli, Dixon Ticonderoga, and MEGA Brands), but by changing times.

There has been a profound technological and cultural shift in how children play. Children and their families are being bombarded with increasingly sophisticated forms of entertainment, many of them digitally based. Digital products are starting to sup- plant physical ones in the world of children's play as well as in other areas of work and everyday life. With the advent of computers and web-based learning, chil- dren are leaving behind hand-held art supplies at an increasingly younger age. The phenomenon is called KGOY, standing for "Kids Growing Older Younger." As children reach the age of 4 or 5, when they become old enough to play with a computer, they become less interested in toys and crayons and prefer electronics such as video

games and digital tablets and smart- phones. Crayola is not immune to this problem.

Will Crayola become a dinosaur from a different era? Not likely, thanks to the company's forward- looking management, which embarked over a decade. ago on far-reaching changes in leadership, organiza- tional culture, and the product development func- tion. The organization restructured around consumer insights and needs rather than specific product lines.

Vicky Lozano, Crayola's VP of Corporate Strategy and her team recognized that Crayola's purpose has always been to nourish originality and to help parents and teachers raise creative and inspired children. Crayola's broader mission is not just to put crayons and art materials in children's hands but to help children learn and play in colorful ways. The question they asked was not, how can we sell more crayons? Instead they asked, what kinds of experi- ences and technologies should Crayola embrace? Crayola has reframed its business model, introduced a new innovation process for product development, and created new products and revenue streams. The company has been transformed from a manufacturer *of* crayons and art tools into a trusted source of tools and experiences for creative play.

Crayola is using digital technology, but not to re- place its core crayon business. Instead, it's integrat- ing the old and the new. The company now offers a new range of products like the iMarker, an all-in-one digital pen, crayon, and pencil, designed for use with the Color Studio HD iPad app. It's like a traditional coloring book, but includes new interactive sounds and motion. Lights, Camera, Color! is another digital application that allows kids to turn their favorite pho- tos into digital coloring book pages. Tech toys such as the Digital Light Designer, a 360-degree domed draw- ing surface, encourage imaginations to run wild with colored LED lights. Children can play updated ver- sions of their favorite games or animate and save up to 50 pieces of their own artwork. Crayola found that par- ents are looking for toys that are less messy than tra- ditional markers or fingerpaints. These digital toys are "100 percent mess-proof," and technology has helped Crayola make its other products less messy as well.

In designing new digital products and experiences, Crayola has drawn on its extensive knowledge of child development. It understands how digital tech- nology can play a part at different ages. For instance, the My First Crayola line is targeted specifically at one-year-olds; while Crayola Catwalk Creations is designed for "tween" girls who like expressing them- selves through fashion.

Crayola also understood that it had to change the way it markets its products as well as the products themselves and has been investing more and more in digital marketing. These initiatives include online advertising, promotions, social media

pushes, and other digital activation programs that allow Crayola to connect with parents and educators invested in rais- ing children's creativity level. Social media has proven especially effective and Crayola has a presence on Facebook, YouTube, Pinterest, Twitter, and Instagram.

Crayola's YouTube channel features colorful videos on Crayola products and instructions for creative projects where they can be used. The company's Facebook presence features a live chat series with experts and creative celebrities called "Inside the Crayon Box." Crayola wants to stimulate conversations around cre- ativity so parents can learn from each other and un- derstand how to build creativity in their children.

Crayola's core parent audience is turning to the web for gift and usage ideas, comparing prices, and reading reviews before making purchases. Crayola wants to be first in mind as a source of $20 artsy toys and mess-proof gifts. The company focuses heavily on search, social media, and digital display, to help parents find the Crayola products needed for their children's school supplies or gifts. Crayola closely tracks activity on its online channels through Google Analytics to make sure it is getting the most out of its marketing and ad campaigns.

Crayola's website has been thoughtfully designed for children, parents, and educators. It features free ideas for crafts, printable coloring pages, and even advice on how to remove stains. The website also can be used for ordering Crayola products online. Thanks to its new array of products and services, Crayola has experienced better growth, and its future looks as bright as the vibrant colors of its iconic crayons.

CASE STUDY QUESTIONS

1. Analyze Crayola's problem. What management, organization, and technology factors contributed to the problem?
2. What competitive strategies is Crayola pursuing? How does digital technology support those strategies?

Sources: www.crayola.com, accessed March 28, 2018; "Crayola SWOT," www.marketingteacher.com, accessed March 29, 2018; and Jon Coen, "Crayola's Colorful Evolution," *Think Play,* July 2012.

3. What people issues did Crayola have to address in designing its new technology-based products?

4. How has digital technology changed Crayola's business model and the way it runs its business?

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.