CHAPTER 3

Strategy and Information Systems

"Hey, Cam, let's get some lunch. I need to hear more about the new LiDAR imaging we're going to start offering," says a well-dressed Alexis as she pops into the development lab where Cam is closely watching an employee testing a large quadcopter.

"Yeah, sure, I could use the break."

"What's that? Are you testing a new quad?"

"Um, well ... yes. Mateo wanted to see if we could 3D-print our own drones. We're testing a new prototype we just finished building. It might be a lot cheaper than buying them. But I've never *built* a drone before."

"Wow. So, we've decided to get into the drone-making business?"

Cam motions to Alexis to move out into the hall so they can talk privately.

"Honestly, I hope not. But we'll see how this turns out. We're still trying to figure out if it will save us enough money to make it worth our while."

"Well, better you than me. They've got the right woman for the job!" Alexis smiles and tries to keep the conversation light.

"Yeah, well, this project is the least of my worries." Cam rolls her eyes and looks sincerely frustrated.

"What do you mean?"

"Who are we?"

"What do you mean?" Alexis is a little taken aback.

"Well, as a company, who are we? We've always been known as a company that provides security monitoring, and we've got some big contracts. I get that. But ... there's a lot of money we could be making in agricultural survey, industrial inspection, real estate videos, and wedding videos. I think we're really missing out."

"Have you talked with Mateo about this?"

"Yes, he agreed that these are all good ideas, but he wants to stay focused on big security contracts. He's even talking about contracting with law enforcement agencies, search and rescue, and the federal government."

"And ... what's the downside?" Alexis asks. "It sounds like if I could close a few big sales, we'd be sittin' pretty. From the sales side, I'd be doing less work for more money."

"Yeah, but that's a big 'if.' What if we can't sign them? What if the funding dries up? What if the public doesn't like the idea of the U.S. federal government using drones to video its citizens?"

"I don't know. If the money's as good as Mateo thinks it is, it might be worth a shot."

"We can't be everything to everybody."

Image source: rommma/Fotolia

"Yes, but we could be spending our time and money developing accounts that we already know are profitable and will be for a long time. People are always getting married. It just seems like a no-brainer to think of Falcon Security as more than just a 'security' company. There's so much money on the table." Cam is clearly frustrated and shakes her head.

"Cam, I completely agree. The side projects we've done have been profitable. There's no arguing that."

"Well?"

"Well, it comes down to focus. We can't be everything to everybody. Providing long-term security monitoring for a chemical company is very different from doing a weekend wedding photo shoot."

"But what about all the money we could be making right now? If we don't earn it, somebody else will."

Alexis starts to smile and says, "Hey, let's grab Joni on the way out to lunch. She's the one who really needs to hear this. You two can talk strategy while I get some of those tasty fish tacos!"

Study QUESTIONS

- **Q3-1** How does organizational strategy determine information systems structure?
- **Q3-2** What five forces determine industry structure?
- **Q3-3** How does analysis of industry structure determine competitive strategy?
- **Q3-4** How does competitive strategy determine value chain structure?
- **Q3-5** How do business processes generate value?
- **Q3-6** How does competitive strategy determine business processes and the structure of information systems?
- **Q3-7** How do information systems provide competitive advantages?
- **Q3-8** 2027?

Chapter PREVIEW

Recall from Chapter 1 that MIS is the development and use of information systems that enables organizations to achieve their strategies. In Chapter 2, you learned how information systems can help people collaborate. This chapter focuses on how information systems support competitive strategy and how IS can create competitive advantages. As you will learn in your organizational behavior classes, a body of knowledge exists to help organizations analyze their industry, select a competitive strategy, and develop business processes. In the first part of this chapter, we will survey that knowledge and show how to use it, via several steps, to structure information systems. Then, toward the end of the chapter, we will discuss how companies use information systems to gain a competitive advantage.

Falcon Security provides a good example. Its strategy has been to differentiate itself by providing security surveillance services using drones. It has systems and processes to do that. But, as Cam states, what if the company can't secure additional security contracts? How will the company grow if it doesn't get them? Even if it did get those new contracts, does it have the systems and process to handle them?

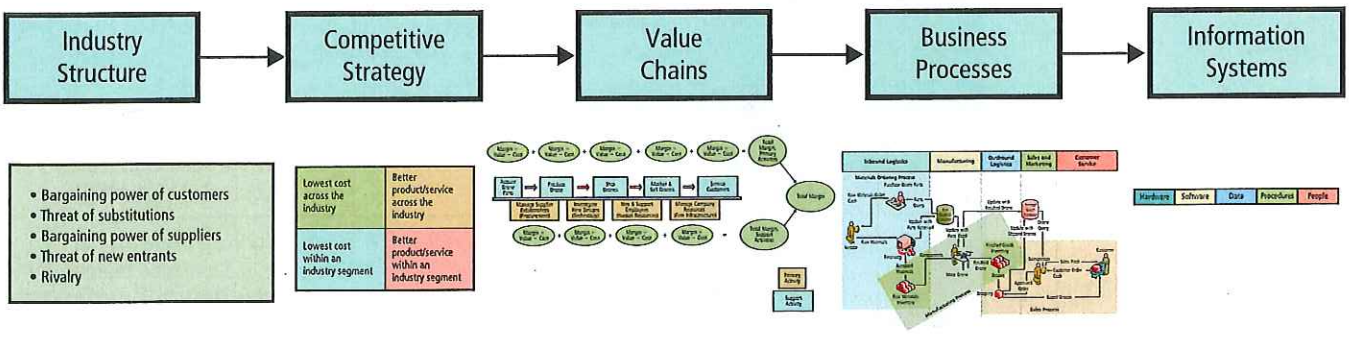
Q3-1 How Does Organizational Strategy Determine Information Systems Structure?

According to the definition of MIS, information systems exist to help organizations achieve their strategies. As you will learn in your business strategy class, an organization's goals and objectives are determined by its *competitive strategy*. Thus, ultimately, competitive strategy determines the structure, features, and functions of every information system.

Figure 3-1 summarizes this situation. In short, organizations examine the structure of their industry and determine a competitive strategy. That strategy determines value chains, which, in turn, determine business processes. The structure of business processes determines the design of supporting information systems.

Michael Porter, one of the key researchers and thinkers in competitive analysis, developed three different models that can help you understand the elements of Figure 3-1. We begin with his five forces model.

FIGURE 3-1
Organizational Strategy Determines Information Systems



Q3-2 What Five Forces Determine Industry Structure?

Organizational strategy begins with an assessment of the fundamental characteristics and structure of an industry. One model used to assess an industry structure is Porter's **five forces model**,[1] summarized in Figure 3-2. According to this model, five competitive forces determine industry profitability: bargaining power of customers, threat of substitutions, bargaining power of suppliers, threat of new entrants, and rivalry among existing firms. The intensity of each of the five forces determines the characteristics of the industry, how profitable it is, and how sustainable that profitability will be.

To understand this model, consider the strong and weak examples for each of the forces in Figure 3-3. A good check on your understanding is to see if you can think of different forces of each category in Figure 3-3. Also, take a particular industry—say, auto repair—and consider how these five forces determine the competitive landscape of that industry.

In the opening vignette of this chapter, Cam is concerned that focusing only on physical security may place Falcon Security at a competitive disadvantage. She thinks the company could expand into agricultural survey, industrial inspection, real estate videos, and wedding videos. She's also worried about being financially dependent on a few large industrial accounts. Figure 3-4 shows an analysis of the competitive landscape Falcon Security faces.

The large industrial accounts that Falcon Security serves could demand more services or lower prices because they account for a large percentage of Falcon Security's revenue. The threat of substitutions, like customers choosing to install wireless digital Web cameras, is somewhat strong. But these substitutions may not be viable options for some of the industrial clients due to

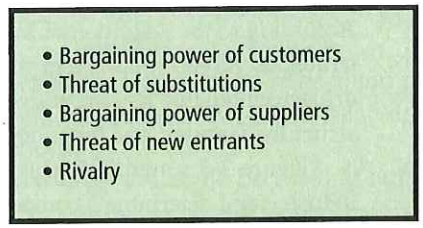


FIGURE 3-2
Porter's Five Forces Model of Industry Structure

Source: Based on Michael E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (The Free Press, a Division of Simon & Schuster Adult Publishing Group). Copyright © 1985, 1998 by Michael E. Porter.

Force	Example of Strong Force	Example of Weak Force
Bargaining power of customers	Toyota's purchase of auto paint (because Toyota is a huge customer that will purchase paint in large volume)	Your power over the procedures and policies of your university
Threat of substitutions	Frequent traveler's choice of auto rental	Patients using the only drug effective for their type of cancer
Bargaining power of suppliers	New car dealers (because they control what the "true price" of a vehicle is and the customer cannot reliably verify the accuracy of that price)	Grain farmers in a surplus year (an oversupply makes the product less valuable and less profitable)
Threat of new entrants	Corner latte stand (because it is an easy business to replicate)	Professional football team (because the number of teams is tightly controlled by the NFL)
Rivalry	Used car dealers (because there are many to choose from)	Google or Bing (expensive to develop and market a search engine)

FIGURE 3-3
Examples of Five Forces

Force	Falcon Security Example	Force Strength	Falcon Security's Response
Bargaining power of customers	A large account wants more services at a lower price	Strong	Lower prices or diversify into other markets
Threat of substitutions	Replace drones with wireless IP Web cameras	Medium	Offer differentiating services, like LiDAR, that cameras can't provide
Bargaining power of suppliers	We're increasing the cost of the drones we sell	Weak	We'll make our own drones
Threat of new entrants	Amazon begins offering package delivery and surveillance via drones	Medium	Offer differentiating services and enter other markets
Rivalry	A new drone company expands its operations into the state	Weak	Offer additional features like direct streaming video to the customer

FIGURE 3-4
Five Forces at Falcon Security

the lack of internal technical expertise or physical distance limitations. A new entrant, like Amazon starting to offer surveillance service using its delivery drones, could be a substantial threat. But Falcon Security could respond to this by offering additional services, like real-time 3D mapping. Or it could enter new markets like agricultural survey and industrial inspection.

The other forces are not as worrisome to Falcon Security. The bargaining power of drone suppliers is weak because there are lots of drone manufacturers to choose from. And it always has the option of 3D printing its own drones. The threat from rivals isn't strong because Falcon Security has developed a self-charging drone platform and an integrated video processing system that wouldn't be easy for rivals to replicate.

Like Falcon Security, organizations examine these five forces and determine how they intend to respond to them. That examination leads to competitive strategy.

Q3-3 How Does Analysis of Industry Structure Determine Competitive Strategy?

See the Ethics Guide on pages 86–87 to learn how new technologies may be used in questionable ways to achieve strategic goals.

An organization responds to the structure of its industry by choosing a **competitive strategy**. Porter followed his five forces model with the model of four competitive strategies, shown in Figure 3-5.[2] According to Porter, firms engage in one of these four strategies. An organization can focus on being the cost leader, or it can focus on differentiating its products or services from those of the competition. Further, the organization can employ the cost or differentiation strategy across an industry, or it can focus its strategy on a particular industry segment.

	Cost	Differentiation
Industry-wide	Lowest cost across the industry	Better product/service across the industry
Focus	Lowest cost within an industry segment	Better product/service within an industry segment

FIGURE 3-5
Porter's Four Competitive Strategies

ETHICS GUIDE

THE LURE OF LOVE BOTS

Gary Lucas couldn't stop looking across the maze of cubicles into the conference room on the other side of the office. His boss, Richard Matthews, was having what looked like a spirited discussion with a group of five people Gary had never seen before. Even without being in the meeting or being close enough to read people's lips, Gary knew what the meeting was about.

The company he worked for, Why Wait, Date!, was struggling. Not only was competition fierce in the online matchmaking industry, but subscriptions at his company had been drying up due to a more challenging problem: The latest analysis of user statistics revealed that 15 percent of the total subscribers were female while 85 percent were male. How could the company retain subscribers if the competition between male users was so fierce? Many male subscribers were unable to find a match, even after months of trying. Unfortunately for Gary, the manager of customer retention, unhappy customers don't keep paying. Despite marketing efforts and discounted subscription offers aimed at female users, Gary had been unable to balance out the disproportionate customer base. He was worried that his job was on the line. His replacement might be sitting in that meeting with his boss right now.

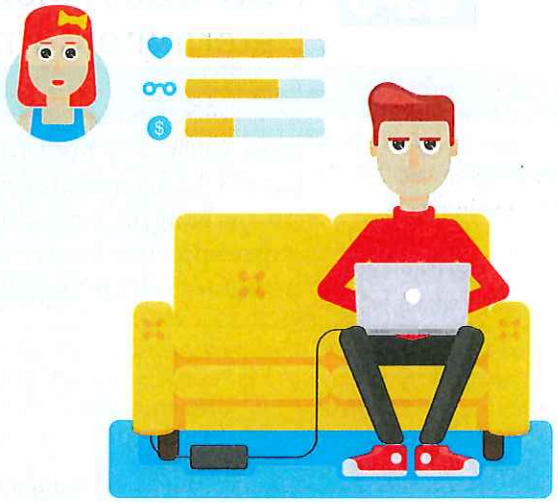
Gary looked back over at the conference room just in time to see Richard open the door and wave him over. Gary hastily made his way to the conference room. As he took a seat at the end of the table, Richard smiled at him and said, "Gary, I think these consultants have a plan that can bring this company back to life!" Gary sighed with relief. It sounded like his job was safe for now—but what kind of miracle had the consultants promised to make Richard so optimistic about the future?

iMatch

Thomas, the lead consultant, began his pitch to save the company. Richard nodded and smiled as Thomas explained his idea. "The key to maintaining subscribers on this type of site," Thomas explained, "is keeping them interested. We need male users to have some sort of positive experience on the site before they reach their threshold of getting discouraged and cancel their subscription. Our consulting team has created a model based on all of your user data, and we are able to predict when a male user is on the verge of canceling his subscription with a high degree of accuracy."

Gary interrupted, "You have access to all of our user data?" He looked at Thomas with a distressed expression on his face, but Thomas motioned for him to calm down and keep listening to the pitch. Thomas continued, "Now that we can predict when a customer is about to leave, we can take action to keep him interested. We know when customers need a potential 'match' in order to keep paying for the service. All we have to do is send them some messages from a dummy account so they think someone is interested.

"Depending on how much you want to invest in our solution," Thomas continued, "we can even have these dummy accounts engage in complex interactions that take place over weeks or months. After several weeks or months, the dummy account will indicate that it has found someone



Source: Poladroid/Fotolia

else. There does not have to be any actual follow-through; the customer will just think that it didn't work out. The best part is that you won't have to pay employees to interact with customers—this can all be done with our AI platform. These long-term interactions will keep customers paying and inflate the hope that they will actually find someone using your site!"

AI-Jedis

An hour after the meeting, Gary was sitting at his desk with this head spinning. He was still trying to come to terms with what had happened in the conference room. His boss had directed him to cut all marketing efforts by 80 percent and start looking to hire new people to take charge of creating the dummy accounts. Richard had also signed a 6-month contract with the consultants; they would begin implementation of their customer retention tool starting the next day.

Gary looked down at the business cards the consultants had given him after the meeting—they all worked for a company called AI-Jedis. Gary realized *AI* stood for "artificial intelligence." He couldn't believe they were going to essentially use robots to trick people into thinking they were about to find a match on the site. He suddenly felt chills down his spine...trick people? He was starting to wonder if this could be perceived as fraudulent or even illegal. What if someone found out about what they were doing? The company would be destroyed. Gary leaned back in his chair, stared at the ceiling, and let out a long sigh. Part of him wanted to go talk to Richard and tell him this was a bad idea; the other part of him decided that it might be time to start polishing his resume.

DISCUSSION QUESTIONS

1. According to the definitions of the ethical principles previously defined in this book:
   a. Do you think that using automated bots on a dating site is ethical according to the categorical imperative (pages 23–24)?
   b. Do you think that using automated bots on a dating site is ethical according to the utilitarian perspective (pages 60–61)?
2. While this scenario might seem like something out of a science fiction movie, the use of automated tools for decision making and customer interaction is widespread. Brainstorm examples of other companies or services that might be using automated tools right now.
3. If you were in this situation, would you leave the company?
4. Do you think Gary would benefit by trying to talk to Richard about the risk of using bots? How do you think people would respond if word got out that the company was using this type of technology to retain customers?

Consider the car rental industry, for example. According to the first column of Figure 3-5, a car rental company can strive to provide the lowest-cost car rentals across the industry, or it can seek to provide the lowest-cost car rentals to an industry segment—say, U.S. domestic business travelers.

As shown in the second column, a car rental company can seek to differentiate its products from the competition. It can do so in various ways—for example, by providing a wide range of high-quality cars, by providing the best reservation system, by having the cleanest cars or the fastest check-in, or by some other means. The company can strive to provide product differentiation across the industry or within particular segments of the industry, such as U.S. domestic business travelers.

According to Porter, to be effective, the organization's goals, objectives, culture, and activities must be consistent with the organization's strategy. To those in the MIS field, this means that all information systems in the organization must reflect and facilitate the organization's competitive strategy.

Q3-4 How Does Competitive Strategy Determine Value Chain Structure?

Organizations analyze the structure of their industry, and, using that analysis, they formulate a competitive strategy. They then need to organize and structure the organization to implement that strategy. If, for example, the competitive strategy is to be *cost leader*, then business activities need to be developed to provide essential functions at the lowest possible cost.

A business that selects a *differentiation* strategy would not necessarily structure itself around least-cost activities. Instead, such a business might choose to develop more costly processes, but it would do so only if those processes provided benefits that outweighed their costs. Joni at Falcon Security knows that buying the best commercial drones is expensive, and she judges the costs worthwhile. She may find that 3D printing Falcon's own custom drones to be worthwhile, too.

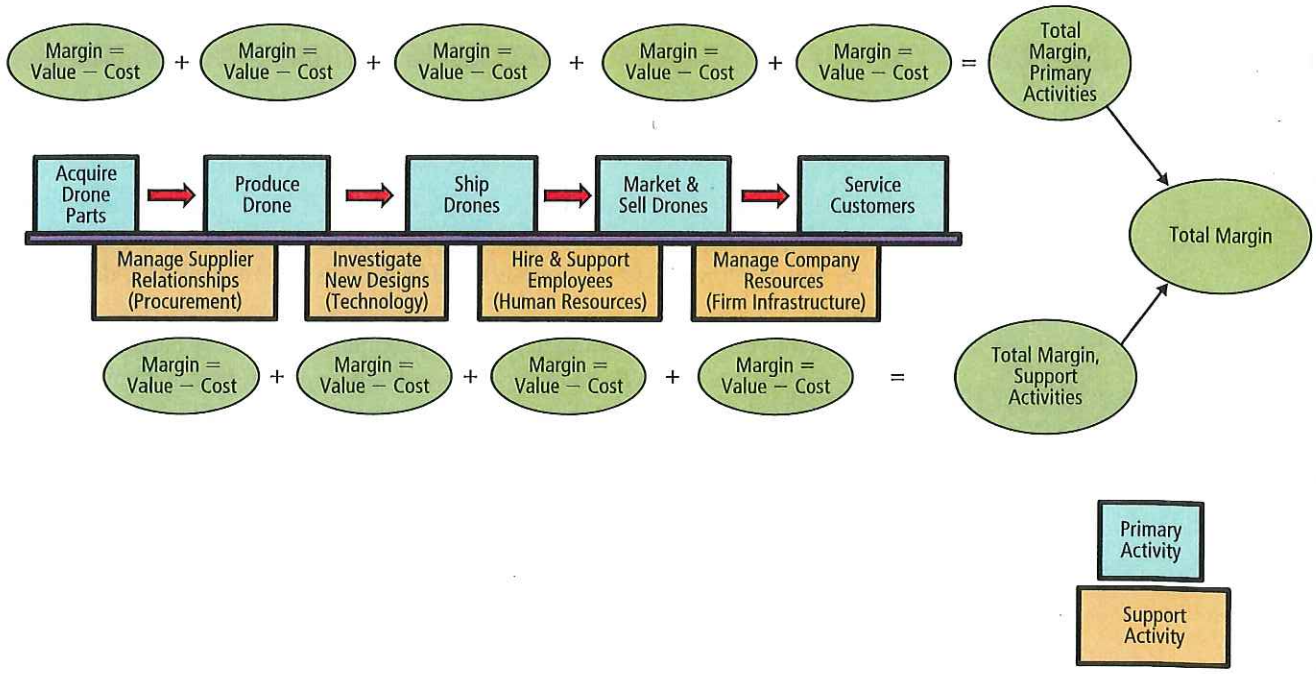
Porter defined **value** as the amount of money that a customer is willing to pay for a resource, product, or service. The difference between the value that an activity generates and the cost of the activity is called the **margin**. A business with a differentiation strategy will add cost to an activity only as long as the activity has a positive margin.

A **value chain** is a network of value-creating activities. That generic chain consists of five **primary activities** and four **support activities**.

Primary Activities in the Value Chain

To understand the essence of the value chain, consider one of Falcon Security's suppliers, a medium-sized drone manufacturer (see Figure 3-6). First, the manufacturer acquires raw materials using the inbound logistics activity. This activity concerns the receiving and handling of raw materials and other inputs. The accumulation of those materials adds value in the sense that even a pile of unassembled parts is worth something to some customer. A collection of the parts needed to build a drone is worth more than an empty space on a shelf. The value is not only the parts themselves, but also the time required to contact vendors for those parts, to maintain business relationships with those vendors, to order the parts, to receive the shipment, and so forth.

FIGURE 3-6
Drone Manufacturer's Value Chain



Primary Activity	Description
Inbound Logistics	Receiving, storing, and disseminating inputs to the products
Operations/Manufacturing	Transforming inputs into the final products
Outbound Logistics	Collecting, storing, and physically distributing the products to buyers
Sales and Marketing	Inducing buyers to purchase the products and providing a means for them to do so
Customer Service	Assisting customers' use of the products and thus maintaining and enhancing the products' value

FIGURE 3-7
Task Descriptions for Primary Activities of the Value Chain
Source: Based on Michael E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (The Free Press, a Division of Simon & Schuster Adult Publishing Group). Copyright © 1985, 1998 by Michael E. Porter.

In the operations activity, the drone maker transforms raw materials into a finished drone, a process that adds more value. Next, the company uses the outbound logistics activity to deliver the finished drone to a customer. Of course, there is no customer to send the drone to without the marketing and sales value activity. Finally, the service activity provides customer support to the drone users.

Each stage of this generic chain accumulates costs and adds value to the product. The net result is the total margin of the chain, which is the difference between the total value added and the total costs incurred. Figure 3-7 summarizes the primary activities of the value chain.

Support Activities in the Value Chain

The support activities in the generic value chain contribute indirectly to the production, sale, and service of the product. They include procurement, which consists of the processes of finding vendors, setting up contractual arrangements, and negotiating prices. (This differs from inbound logistics, which is concerned with ordering and receiving in accordance with agreements set up by procurement.)

Porter defined technology broadly. It includes research and development, but it also includes other activities within the firm for developing new techniques, methods, and procedures. He defined human resources as recruiting, compensation, evaluation, and training of full-time and part-time employees. Finally, firm infrastructure includes general management, finance, accounting, legal, and government affairs.

Supporting functions add value, albeit indirectly, and they also have costs. Hence, as shown in Figure 3-6, supporting activities contribute to a margin. In the case of supporting activities, it would be difficult to calculate the margin because the specific value added of, say, the manufacturer's lobbyists in Washington, D.C., is difficult to know. But there is a value added, there are costs, and there is a margin—even if it is only in concept.

Value Chain Linkages

Porter's model of business activities includes **linkages**, which are interactions across value activities. For example, manufacturing systems use linkages to reduce inventory costs. Such a system uses sales forecasts to plan production; it then uses the production plan to determine raw material needs and then uses the material needs to schedule purchases. The end result is just-in-time inventory, which reduces inventory sizes and costs.

By describing value chains and their linkages, Porter recognized a movement to create integrated, cross-departmental business systems. Over time, Porter's work led to the creation of a new discipline called business process design. The central idea is that organizations should not automate or improve existing functional systems. Rather, they should create new, more efficient

business processes that integrate the activities of all departments involved in a value chain. You will see an example of a linkage in the next section.

Value chain analysis has a direct application to manufacturing businesses like the drone manufacturer. However, value chains also exist in service-oriented companies such as medical clinics. The difference is that most of the value in a service company is generated by the operations, marketing and sales, and service activities. Inbound and outbound logistics are not typically as important.

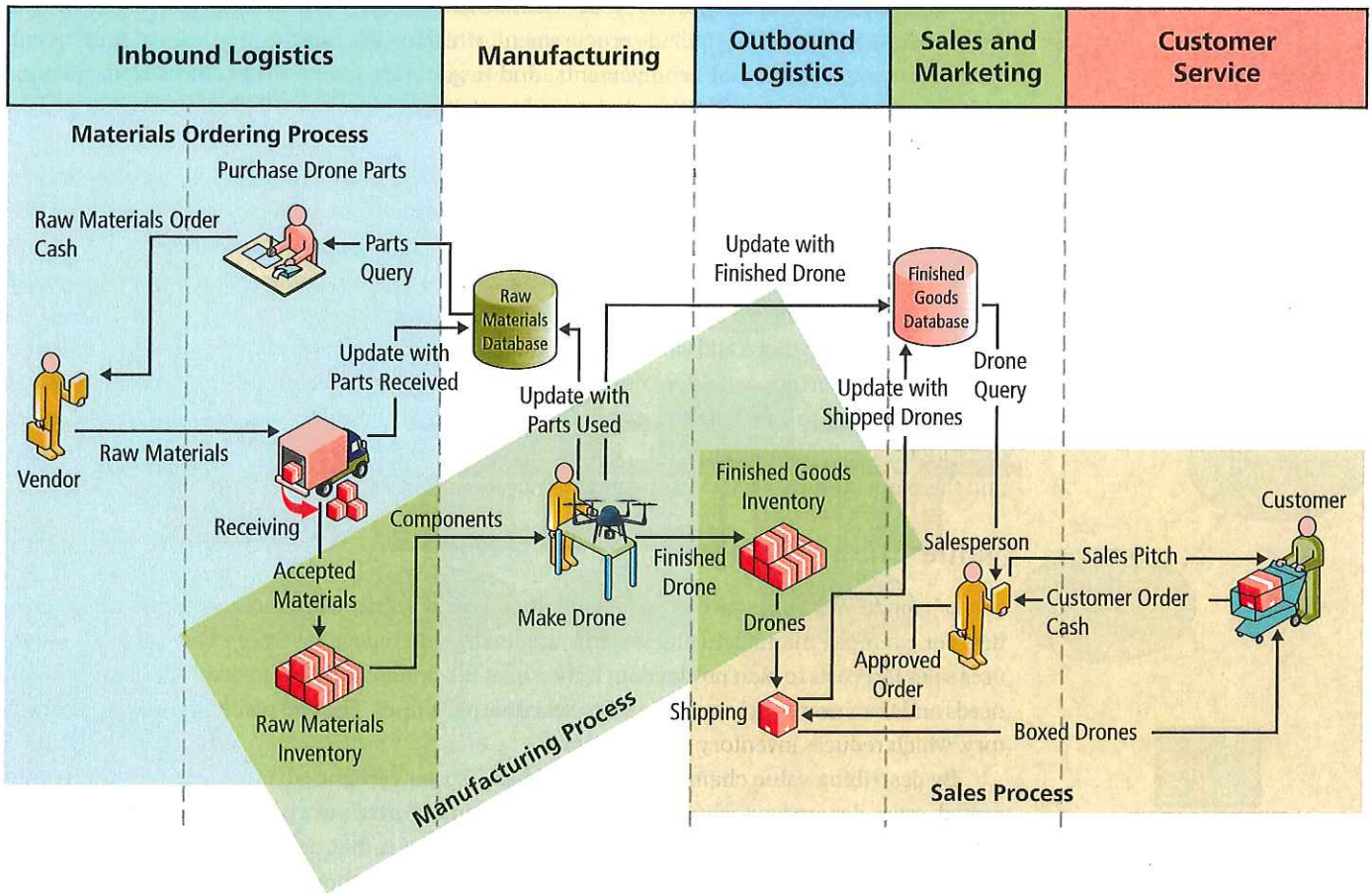
Q3-5 How Do Business Processes Generate Value?

A **business process** is a network of activities that generate value by transforming inputs into outputs. The **cost** of the business process is the cost of the inputs plus the cost of the activities. The margin of the business process is the value of the outputs minus the cost.

A business process is a network of activities. Each **activity** is a business function that receives inputs and produces outputs. An activity can be performed by a human, by a computer system, or by both. The inputs and outputs can be physical, like drone parts, or they can be data, such as a purchase order. A **repository** is a collection of something; a database is a repository of data, and a raw material repository is an inventory of raw materials. We will refine and extend these definitions in Chapter 7 and again in Chapter 12, but these basic terms will get us started.

Consider the three business processes for a drone manufacturer shown in Figure 3-8. The materials ordering process transforms cash[3] into a raw materials inventory. The manufacturing process transforms raw materials into finished goods. The sales process transforms finished goods into cash. Notice that the business processes span the value chain activities. The sales process involves sales and marketing as well as outbound logistics activities, as you would expect. Note, too,

FIGURE 3-8
Three Examples of Business Processes



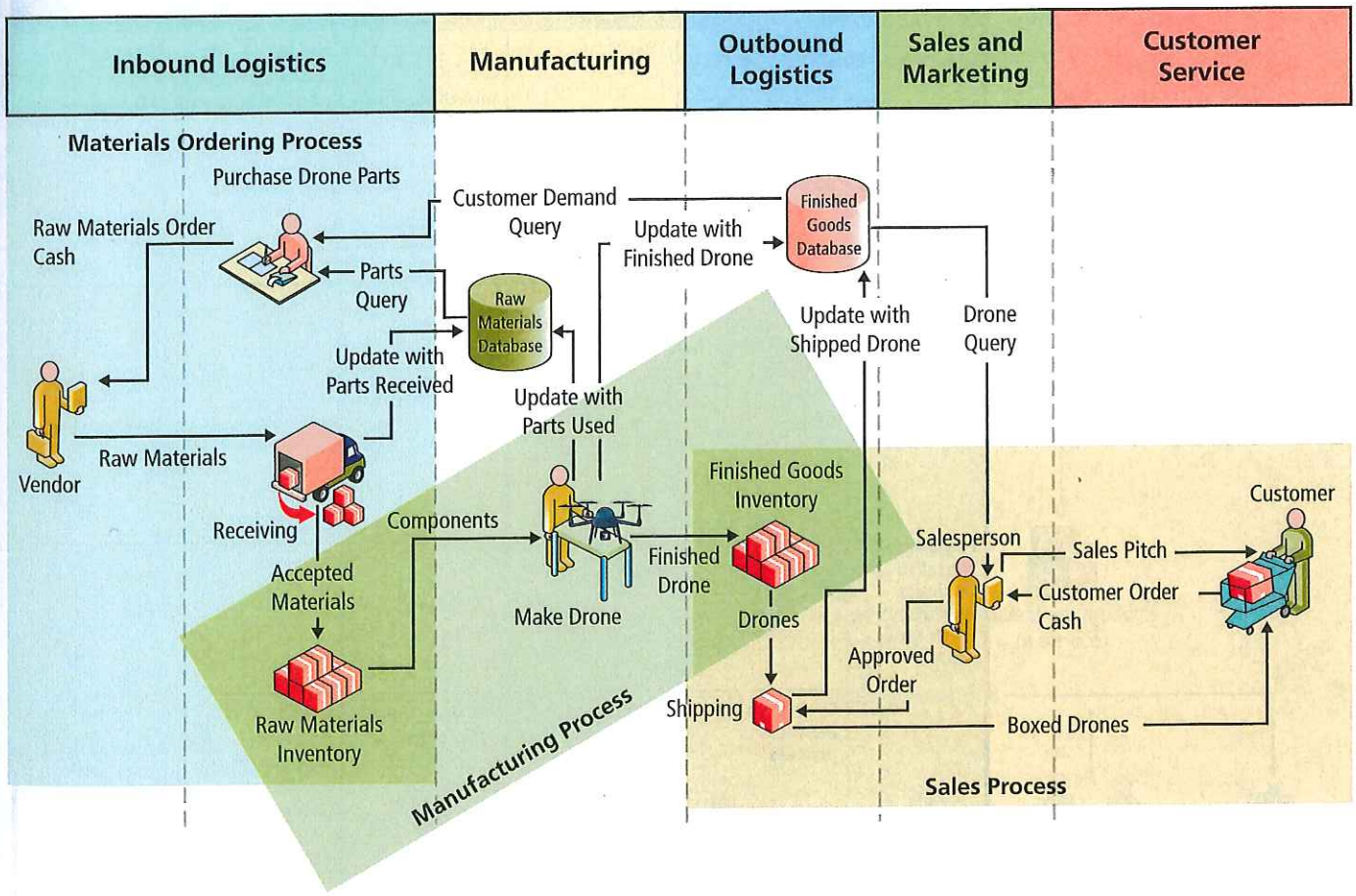
that while none of these three processes involve a customer-service activity, customer service plays a role in other business processes.

Also notice that activities get and put data resources from and to databases. For example, the purchase-drone parts activity queries the raw materials database to determine the materials to order. The receiving activity updates the raw materials database to indicate the arrival of materials. The make-drone activity updates the raw materials database to indicate the consumption of materials. Similar actions are taken in the sales process against the finished goods database.

Business processes vary in cost and effectiveness. In fact, the streamlining of business processes to increase margin (add value, reduce costs, or both) is key to competitive advantage. You will learn about process design when we discuss **business process management** in Chapter 12. To get a flavor of process design, however, consider Figure 3-9, which shows an alternate process for the drone manufacturer. Here the purchase-drone-parts activity not only queries the raw materials inventory database, it also queries the finished goods inventory database. Querying both databases allows the purchasing department to make decisions not just on raw materials quantities but also on customer demand. By using this data, purchasing can reduce the size of raw materials inventory, reducing production costs and thus adding margin to the value chain. This is an example of using a linkage across business processes to improve process margin.

As you will learn, however, changing business processes is not easy to do. Most process design requires people to work in new ways and to follow different procedures, and employees often resist such change. In Figure 3-9, the employees who perform the purchase-drone-parts activity need to learn to adjust their ordering processes to use customer purchase patterns. Another complication is that data stored in the finished goods database likely will need to be redesigned to keep track of customer demand data. As you will learn in Chapter 12, that redesign effort will require that some application programs be changed as well.

FIGURE 3-9
Improved Material Ordering Process



Q3-6 How Does Competitive Strategy Determine Business Processes and the Structure of Information Systems?

You can read about how IT architecture supports competitive strategy in the Career Guide on page 103.

Figure 3-10 shows a business process for renting bicycles. The value-generating activities are shown in the top of the table, and the implementation of those activities for two companies with different competitive strategies is shown in the rows below.

The first company has chosen a competitive strategy of low-cost rentals to students. Accordingly, this business implements business processes to minimize costs. The second company has chosen a differentiation strategy. It provides "best-of-breed" rentals to executives at a high-end conference resort. Notice that this business has designed its business processes to ensure superb service. To achieve a positive margin, it must ensure that the value added will exceed the costs of providing the service.

Now, consider the information systems required for these business processes. The student rental business uses a shoebox for its data facility. The only computer/software/data component in its business is the machine provided by its bank for processing credit card transactions.

The high-service business, however, makes extensive use of information systems, as shown in Figure 3-11. It has a sales tracking database that tracks past customer rental activity and an inventory database that is used to select and up-sell bicycle rentals as well as to control bicycle inventory with a minimum of fuss to its high-end customers.

	Value-Generating Activity	Greet Customer	Determine Needs	Rent Bike	Return Bike & Pay
Low-cost rental to students	Message that implements competitive strategy	"You wanna bike?"	"Bikes are over there. Help yourself."	"Fill out this form, and bring it to me over here when you're done."	"Show me the bike." "OK, you owe $23.50. Pay up."
	Supporting business process	None.	Physical controls and procedures to prevent bike theft.	Printed forms and a shoebox to store them in.	Shoebox with rental form. Minimal credit card and cash receipt system.
High-service rental to business executives at conference resort	Message that implements competitive strategy	"Hello, Ms. Henry. Wonderful to see you again. Would you like to rent the WonderBike 4.5 that you rented last time?"	"You know, I think the WonderBike Supreme would be a better choice for you. It has . . . "	"Let me just scan the bike's number into our system, and then I'll adjust the seat for you."	"How was your ride?" "Here, let me help you. I'll just scan the bike's tag again and have your paperwork in just a second." "Would you like a beverage?" "Would you like me to put this on your hotel bill, or would you prefer to pay now?"
	Supporting business process	Customer tracking and past sales activity system.	Employee training and information system to match customer and bikes, biased to "up-sell" customer.	Automated inventory system to check bike out of inventory.	Automated inventory system to place bike back in inventory. Prepare payment documents. Integrate with resort's billing system.

FIGURE 3-10
Operations Value Chains for Bicycle Rental Companies

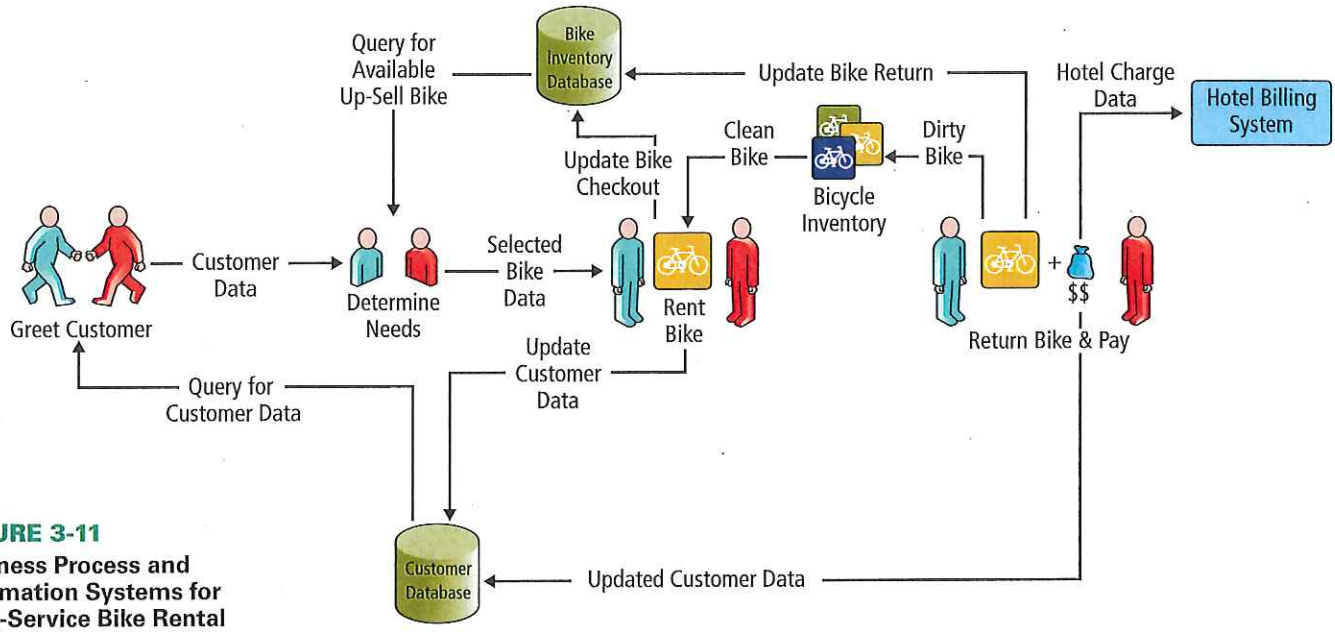


FIGURE 3-11
Business Process and Information Systems for High-Service Bike Rental

Q3-7 How Do Information Systems Provide Competitive Advantages?

In your business strategy class, you will study the Porter models in greater detail than we have discussed here. When you do so, you will learn numerous ways that organizations respond to the five competitive forces. For our purposes, we can distill those ways into the list of principles shown in Figure 3-12. Keep in mind that we are applying these principles in the context of the organization's competitive strategy.

Some of these competitive techniques are created via products and services, and some are created via the development of business processes. Consider each.

Competitive Advantage via Products

The first three principles in Figure 3-12 concern products or services. Organizations gain a competitive advantage by creating *new* products or services, by *enhancing* existing products or services, and by *differentiating* their products and services from those of their competitors.

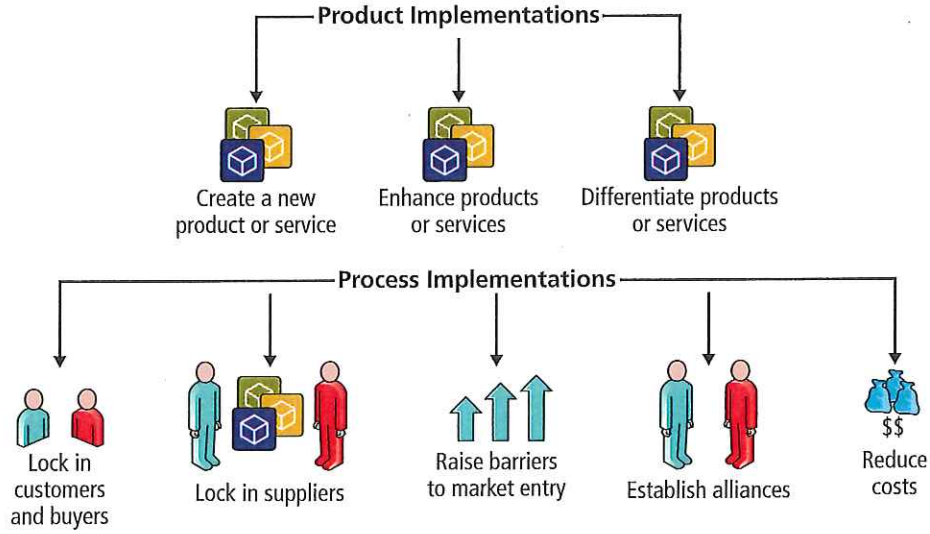


FIGURE 3-12
Principles of Competitive Advantage

SO WHAT?

THE AUTONOMOUS RACE

Stop and think for a minute about the evolution of technology over the past two centuries. If you had to pick the one innovation that has had the biggest impact on humanity, what would you choose? The first innovation that likely comes to mind is the smartphone. It's a device that allows users to access virtually any information in the palm of their hand. While smartphones have certainly had a drastic impact on how we access information and interact with one another, think back a little further.

Advances in travel (e.g., airplanes) or earlier technological advancements like the Internet and computer chips seem like obvious choices. All of these developments have clearly made important contributions to humanity. But in a recent TED talk, the presenter identified the clothes washing machine as the greatest invention of the industrial revolution![4]

Wait...what? Yes, the lowly washing machine has made a profound contribution to society. Washing clothes by hand requires clean water, firewood (to feed the fire that heats the water), and persistent hands-on labor. It takes a tremendous amount of time and effort to wash clothes by hand. The automation of this process eliminates an extensive time commitment by the laborer and allows that individual to complete other, far more important tasks.[5]

Are there any innovations evolving today that could eliminate hours of "wasted" time? It could be argued that autonomous cars are one of these innovations. They will likely have a profound impact on how we travel and spend our time. One report estimates that the average American spends roughly 4.3 years of his or her life driving a car![6]

Driving? There's an App for That

A future with driverless cars is inevitable. Billions of dollars of research and development has been invested in honing the technology needed to create viable autonomous vehicles. Nearly all major automakers are investing in and have already been testing their own self-driving cars, including Mercedes Benz, Audi, BMW, and Toyota.[7] Google has been a leader in this innovation race as Google's autonomous vehicles have already driven hundreds of thousands of miles and can cruise effortlessly on highways at 70-plus miles per hour with little or no human intervention. They can even track and predict the movement of numerous objects in the environment to avoid collisions.[8]

Time savings aside, autonomous vehicles have the potential to drastically reduce accidents and improve safety. Nearly 93 percent of crashes have been attributed to operator error being the "definite or probable" cause.[9] Despite the

Source: Monicaodo/Fotolia

obvious benefits, some argue that a world filled with driverless cars is still years away. The transition to autonomous vehicles will likely be gradual. It will begin with vehicles that can take control on the highway before we have cars that can completely navigate from point A to point B without human intervention.

The cost required to outfit autonomous vehicles may also slow their adoption. Adding the new sensors and controls won't be trivial expenses for auto manufacturers. Then there are government approval, passage of new federal laws, and changing of existing regulations (e.g., the FAA feverishly working to develop policies to regulate the use of drones while drone collisions with commercial aircraft happen on almost a weekly basis). There are also more practical issues to address. Passenger studies have found that riding in the back seat of an autonomous vehicle can actually cause nausea and discomfort due to the unpredictable movements executed by the vehicle's navigation algorithms.

Holding Your Car Hostage

While autonomous vehicles offer some clear benefits, there are some inherent costs as well. Time and time again we must consider the tension between the automation of a given task and the security weaknesses that the digitization of that task presents. For example, both companies and private technology users are moving toward a world in which data is stored in digital form. However, storing data in digital form means that it can be deleted, manipulated, or stolen by nefarious persons. The use of ransomware, software designed to encrypt data on a target computer until payment has been provided to unlock it,

by hackers has increased drastically over recent years. Ransomware attacks have been used against law enforcement agencies and healthcare providers, industries in which the victims have no choice but to pay hackers to gain access to critically important and irreplaceable data (e.g., evidence files, court records, medical records).

In a future world full of autonomous vehicles, ransomware attacks could spread to vehicles.[10] Instead of digital evidence files, court records, or medical records being locked by hackers until a payment is made, imagine police cruisers or ambulances suddenly becoming disabled and unusable due to ransomware attacks! Law enforcement agencies and medical service providers could be forced to pay exorbitant sums of money to gain access to their own vehicles (with legitimate life-or-death implications). If you have an entrepreneurial spirit, now could be a great time to start a software company selling antivirus solutions for cars!

Questions

1. The first section of the article asks you to identify innovations that have had a major impact on humanity. List a few innovations you believe have had an impact on society over the past century.
2. The development of autonomous cars is only one facet of transportation. Can you think of other modes of transportation that have already been automated or are likely to be automated as this type of transportation technology advances?
3. Car manufacturing companies are clearly trying to stay relevant by creating their own driverless cars. What impact will the widespread use of driverless vehicles have on other industries related to the automotive industry? Will any industries be created or eliminated because of this advancement in technology?
4. The article mentions ransomware as a pervasive security threat. What are some tactics that can be used by both private users as well as companies and municipal organizations to aid in preventing the growing use of ransomware by hackers?

Information systems create competitive advantages either as part of a product or by providing support to a product. Consider, for example, a car rental agency like Hertz or Avis. An information system that produces information about the car's location and provides driving instructions to destinations is part of the car rental, and thus is part of the product itself (see Figure 3-13a). In contrast, an information system that schedules car maintenance is not part of the product but instead supports the product (see Figure 3-13b). Either way, information systems can help achieve the first three principles in Figure 3-12.

The remaining five principles in Figure 3-12 concern competitive advantage created by the implementation of business processes.

Competitive Advantage via Business Processes

Organizations can *lock in customers* by making it difficult or expensive for customers to switch to another product. This strategy is sometimes called establishing high **switching costs**. Organizations can *lock in suppliers* by making it difficult to switch to another organization or, stated positively, by making it easy to connect to and work with the organization. Finally, competitive advantage can be gained by *creating entry barriers* that make it difficult and expensive for new competition to enter the market.

One advantage a company can create is ensuring that it produces secure products. For more information, see the Security Guide on pages 100–101.

Another means to gain competitive advantage is to *establish alliances* with other organizations. Such alliances establish standards, promote product awareness and needs, develop market size, reduce purchasing costs, and provide other benefits. Finally, organizations can gain competitive advantage by *reducing costs*. Such reductions enable the organization to reduce prices and/or to increase profitability. Increased profitability means not just greater shareholder value but also more cash, which can fund further infrastructure development for even greater competitive advantage.

All of these principles of competitive advantage make sense, but the question you may be asking is "How do information systems help to create competitive advantage?" To answer that question, consider a sample information system.

a. Information System as Part of a Car Rental Product

b. Information System That Supports a Car Rental Product

Daily Service Schedule – June 15, 2018

StationID 22
StationName Lubrication

ServiceDate	ServiceTime	VehicleID	Make	Model	Mileage	ServiceDescription
06/15/2018	12:00 AM	155890	Ford	Explorer	2244	Std. Lube
06/15/2018	11:00 AM	12448	Toyota	Tacoma	7558	Std. Lube

StationID 26
StationName Alignment

ServiceDate	ServiceTime	VehicleID	Make	Model	Mileage	ServiceDescription
06/15/2018	9:00 AM	12448	Toyota	Tacoma	7558	Front end alignment inspect

StationID 28
StationName Transmission

ServiceDate	ServiceTime	VehicleID	Make	Model	Mileage	ServiceDescription
06/15/2018	11:00 AM	155890	Ford	Explorer	2244	Transmission oil change

FIGURE 3-13
Two Roles for Information Systems Regarding Products

How Does an Actual Company Use IS to Create Competitive Advantages?

ABC, Inc., a major transportation company that did not want its name published in this textbook, is a worldwide shipper with sales well in excess of $1B. From its inception, ABC invested heavily in information technology and led the shipping industry in the application of information systems for competitive advantage. Here we consider one example of an information system that illustrates how ABC successfully uses information technology to gain competitive advantage.

ABC maintains customer account data that include not only the customer's name, address, and billing information, but also data about the people, organizations, and locations to which the customer ships. Figure 3-14 shows a Web form that an ABC customer is using to schedule a shipment. When the ABC system creates the form, it fills the Company name drop-down list with the names of companies that the customer has shipped to in the past. Here the user is selecting Pearson Education.

When the user clicks the Company name, the underlying ABC information system reads the customer's contact data from a database. The data consist of names, addresses, and phone numbers of recipients from past shipments. The user then selects a Contact name, and the system inserts that contact's address and other data into the form using data from the database, as shown in Figure 3-15. Thus, the system saves customers from having to reenter data for recipients to whom they have shipped in the past. Providing the data in this way also reduces data-entry errors.

Figure 3-16 shows another feature of this system. On the right-hand side of this form, the customer can request that ABC send email messages to the sender (the customer), the recipient, and others as well. The customer can opt for ABC to send an email when the shipment is created and when it has been delivered. In Figure 3-16, the user has provided three email addresses. The customer wants all three addresses to receive delivery notification, but only the sender will receive shipment notification. The customer can add a personal message as well. By adding this capability to the shipment scheduling system, ABC has extended its product from a package-delivery service to a package- *and* information-delivery service.

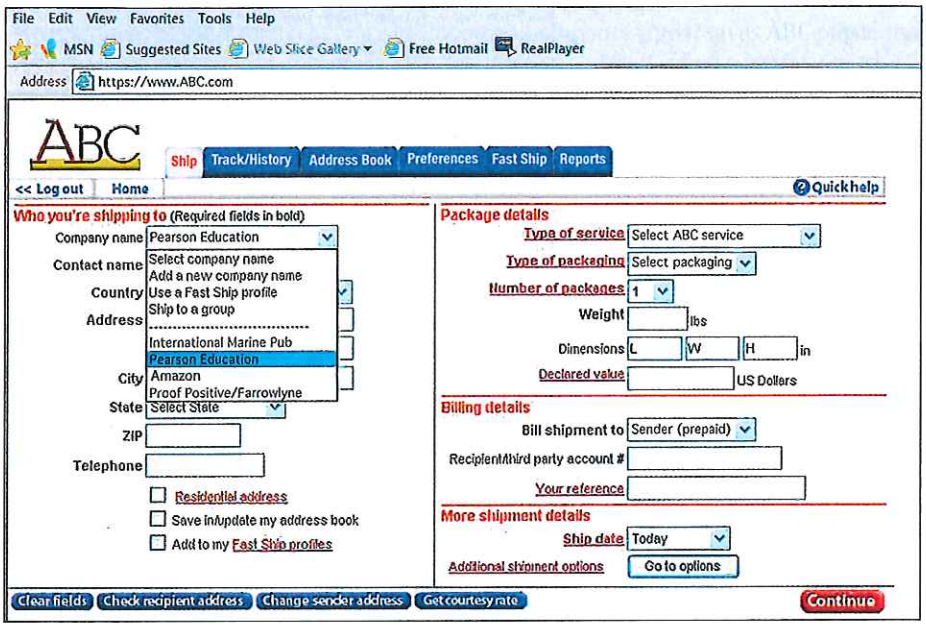


FIGURE 3-14
ABC, Inc., Web Page to Select a Recipient from the Customer's Records

Figure 3-17 shows one other capability of this information system. It has generated a shipping label, complete with bar code, for the user to print. By doing this, the company not only reduces errors in the preparation of shipping labels, but it also causes the customer to provide the paper and ink for document printing! Millions of such documents are printed every day, resulting in a considerable savings to the company.

How Does This System Create a Competitive Advantage?

Now consider the ABC shipping information system in light of the competitive advantage factors in Figure 3-12. This information system *enhances* an existing service because it eases the effort of creating a shipment to the customer while reducing errors. The information system also helps to *differentiate* the ABC package delivery service from competitors that do not have a similar system. Further, the generation of email messages when ABC picks up and delivers a package could be considered to be a *new* service.

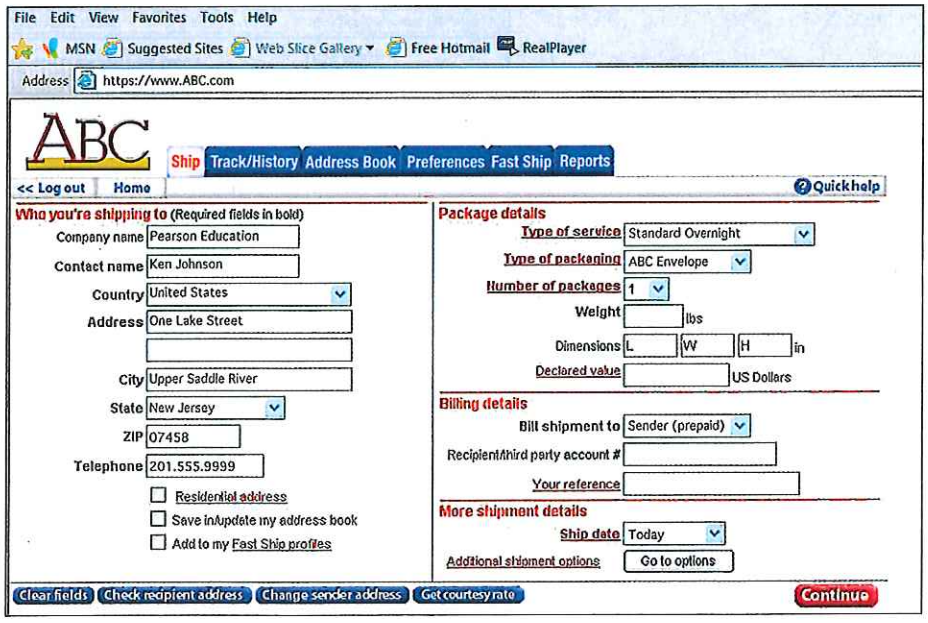


FIGURE 3-15
ABC, Inc., Web Page to Select a Contact from the Customer's Records

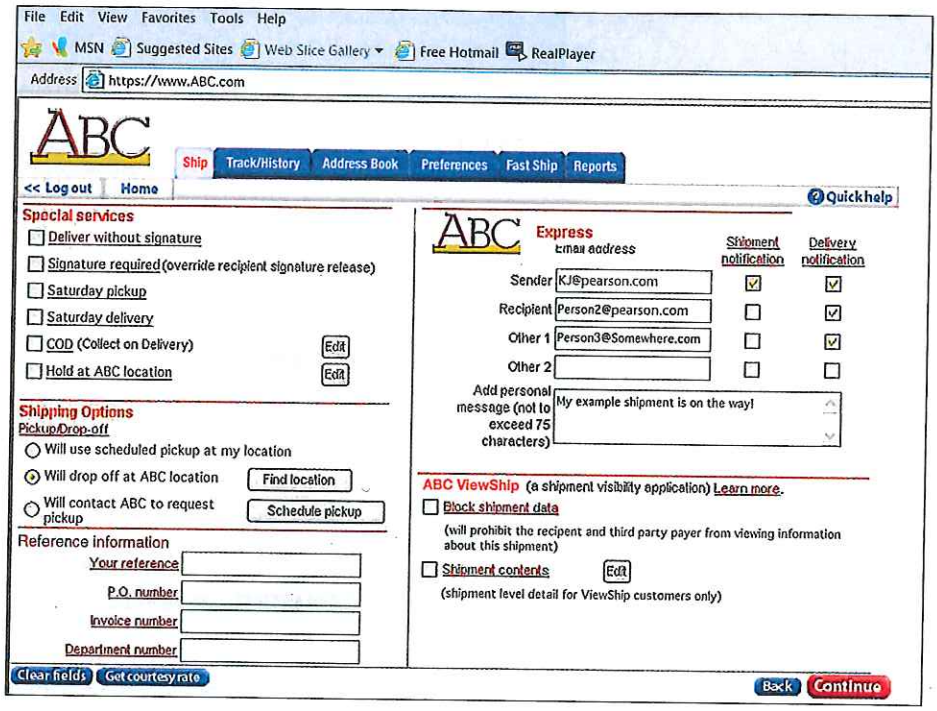


FIGURE 3-16
ABC, Inc., Web Page to Specify Email Notification

Because this information system captures and stores data about recipients, it reduces the amount of customer work when scheduling a shipment. Customers will be *locked in* by this system: If a customer wants to change to a different shipper, he or she will need to rekey recipient data for that new shipper. The disadvantage of rekeying data may well outweigh any advantage of switching to another shipper.

This system achieves a competitive advantage in two other ways as well. First, it raises the barriers to market entry. If another company wants to develop a shipping service, it will not only have to be able to ship packages, but it will also need to have a similar information system. In addition,

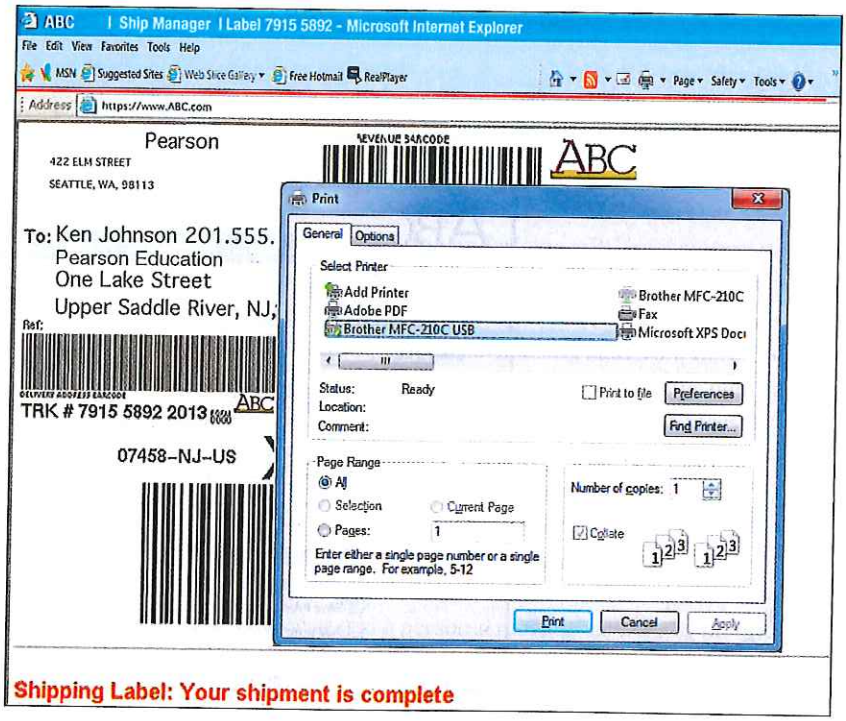


FIGURE 3-17
ABC, Inc., Web Page to Print a Shipping Label

the system reduces costs. It reduces errors in shipping documents, and it saves ABC paper, ink, and printing costs.

Of course, to determine if this system delivers a *net savings* in costs, the cost of developing and operating the information system will need to be offset against the gains in reduced errors and paper, ink, and printing costs. It may be that the system costs more than the savings. Even still, it may be a sound investment if the value of intangible benefits, such as locking in customers and raising entry barriers, exceeds the net cost.

Before continuing, review Figure 3-12. Make sure you understand each of the principles of competitive advantage and how information systems can help achieve them. In fact, the list in Figure 3-12 probably is important enough to memorize because you can also use it for non-IS applications. You can consider any business project or initiative in light of competitive advantage.

Q3-8 2027?

In the next 10 years, business models, strategies, and competitive advantages are unlikely to change. Their relationships to business processes and IS are also unlikely to change. They may evolve and new models may rise to the surface, but those new models will likely be extensions of existing models within existing paradigms.

What is likely to change, however, is pace. The speed of business is continuing to accelerate because of faster Internet speeds, new networked devices, and improved hardware. The Web and other social sites (e.g., Twitter, Facebook, etc.) enable the rapid spread of new ideas and innovations. They also require businesses to constantly be on alert for changes that may affect their strategy in the near future.

To look forward, it is sometimes helpful to look back. Consider the innovations shown in Figure 3-18 below. These are innovative new products developed by five of the largest technology companies in the world. Many of them weren't around 10 years ago (i.e., in 2007). Google (1998) and Facebook (2004) were up and running, and the first iPhone had just been released. Smartphone competitors and the first AIs wouldn't come into being for about 5 years. Smartwatches wouldn't appear for about 7 years. Augmented reality (AR) and virtual reality devices (VR) are just now being released to consumers. Drones are currently used by hobbyists and some small companies, but large-scale commercial use is still in the experimental stage. Self-driving cars are in the late development to early adoption phases and are getting a lot of attention from manufacturers and consumers.

FIGURE 3-18
Innovations by Technology Companies

Company	Market Cap. In Billions	Search	Smartphone	AI	Smartwatch	AR/VR	Drones	Self-driving Car
Apple	$539		iPhone (2007)	Siri (2011)	Apple Watch (2015)	? (dev.)		? (dev.)
Alphabet	$480	Google (1998)	Nexus (2013)	Assistant (2016)	Wear (os) (2014)	Daydream VR & Magic Leap (dev.)	Wing (dev.)	Self-driving Car (dev.)
Microsoft	$395	Bing (2009)	Lumia (2011)	Cortana (2014)	Band (2014)	Hololens (2016)		
Facebook	$306	Facebook (2004)		FAIR (dev.)		Oculus Rift (2016)	Ascenta (dev.)	
Samsung	$162		Galaxy S (2010)	S Voice (2012)	Gear S2 (2013)	Gear VR (2015)		

SECURITY GUIDE

HACKING SMART THINGS

You may have noticed a recent trend in TV commercials for cars. Many car manufacturers are focusing on technology-centric special features. One of the most popular add-ons right now is adding the capability to turn your car into an Internet hot spot. Sure, allowing your friends to check their social media updates using your car's Wi-Fi sounds pretty cool. But there may be some unintended risks associated with incorporating this capability into your car—or any device, for that matter. What if one of your passengers used that Wi-Fi connection to access your car's brakes?

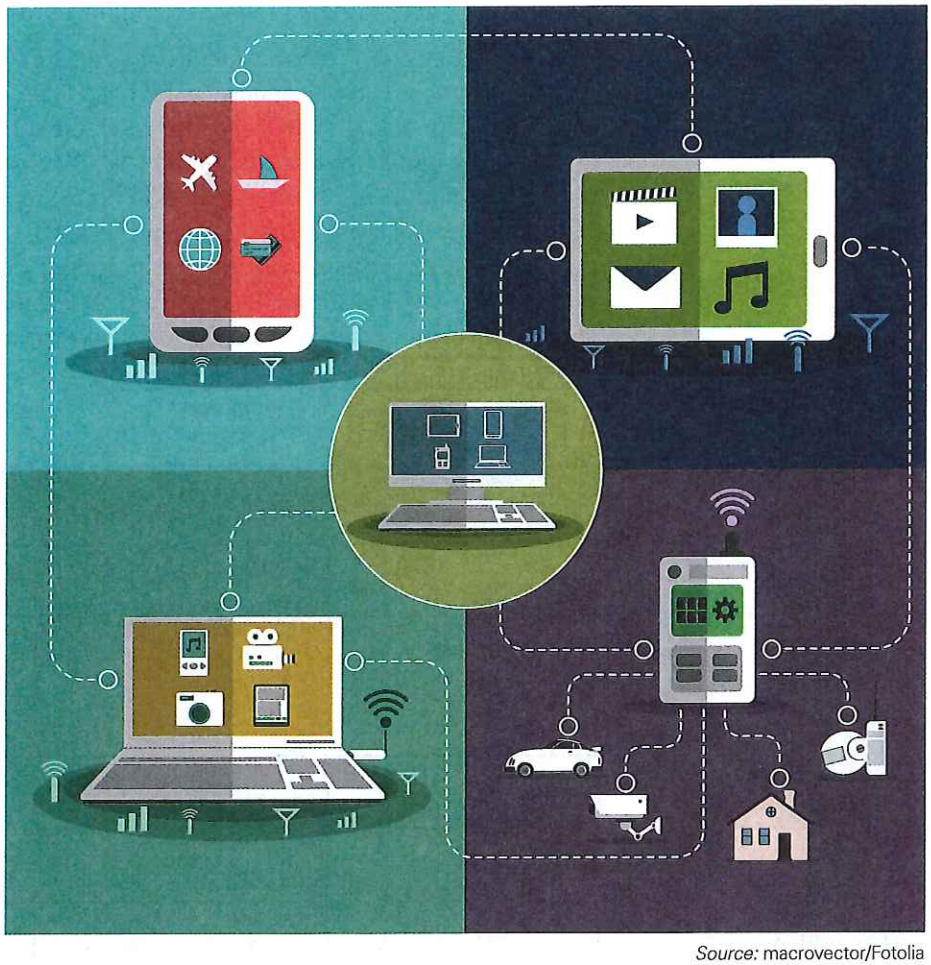
Internet of Things (IoT)

You may have already heard of the *Internet of Things* (IoT), or the idea that objects are becoming connected to the Internet so they can interact with other devices, applications, or services. Countless companies are working to capitalize on the possibilities of new "smart" products designed to automatically communicate with other devices and exchange data with little or no intervention by the user. The trend of developing new Internet-enabled devices is so widespread that some estimates place the number of IoT devices at roughly 21 billion by 2021.[11]

But what can all of these new smart devices be used for? Take home automation, for example. The home automation market is growing rapidly with new Internet-enabled devices like thermostats, smoke detectors, light bulbs, surveillance cameras, and door locks gaining in popularity.[12] These devices allow a homeowner to remotely monitor the temperature of the home, turn lights on or off, or remotely keep an eye on the family dog by tapping into a webcam feed. While all of these capabilities seem like a great idea and add convenience to daily life, the trend of outfitting every object with Internet access may prove to be a hazardous, even dangerous, proposition.

Internet of Threats

You might already be aware of some of the types of security threats on the Internet. If you tune in to the evening news on any given night, you will see stories about data stolen from



Source: macrovector/Fotolia

large corporations, government insiders leaking sensitive information, or cyberattacks launched from around the globe.

What does this have to do with you? Well, you have sensitive information, too. How would you feel if your bank statements, medical records, and email history for the past 5 years were stolen and posted online? You probably are taking steps to avoid these threats like running antivirus software, enabling automatic updates, using your operating system's default firewall, avoiding suspicious emails, and staying away from shady Web sites.

But what about securing your data stored on these new Internet-enabled smart devices? Think about the security implications of having to protect 10, 20, or 30 different Internet-enabled devices in your home. Will you have to buy antivirus software for your refrigerator or configure a firewall on your thermostat? Could a hacker hijack the webcam in your living room or, worse, actually hijack your car?

Taking Back-Seat Driver to a Whole New Level

Yes, a hacker could potentially compromise your car if it is connected to the Internet. If a hacker takes control of your vehicle, he or she could then remotely control various functions of the vehicle (e.g., the brakes), keep tabs on your GPS coordinates, activate the Bluetooth microphone and listen to anything taking place inside of the car, or access data about the vehicle's operations and performance.[13] The thought of someone eavesdropping on your conversations in the car is bad enough. But what would happen if the hacker activates the brakes, or disables them, while you are driving? What happens when driverless cars become widely adopted and hackers could have complete control over the vehicle?

As more and more devices are accessible over some form of network, users will have to weigh the pros and the cons of using them. But securing these new smart devices will take additional work. The same thing that makes these devices great will also make them vulnerable to attack. Yes, of course, a smart thermostat will save you money. But what happens when it gets a virus? Will you be the one running a temperature?

DISCUSSION QUESTIONS

1. How many devices in your home are connected to the Internet? How much time do you spend daily, weekly, or monthly trying to ensure that these devices have the latest updates and are secure? What are the implications of maintaining dozens of smart devices?
2. The guide discusses the potential threat of a hacker accessing a vehicle and downloading data about the car's performance and operations. Aside from a malicious hacker acting alone, are there any businesses or government agencies that could benefit from accessing these data? How?
3. Has this guide changed your perception of the Internet of Things? Do the benefits of smart devices outweigh the risk of data loss or your personal privacy? Why or why not?
4. The Internet of Things is not solely focused on home automation or private consumer products. Businesses are using the Internet of Things to manage supply chains and streamline various business processes. What benefits or risks are associated with businesses adopting new Internet-enabled devices?

This isn't a complete list, either—3D printing, cloud computing, software, hardware, e-commerce, and social media were left out of this chart. You'll learn more about innovations in hardware and software in Chapter 4. Companies such as IBM, Oracle, and Amazon could be included in this comparison as potential competitors as well. The point of this chart is to show the pace of technological development over time. Consider how quickly corporate strategies must adapt to this development. Strategically speaking, should each company have a product in each category like Alphabet does? Or would it be smarter to focus on a fewer products?

By 2027, it's very likely that AR/VR will be commonplace. New 3D applications, games, and user interfaces will be developed. Consequently, companies may need to redesign their business processes. Drones and self-driving cars will see widespread use and have a major effect on competitive strategies. For many products, transportation is a major cost. Entire value chains will be disrupted as transportation and delivery costs plummet.

Robotics will likely be the next big area of technological expansion. Even now, companies are introducing robotics into areas outside of manufacturing. The strategic implications of a robotic workforce cannot be understated. Robots don't require health care, time off, vacations, breaks, sick days, or workman's compensation. They don't join unions, get mad, sue their employer, harass coworkers, or drink on the job. They also work 24 hours a day without a paycheck! Combine that with a great AI like IBM's Watson, and you've got an entirely different workforce. By 2027 we may understand "labor" in an entirely different way.

So, we can reasonably assume that the pace of change and the pace at which new technology is integrated will be fast and increasing, possibly accelerating, in the next 10 years. We can lament this fact or we can ignore it, but doing either is like standing on the shore of the Mississippi River and telling it to flow elsewhere.

Instead, we, and especially *you*, need to view this increased pace as rapidly creating opportunities in which you can excel. You know it's coming. You know that, if not self-driving vehicles, then some other new technology-based product that is being constructed in someone's garage today will change the competitive landscape for the company for which you will work. Knowing that, how can you take advantage of it?

Maybe you want to be an innovator and use technology to create new products like self-driving cars, drones, or 3D printers. If so, do it. But, maybe, like Falcon Security, you want to use the innovative products that others are making and create new strategies or build new businesses that take advantage of the opportunities that new products create. You can be certain that, 10 years from now, you will have even more opportunity to do so.

CAREER GUIDE

Source: Gabriel Chino

Name: Gabe Chino
Company: Financial Services
Job Title: Director of Architecture
Education: Weber State University, University of Utah

1 How did you get this type of job?

I took an internship as a Software Engineer at a small company while completing my undergraduate work in computer science. I stayed with the company for 3 years as a web developer. During that time, I learned SQL, application development, and front-end development. I eventually left the company to broaden my experience in IT. After working at a few more companies, I programmed in numerous languages, managed servers, managed networks, and even did some desktop support. I then went on to do my graduate work in IS. These experiences prepared me to be a director at a large financial services company where I manage IT teams and have broad influence on IT decisions for the organization.

2 What attracted you to this field?

I have always been interested in how technology can enhance our lives. After getting some exposure to programming in college, I was hooked. I realize there is no end to innovation and creativity in this field, so I am never bored.

3 What does a typical workday look like for you (duties, decisions, problems)?

I provide solutions. Depending on the day, these could be technology solutions, including code, data, and infrastructure. They can be team solutions, including relationships, communication, or efficiency. They can also be organizational and business solutions. When you are on the technology side of the organization, you get a reputation for being the person who can figure anything out.

4 What do you like most about your job?

I like to come up with creative solutions to business problems. I pretty much get to define how I get work done. I am expected to be a thought leader in the organization, and I feel like there is a high level of respect between my peers and me.

5 What skills would someone need to do well at your job?

The skills needed to be an IT architect are (1) a solid technical background with exposure to many platforms and systems and (2) very strong communication skills. In IT, there are many ways to solve a problem. The architect's job is to find the right solution for the company's needs. I always have to be prepared to have my ideas challenged.

6 Are education or certifications important in your field? Why?

An education is a must for this field. I have met amazing IT architects from a variety of majors. The most common majors in this field are information systems and computer science. Certifications can really set you apart as an architect as well. Networking, programming, and security certifications are most common. I recently completed my TOGAF certification, which is an architect certification.

7 What advice would you give to someone who is considering working in your field?

My advice would be to always watch where the tech field is going. If this field is really for you, stay current with the latest IT trends.

8 What do you think will be hot tech jobs in 10 years?

IT security professionals will be in very high demand as businesses continue to put more and more online. Data scientists will continue to grow in importantance as businesses try to target the right customers in the right way.

ACTIVE REVIEW

Use this Active Review to verify that you understand the ideas and concepts that answer the chapter's study questions.

Q3-1 How does organizational strategy determine information systems structure?

Diagram and explain the relationship of industry structure, competitive strategy, value chains, business processes, and information systems. Working from industry structure to IS, explain how the knowledge you've gained in these first three chapters pertains to that diagram.

Q3-2 What five forces determine industry structure?

Name and briefly describe the five forces. Give your own examples of both strong and weak forces of each type, similar to those in Figure 3-3.

Q3-3 How does analysis of industry structure determine competitive strategy?

Describe four different strategies as defined by Porter. Give an example of four different companies that have implemented each of the strategies.

Q3-4 How does competitive strategy determine value chain structure?

Define the terms *value, margin,* and *value chain.* Explain why organizations that choose a differentiation strategy can use value to determine a limit on the amount of extra cost to pay for differentiation. Name the primary and support activities in the value chain and explain the purpose of each. Explain the concept of linkages.

Q3-5 How do business processes generate value?

Define *business process, cost,* and *margin* as they pertain to business processes. Explain the purpose of an activity and describe types of repository. Explain the importance of business process redesign and describe the difference between the business processes in Figure 3-8 and those in Figure 3-9.

Q3-6 How does competitive strategy determine business processes and the structure of information systems?

In your own words, explain how competitive strategy determines the structure of business processes. Use the examples of a clothing store that caters to struggling students and a clothing store that caters to professional businesspeople in a high-end neighborhood. List the activities in the business process for the two companies and create a chart like that in Figure 3-9. Explain how the information systems' requirements differ between the two stores.

Q3-7 How do information systems provide competitive advantages?

List and briefly describe eight principles of competitive advantage. Consider your college bookstore. List one application of each of the eight principles. Strive to include examples that involve information systems.

Q3-8 2027?

Describe how technological innovations have developed in the past 10 years. What new innovations currently under development will likely be adopted in the next 10 years? Explain how business strategies might change due to these new innovations. Describe the strategic implications of self-driving cars or robotics on traditional companies.

Using Your Knowledge with Falcon Security

Explain in your own words how Falcon Security's competitive strategy is threatened by relying on a few large industrial accounts. Describe Falcon Security's planned response and summarize the problems that Cam perceives with that response. Recommend a course of action for Falcon Security. Use Cam's idea of diversifying the type of work the company does to illustrate your answer.

KEY TERMS AND CONCEPTS

Activity 90
Business process 90
Business process management 91
Competitive strategy 85
Cost 90
Five forces model 84
Linkages 89
Margin 88
Primary activities 88
Repository 90
Support activities 88
Switching costs 95
Value 88
Value chain 88

MyMISLab™

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

USING YOUR KNOWLEDGE

3-1. MyMISLab Apply the value chain model to a mail-order company such as L.L.Bean (*www.llbean.com*). What is its competitive strategy? Describe the tasks L.L.Bean must accomplish for each of the primary value chain activities. How does L.L.Bean's competitive strategy and the nature of its business influence the general characteristics of its information systems?

3-2. MyMISLab Suppose you decide to start a business that recruits students for summer jobs. You will match available students with available jobs. You need to learn what positions are available and what students are available for filling those positions. In starting your business, you know you will be competing with local newspapers, Craigslist (*www.craigslist.org*), and your college. You will probably have other local competitors as well.

a. Analyze the structure of this industry according to Porter's five forces model.
b. Given your analysis in part a, recommend a competitive strategy.
c. Describe the primary value chain activities as they apply to this business.
d. Describe a business process for recruiting students.
e. Describe information systems that could be used to support the business process in part d.
f. Explain how the process you describe in part d and the system you describe in part e reflect your competitive strategy.

3-3. MyMISLab Consider the two different bike rental companies in Q3-6. Think about the bikes they rent. Clearly, the student bikes will be just about anything that can be ridden out of the shop. The bikes for the business executives, however, must be new, shiny, clean, and in tip-top shape.

a. Compare and contrast the operations value chains of these two businesses as they pertain to the management of bicycles.
b. Describe a business process for maintaining bicycles for both businesses.
c. Describe a business process for acquiring bicycles for both businesses.
d. Describe a business process for disposing of bicycles for both businesses.
e. What roles do you see for information systems in your answers to the earlier questions? The information systems can be those you develop within your company or they can be those developed by others, such as Craigslist.

COLLABORATION EXERCISE 3

Using the collaboration IS you built in Chapter 2 (page 000), collaborate with a group of students to answer the following questions.

Singing Valley Resort is a top-end 50-unit resort located high in the Colorado mountains. Rooms rent for $400 to $4,500 per night, depending on the season and the type of accommodations. Singing Valley's clientele are well-to-do; many are famous entertainers, sports figures, and business executives. They are accustomed to, and demand, superior service.

Singing Valley resides in a gorgeous mountain valley and is situated a few hundred yards from a serene mountain lake. It prides itself on superior accommodations; tip-top service; delicious, healthful, organic meals; and exceptional wines. Because it has

been so successful, Singing Valley is 90 percent occupied except during the "shoulder seasons" (November, after the leaves change and before the snow arrives, and late April, when winter sports are finished but the snow is still on the ground).

Singing Valley's owners want to increase revenue, but because the resort is nearly always full and because its rates are already at the top of the scale, it cannot do so via occupancy revenue. Thus, over the past several years it has focused on up-selling to its clientele activities such as fly-fishing, river rafting, cross-country skiing, snowshoeing, art lessons, yoga and other exercise classes, spa services, and the like.

To increase the sales of these optional activities, Singing Valley prepared in-room marketing materials to advertise their availability. Additionally, it trained all registration personnel on techniques of casually and appropriately suggesting such activities to guests on arrival.

The response to these promotions was only mediocre, so Singing Valley's management stepped up its promotions. The first step was to send email to its clientele advising them of the activities available during their stay. An automated system produced emails personalized with names and personal data.

Unfortunately, the automated email system backfired. Immediately upon its execution, Singing Valley management received numerous complaints. One long-term customer objected that she had been coming to Singing Valley for 7 years and asked if they had yet noticed that she was confined to a wheelchair. If they had noticed, she said, why did they send her a personalized invitation for a hiking trip? The agent of another famous client complained that the personalized email was sent to her client and her husband, when anyone who had turned on a TV in the past 6 months knew the two of them were involved in an exceedingly acrimonious divorce. Yet another customer complained that, indeed, he and his wife had vacationed at Singing Valley 3 years ago, but he had not been there since. To his knowledge, his wife had not been there, either, so he was puzzled as to why the email referred to their visit last winter. He wanted to know if, indeed, his wife had recently been to the resort, without him. Of course, Singing Valley had no way of knowing about customers it had insulted who never complained.

During the time the automated email system was operational, sales of extra activities were up 15 percent. However, the strong customer complaints conflicted with its competitive strategy so, in spite of the extra revenue, Singing Valley stopped the automated email system, sacked the vendor who had developed it, and demoted the Singing Valley employee who had brokered the system. Singing Valley was left with the problem of how to increase its revenue.

Your team's task is to develop two innovative ideas for solving Singing Valley's problem. At the minimum, include the following in your response:

a. An analysis of the five forces of the Singing Valley market. Make and justify any necessary assumptions about their market.

b. A statement of Singing Valley's competitive strategy.

c. A statement of the problem. Recall from Chapter 2 that a problem is a perceived difference between what is and what ought to be. If the members of your group have different perceptions of the problem, all the better. Use a collaborative process to obtain the best possible problem description to which all can agree.

d. Document in a general way (like the top row of Figure 3-10) the process of up-selling an activity.

e. Develop two innovative ideas for solving the Singing Valley problem. For each idea, provide:
- A brief description of the idea.
- A process diagram (like Figure 3-11) of the idea. Figure 3-11 was produced using Microsoft Visio; if you have access to that product, you'll save time and have a better result if you also use it.
- A description of the information system needed to implement the idea.

f. Compare the advantages and disadvantages of your alternatives in part e and recommend one of them for implementation.

CASE STUDY 3

The Amazon of Innovation

On Cyber Monday, November 30, 2015, *Amazon.com* customers ordered more than 33 electronics per second from a mobile device.[14] And 70 percent of Amazon's holiday shoppers bought gifts using a mobile device. This contributed to a 40 percent annual increase in Amazon's sales. Amazon's last same-day delivery order for the holiday season was placed on December 24 at 9:58 AM and was delivered at 2:59 PM just in time for Christmas. (Some of Amazon's major innovations are listed in Figure 3-19.)

You may think of Amazon as simply an online retailer, and that is indeed where the company achieved most of its success. To do this, Amazon had to build enormous supporting infrastructure—just imagine the information systems and fulfillment facilities needed to ship electronics ordered at a rate of 33 per second. That infrastructure, however, is needed only during the busy holiday season. Most of the year, Amazon is left with excess infrastructure capacity. Starting in 2000, Amazon

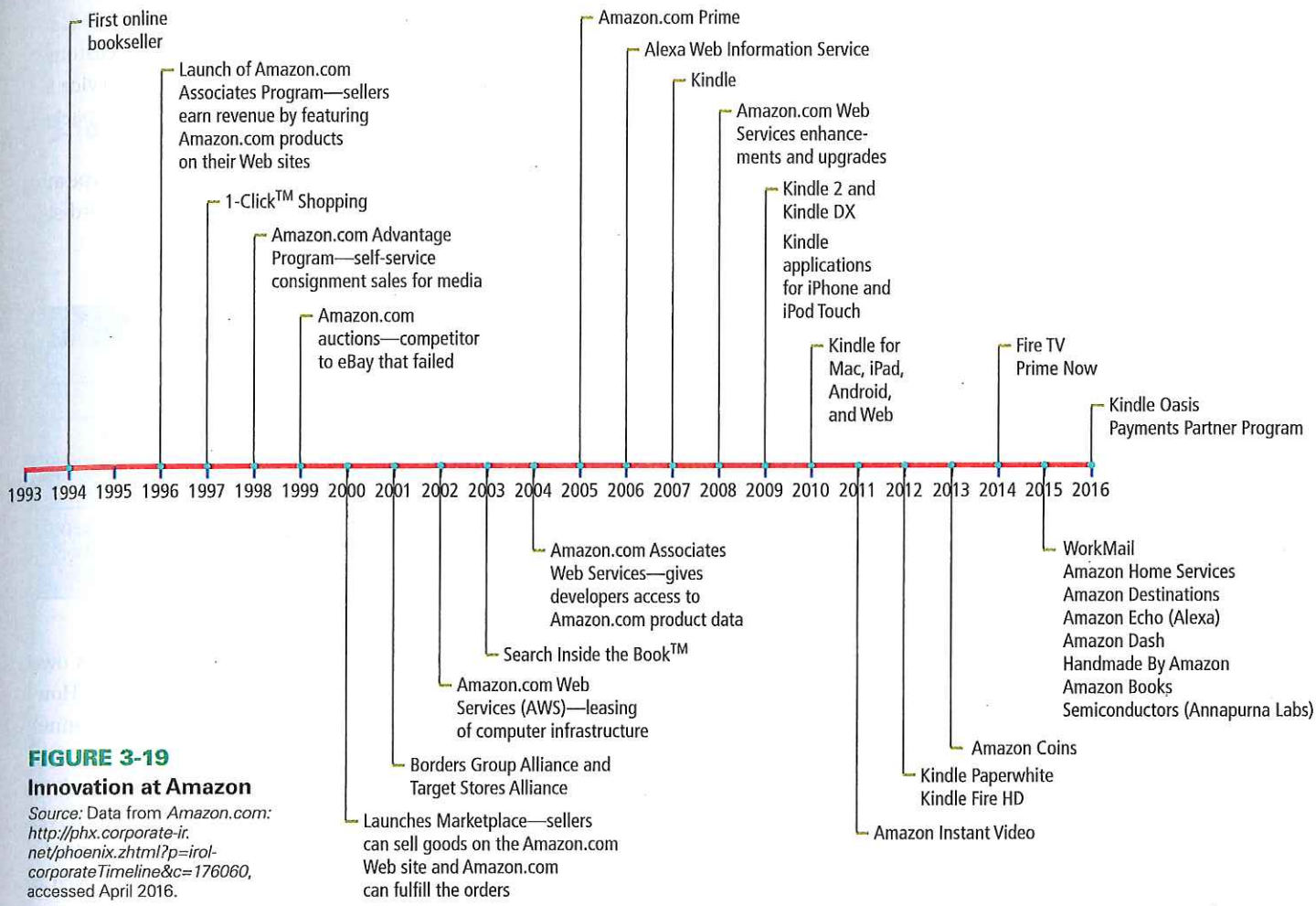


FIGURE 3-19
Innovation at Amazon
Source: Data from *Amazon.com: http://phx.corporate-ir.net/phoenix.zhtml?p=irol-corporateTimeline&c=176060*, accessed April 2016.

began to lease some of that capacity to other companies. In the process, it played a key role in the creation of what are termed *cloud services*, which you will learn about in Chapter 6. For now, just think of cloud services as computer resources somewhere out in the Internet that are leased on flexible terms.

Today, Amazon's business lines can be grouped into three major categories:

- Online retailing
- Order fulfillment
- Cloud services

Consider each.

Amazon created the business model for online retailing. It began as an online bookstore, but every year since 1998 it has added new product categories. The company is involved in all aspects of online retailing. It sells its own inventory. It incentivizes you, via the Associates program, to sell its inventory as well. Or it will help you sell your inventory within its product pages or via one of its consignment venues. Online auctions are the major aspect of online sales in which Amazon does not participate. It tried auctions in 1999, but it could never make inroads against eBay.[15]

Today, it's hard to remember how much of what we take for granted was pioneered by Amazon. "Customers who bought this, also bought that;" online customer reviews; customer ranking of customer reviews; books lists; Look Inside the Book; automatic free shipping for certain orders or frequent customers; and Kindle books and devices were all novel concepts when Amazon introduced them.

Amazon's retailing business operates on very thin margins. Products are usually sold at a discount from the stated retail price, and 2-day shipping is free for Amazon Prime members (who pay an annual fee of $99). How does it do it? For one, Amazon drives its employees incredibly hard. Former employees claim the hours are long, the pressure is severe, and the workload is heavy. But what else? It comes down to Moore's Law and the innovative use of nearly free data processing, storage, and communication.

In addition to online retailing, Amazon also sells order fulfillment services. You can ship your inventory to an Amazon warehouse and access Amazon's information systems just as if they were yours. Using technology known as Web services (discussed in Chapter 6), your order processing information systems can directly integrate, over the Web, with Amazon's

inventory, fulfillment, and shipping applications. Your customers need not know that Amazon played any role at all. You can also sell that same inventory using Amazon's retail sales applications.

Amazon Web Services (AWS) allow organizations to lease time on computer equipment in very flexible ways. Amazon's Elastic Cloud 2 (EC2) enables organizations to expand and contract the computer resources they need within minutes. Amazon has a variety of payment plans, and it is possible to buy computer time for less than a penny an hour. Key to this capability is the ability for the leasing organization's computer programs to interface with Amazon's to automatically scale up and scale down the resources leased. For example, if a news site publishes a story that causes a rapid ramp-up of traffic, that news site can, programmatically, request, configure, and use more computing resources for an hour, a day, a month, whatever.

With its Kindle devices, Amazon has become both a vendor of tablets and, even more importantly in the long term, a vendor of online music and video. And to induce customers to buy Kindle apps, in 2013 Amazon introduced its own currency, Amazon Coins. In 2014, Amazon opened a 3D printing store from which customers can customize their own toys, jewelry, dog bones, and dozens of other products. It also made a push to provide video services by introducing Fire TV.[16]

In 2015 Amazon introduced WorkMail, a potential cloud-based replacement for Microsoft Exchange. It also introduced Amazon Home Services (local professional services), Amazon Destinations (travel site), Amazon Echo (a voice-enabled ordering system), Amazon Books (a physical retail location), and Amazon Dash (a one-button reordering device), and it started selling semiconductors after acquiring Annapurna Labs.[17] By mid-2016 Amazon announced its new Kindle Oasis and the launch of its new Payments Partner Program designed to compete with PayPal, Apple Pay, and Visa.

Finally, Jeff Bezos announced in 2014 that Amazon was experimenting with package delivery using drones, a service called Prime Air.[18] In 2015, Amazon was given permission to start testing its drones in the United States but was hampered by U.S. regulations. Consequently, by mid-2016 Amazon expanded its testing to Canada, the United Kingdom, and the Netherlands.[19] But drone delivery is something that will happen in the future; consider a business service that *Amazon.com* is offering right now.

Fulfillment by Amazon (FBA)

Fulfillment by Amazon (FBA) is an Amazon service by which other sellers can ship goods to Amazon warehouses for stocking, order packaging, and shipment. FBA customers pay a fee for the service as well as for inventory space. Amazon uses its own inventory management and order fulfillment business processes and information systems to fulfill the FBA customers' orders.

FBA customers can sell their goods on *Amazon.com*, sell them via their own sales channels, or both. If the FBA customer sells on *Amazon.com*, Amazon will provide customer service for order processing (handling returns, fixing erroneously packed orders, answering customer order queries, and the like).

The costs for Fulfillment by Amazon depend on the type and size of the goods to be processed. The FBA fees for standard-size products as of April 2016 are shown in the table.

	FBA Costs[20]
Order handling (per order)	$1.00
Pick & pack (per item)	$1.06
Weight handling (per pound)	Between $0.50 for less than 1 pound, to $1.95 plus $0.39 per pound for items over 2 pounds
Storage (cubic foot per month)	$0.54 between January and September and $0.72 from October to December

If goods are sold via *Amazon.com*, Amazon uses its own information systems to drive the order fulfillment process. However, if the goods are sold via an FBA customer's sales channel, then the FBA customer must connect its own information systems with those at Amazon. Amazon provides a standardized interface by which this is done called Amazon Marketplace Web Service (MWS). Using Web-standard technology (see Chapter 6), FBA customers' order and payment data are directly linked to Amazon's information systems.

FBA enables companies to outsource order fulfillment to Amazon, thus avoiding the cost of developing their own processes, facilities, and information systems for this purpose.

QUESTIONS

3-4. Based on the facts presented in this case, what do you think is *Amazon.com's* competitive strategy? Justify your answer.

3-5. Jeff Bezos, CEO of *Amazon.com*, has stated that the best customer support is none. What does that mean?

3-6. Suppose you work for Amazon or a company that takes innovation as seriously as Amazon does. What do you suppose is the likely reaction to an employee who says to his or her boss, "But, I don't know how to do that!"?

3-7. Using your own words and your own experience, what skills and abilities do you think you need to have to thrive at an organization like Amazon?

3-8. What should UPS and FedEx be doing in response to *Amazon.com's* interest in drone delivery?

3-9. Summarize the advantages and disadvantages for brick-and-mortar retailers to sell items via *Amazon.com*. Would you recommend that they do so?

3-10. If a brick-and-mortar retailer were to use FBA, what business processes would it not need to develop? What costs would it save?

3-11. If a brick-and-mortar retailer were to use FBA, what information systems would it not need to develop? What costs would it save?

3-12. If a brick-and-mortar retailer were to use FBA, how would it integrate its information systems with Amazon's? (To add depth to your answer, Google the term *Amazon MWS*.)

MyMISLab™

Go to the Assignments section of your MyLab to complete these writing exercises.

3-13. Samantha Green owns and operates Twigs Tree Trimming Service. Samantha graduated from the forestry program of a nearby university and worked for a large landscape design firm, performing tree trimming and removal. After several years of experience, she bought her own truck, stump grinder, and other equipment and opened her own business in St. Louis, Missouri. Although many of her jobs are one-time operations to remove a tree or stump, others are recurring, such as trimming a tree or groups of trees every year or every other year. When business is slow, she calls former clients to remind them of her services and of the need to trim their trees on a regular basis. Samantha has never heard of Michael Porter or any of his theories. She operates her business "by the seat of her pants."

- **a.** Explain how an analysis of the five competitive forces could help Samantha.
- **b.** Do you think Samantha has a competitive strategy? What competitive strategy would seem to make sense for her?
- **c.** How would knowledge of her competitive strategy help her sales and marketing efforts?
- **d.** Describe, in general terms, the kind of information system that she needs to support sales and marketing efforts.

3-14. YourFire, Inc., is a small business owned by Curt and Julie Robards. Based in Brisbane, Australia, YourFire manufactures and sells a lightweight camping stove called the YourFire. Curt, who previously worked as an aerospace engineer, invented and patented a burning nozzle that enables the stove to stay lit in very high winds—up to 90 miles per hour. Julie, an industrial designer by training, developed an elegant folding design that is small, lightweight, easy to set up, and very stable. Curt and Julie manufacture the stove in their garage, and they sell it directly to their customers over the Internet and via phone.

- **a.** Explain how an analysis of the five competitive forces could help YourFire.
- **b.** What does the YourFire competitive strategy seem to be?
- **c.** Briefly summarize how the primary value chain activities pertain to YourFire. How should the company design these value chains to conform to its competitive strategy?
- **d.** Describe business processes that YourFire needs in order to implement its marketing and sales and its service value chain activities.
- **e.** Describe, in general terms, information systems to support your answer to part d.

3-15. A friend of yours from college, who you haven't talked to in 3 years, sends you an email asking you to meet him for lunch. He says he's got a great idea for a business and wants to run it by you. At first you're hesitant because your

friend, while obviously intelligent, doesn't always think things though. You agree to meet for lunch and talk about the idea. At lunch, he explains that he's been developing new flexible screens for his employer that are incredibly tough, waterproof, and use very little energy. His idea is to use these new flexible screens to create wearable computing clothing that can connect directly to smartphones and push ads, promotions, and video. His only problem is that he knows nothing about business. He's not sure where to start.

a. Explain how you could use the five forces model to help your friend understand the potential success of his wearable flex screens.

b. How might understanding the unique forces affecting this industry determine the competitive advantage for your friend's new company?

ENDNOTES

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