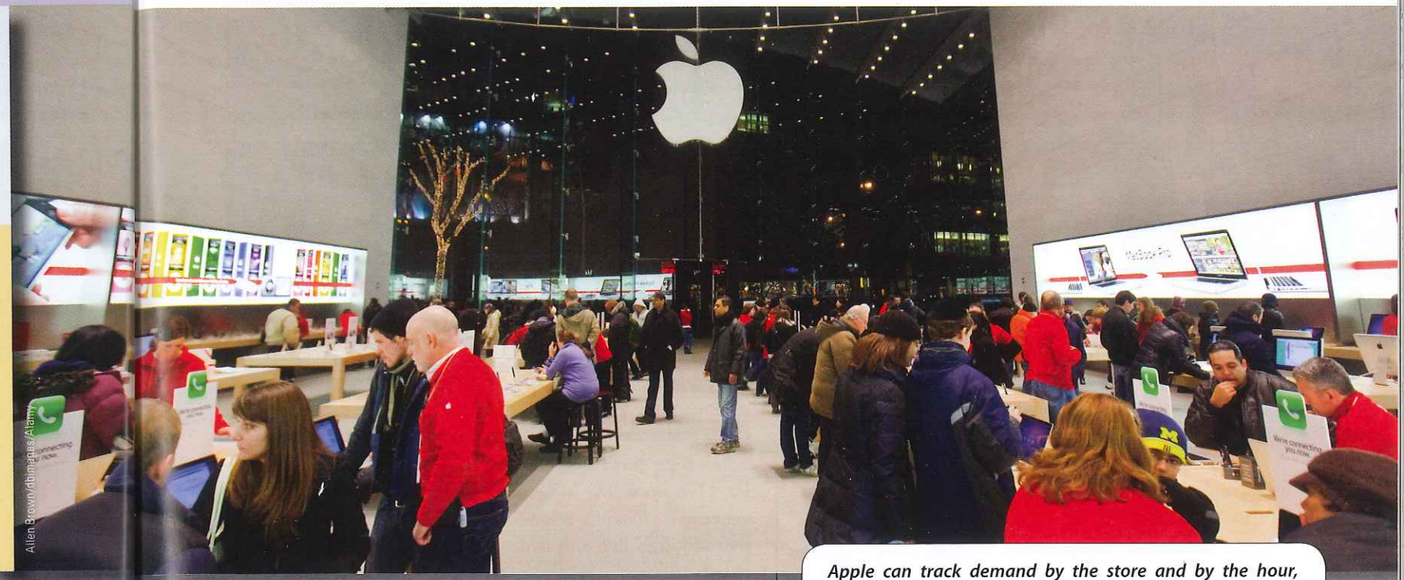
2 | Value Chains

LEARNING OUTCOMES

After studying this chapter, you should be able to:

- 2-1 Explain the concept of value and how it can be increased.
- 2-2 Describe a value chain and the two major perspectives that characterize it.
- 2-3 Explain outsourcing and vertical integration in value chains.
- 2-4 Explain offshoring and reshoring, and issues that managers must consider in making these decisions.
- 2-5 Identify important issues associated with value chains in a global business environment.
- 2-6 Describe how sustainability plays an important role in value chains.

After you finish this chapter go to **PAGE 46** for **STUDY TOOLS**



Allen Brown/dbimages/Alamy

Apple can track demand by the store and by the hour, and adjust production forecasts daily.

Apple has mastered the art of blending physical goods with services to create value for its customers. Think iPod + iTunes, iPhone/iPad + apps, Apple stores + Genius Bar; well, you get the picture. Managing all operations involved from the creation of goods and services through their delivery to the customer and postsale services—which we call the value chain—is one of Apple's core competencies. "Operations expertise is as big an asset for Apple as product innovation or marketing," says Mike Fawkes, the former supply chain chief at Hewlett-Packard. "They've taken operational excellence to a level never seen before." Apple controls every piece of the value chain. For example, managers and engineers often work at supplier and manufacturer sites to refine their operations, and designers work with suppliers to create new tooling equipment. When the iPad 2 debuted, Apple employees monitored every handoff point—suppliers, production, loading dock, airport, truck depot, and distribution center—to make sure each unit was accounted for and of the highest quality. Apple's retail stores give it a final operational advantage. The company can track demand by the store and by the hour, and adjust production forecasts daily. If it becomes clear a given part will run out, teams are deployed and given approval to spend millions of dollars on extra equipment to get around the bottleneck. Apple's significant profit margins are in large part due to this focus on operational excellence in its value chain.[1]

WHAT DO YOU THINK?

Cite some other examples in which digital content has been combined with a physical good. How do you see the digital revolution changing the nature of physical goods in the future?

The creation of customer value depends on an effective system of linked facilities and processes, and the ability to manage them effectively. Apple, for example, manages a large global network of suppliers in countries such as Malaysia and Indonesia, and factories in the United States, China, and other countries to produce its physical goods, which must be coordinated with the development and production of software and other digital content, retail sales, and service and support. As the opening anecdote suggests, coordinating these goods-producing and service-providing processes can be challenging.

The set of activities involved in providing goods and services to customers is called a value chain and helps to characterize the scope of operations management activities. *A* **value chain** *is a network of facilities and processes that describes the flow of materials, finished goods, services, information, and financial transactions from suppliers, through the facilities and processes that create goods and services, and those that deliver them to the customer.* Value chains involve all major functions in an organization. This includes not only operations but also purchasing, marketing and sales, human resource management, finance and accounting, information systems and technology, distribution, and service and support.

Many organizations use the terms "value chain" and "supply chain" interchangeably; however, we differentiate these two terms in this book. *A* **supply chain** *is the portion of the value chain that focuses primarily on the physical movement of goods and materials, and supporting flows of information and financial transactions through the supply, production, and distribution processes.* A value chain is broader in scope than a supply chain and is easier to apply to service-providing organizations as well as to goods-producing firms. We will focus on supply chains in Chapter 9.

It is important for you to understand how operations management influences the design and management of value chains. Today's organizations face difficult decisions in balancing cost, quality, service, and sustainability objectives to create value for their customers and stakeholders, and in coordinating the many activities that take place within value chains. Modern firms increasingly deliver goods and services to multiple markets and operate in a global business environment. As a result, many companies have reconfigured their value chains and moved some operations out of the United States to keep costs

A **value chain** is a network of facilities and processes that describes the flow of materials, finished goods, services, information, and financial transactions from suppliers, through the facilities and processes that create goods and services, and those that deliver them to the customer.

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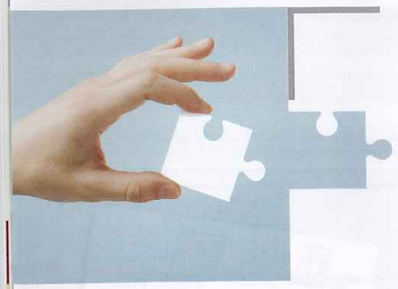

The underlying purpose of every organization is to provide value to its customers and stakeholders.

competitive, remain profitable, and improve customer service. As one chief financial officer wrote in a *CFO Magazine* survey, "You cannot compete globally unless you use global resources."[2] Thus, we emphasize the importance of understanding the global business environment and local culture, and their impact on value chain design and operations.

2-1 THE CONCEPT OF VALUE

Today's consumers demand innovative products, high quality, quick response, impeccable service, and low prices; in short, they want value in every purchase or experience. One of the most important points that we can emphasize in this book is that the underlying purpose of every organization is to provide value to its customers and stakeholders.

Value *is the perception of the benefits associated with a good, service, or bundle of goods and services (i.e., the customer benefit package) in relation to what buyers are willing to pay for them.* The decision to purchase a good or service or a customer benefit package is based on an assessment by the customer of the perceived benefits in relation to its price. The customer's cumulative judgment of the perceived benefits leads to either satisfaction or dissatisfaction. One of the simplest functional forms of value is:

$$\text{Value} = \frac{\text{Perceived benefits}}{\text{Price (cost) to the customer}}$$

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A competitively dominant customer experience is often called a **value proposition.**

If the value ratio is high, the good or service is perceived favorably by customers, and the organization providing it is more likely to be successful.

A competitively dominant customer experience is often called a **value proposition.**[3] The economist Adam Smith, in his 1776 book *The Wealth of Nations,* recognized that economic exchange is based on the production of goods that acquire value during design and manufacturing processes. However, he also noted that "real value" is represented by "value in-use"; that is, a good such as a cell phone provides value only when used, and thus reflects the importance of services in a value proposition. The focus on value has forced many traditional goods-producing companies to add services and, increasingly, digital content to their customer benefit packages. If the quality or features of goods cannot be improved at a reasonable cost and prices cannot be lowered, then enhanced or additional services may provide better total value to customers.

The integration of services in manufacturing was recognized some time ago. "In the same way that service businesses were managed and organized around manufacturing models during the industrial economy, we can expect that manufacturing businesses will be managed and organized around service models in this new economy."[4] A goods-producing company can no longer be viewed as simply a factory that churns out physical goods, because customer perceptions of goods are influenced highly by such facilitating services as financing and leasing, shipping and installation, maintenance and repair, and technical support and consulting. Today we see digital content, such as websites, streaming videos, social networks, and e-mail newsletters, becoming an important aspect of a company's value proposition. Coordinating the operational capability to design and deliver an integrated customer benefit package of physical and digital goods and services is the essence of operations management.

HOW TO INCREASE VALUE?

To increase value, an organization must

(a) increase perceived benefits while holding price or cost constant;

(b) increase perceived benefits while reducing price or cost; or

(c) decrease price or cost while holding perceived benefits constant.

In addition, proportional increases or decreases in perceived benefits as well as price result in no net change in value. Management must determine how to maximize value by designing processes and systems that create and deliver the appropriate goods and services customers want to use, pay for, and experience.

Understanding the integration of goods and services and customer benefit packages is fundamental to how managers view their business, strategy, and value chains. Some important questions that operations managers must consider are: What do customers buy from us? Do all value chains create and deliver services (sometimes through physical goods)? How does one value chain compete against another? The answers aren't easy, but they can make the difference in creating true customer value and a sustainable competitive advantage for the firm.

2-2 VALUE CHAIN PARADIGMS AND PERSPECTIVES

We will describe a value chain from two different perspectives: an input-output framework and a pre- and postproduction services framework. Examples using actual companies will be used to illustrate these. It is important to recognize that each of these frameworks incorporates *both* goods and services into the value chain.

2-2a Value Chains: An Input-Output Perspective

As shown in Exhibit 2.1, a value chain can be depicted as a "cradle-to-grave" input-output model of

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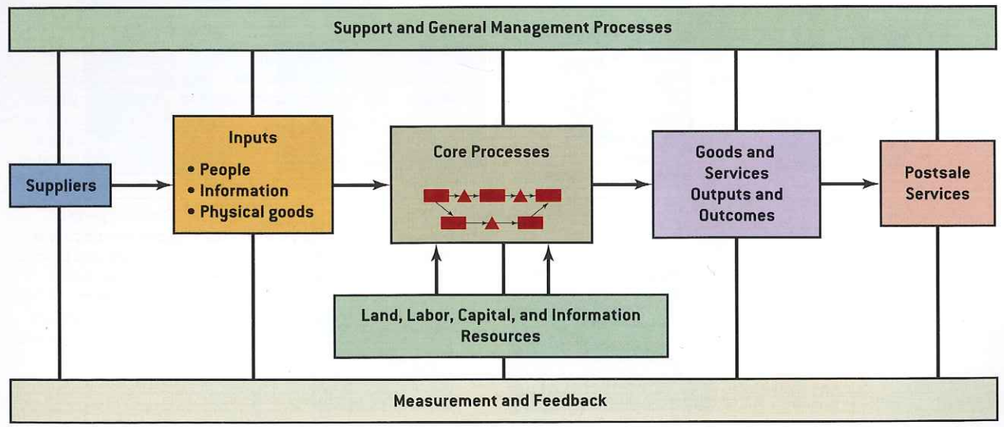
Exhibit 2.1

An Input-Output Perspective of a Value Chain



the operations function. The value chain begins with suppliers who provide inputs to a goods-producing or service-providing process or network of processes. Suppliers might be retail stores, distributors, employment agencies, dealers, financing and leasing agents, information and Internet companies, field maintenance and repair services, architectural and engineering design firms, and contractors, as well as manufacturers of materials and components. The inputs they provide might be physical goods such as automobile engines or microprocessors provided to an assembly plant; meat, fish, and vegetables provided to a restaurant; trained employees provided to organizations by universities and technical schools; or information such as market research or a medical diagnosis.

Inputs are transformed into value-added goods and services through processes that are supported by such resources as equipment and facilities, labor, money, and information. Note that what is being transformed can be almost anything—for instance, people in a hospital, a physical good in an oil refinery, information in an e-publishing business, or a mixture of people, physical goods, and information. Value chain processes include the three types we defined in Chapter 1: core processes (those that directly create and deliver goods and services), support processes (those "behind the scenes," but which support core processes), and general management processes (those that are needed for efficient and effective business performance). At a hospital, for example, value creation such as surgery and drug administration are used to transform sick people into healthy ones, whereas support processes such as lab testing and purchasing help to ensure that surgery and drug administration accomplish their goals. Finally, the value chain outputs—goods and services—are delivered or provided to customers and targeted market segments. Some examples of value chains that illustrate the elements in Exhibit 2.1 are shown in Exhibit 2.2. The success of the entire value chain depends on how it is designed and managed. This includes measuring performance (which we address in the next chapter) and using the feedback from measurements to improve all aspects of the value chain.

Exhibit 2.2

Examples of Goods-Producing and Service-Providing Value Chains

Organization	Suppliers	Inputs	Transformation Process	Outputs	Customers and Market Segments
Auto assembly plant	Engine plant Tires Frame Axles Paint Seats	Labor Energy Auto parts Specifications	Welding Machining Assembly Painting	Automobiles Trucks	Economy Luxury Rental Trucking Ambulance Police
Hospital	Pharmaceutical companies Equipment suppliers Food suppliers Organ donors Medical suppliers	Patients Beds Staff Drugs Diagnostic equipment Knowledge	Admissions Lab testing Doctor diagnosis Food service Surgery Schedules Drug administration Rehabilitation	Healthy people Lab results Accurate bills Community health education	Heart clinics Pediatrics Emergency and trauma services Ambulatory services Medical specialties and hospital wards
State Government	Highway and building contractors Employment agencies Food suppliers Equipment suppliers Other governments	Labor Energy Information Trash Crimes Disputes Sick people Low-income people	Health care benefits Food stamps Legal services Prisons Trash removal Park services License services Police services Tax services	Good use of taxpayers' monies Safety net Security Reallocate taxes Clean, safe, and fun parks	Disabled people Low-income people Criminals and prisons Corporate taxes Boat licenses Building inspections Weekend vacationers Child custody services Legal court services

2-2b The Value Chain at Buhrke Industries Inc.

To illustrate the input-output perspective of a value chain, we highlight Buhrke Industries Inc., located in Arlington Heights, Illinois, which provides stamped metal parts to many industries, including automotive, appliance, computer, electronics, hardware, housewares, power tools, medical, and telecommunications. A simplified view of Buhrke's value chain is shown in Exhibit 2.3.

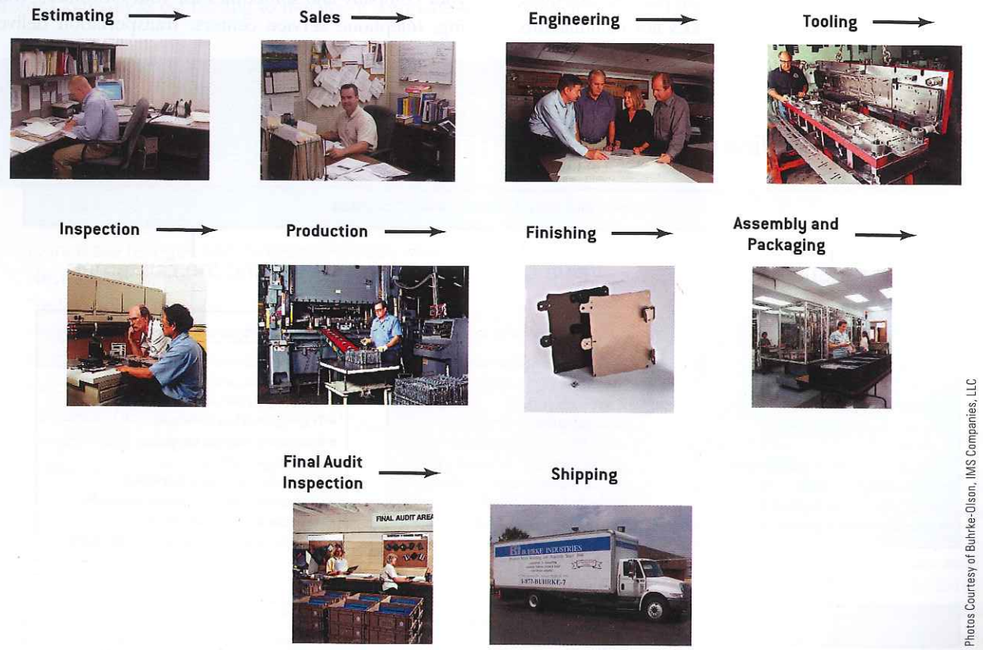
Buhrke's objective is to be a customer's best total-value producer with on-time delivery, fewer rejects, and high-quality stampings. However, the company goes beyond manufacturing goods; it prides itself in providing the best service available as part of its customer value chain. Service is more than delivering a product on time. It's also partnering with customers by providing personalized service for fast, accurate response; customized engineering designs to meet customer needs; preventive maintenance systems to ensure high machine uptime; experienced, highly trained, long-term employees; and troubleshooting by a knowledgeable sales staff.

Suppliers and other value chain inputs include people, information, and physical goods—for example, engineering blueprints and specifications, rolled steel, factory equipment and lubricants, pallets and boxes, employment agencies, inbound shipping, and outside training and industrial marketing firms. Value-creation processes include tooling, inspection, production, finishing, and sometimes assembly into a complete subassembly. Outputs include the stamped metal parts and postsale service outcomes such as out-in-the-field consulting and troubleshooting by company employees. General management processes coordinate processes, often in different functional areas, while support processes include hiring, medical benefits, and accounting. As many as 100 processes are required for Buhrke to perform its work and create value for its customers.

The major stages of Buhrke's value chain shown in Exhibit 2.3 begin with a customer request for a quotation.

Exhibit 2.3

The Value Chain at Buhrke Industries



Photos Courtesy of Buhrke-Olson, IMS Companies, LLC

The estimating department processes such job parameters as specifications, metals, finishing or packaging services, the presses that will be used to run the job, and customer deadlines in developing a quote. Next, a sales engineer is assigned to monitor each stamping job from start to finish, so the customer may have the convenience of a single point of contact. Sales engineers work closely with the engineering staff to convey customer needs. Engineers then design the best tooling for the job, using computer-assisted design processes to ensure precise designs and timely completion. After a tool is designed and built, it is maintained in an on-site tool room. Burhke's toolmakers have decades of experience constructing tools for metal stamping, and they are put on a strict maintenance regimen to ensure long life and consistent stampings.

Production of the metal parts is accomplished on a full range of presses, from 15 tons to 200 tons, with speeds of up to 1,500 parts per minute. Inspection of raw materials (inputs), work-in-process, and finished products (outputs) helps ensure zero defects. The company provides a full range of secondary and finishing operations, from heat-treating to powder coating to tapping, to add value to customers. Customers do not need to ship stampings elsewhere or arrange for another service provider to finish the job.

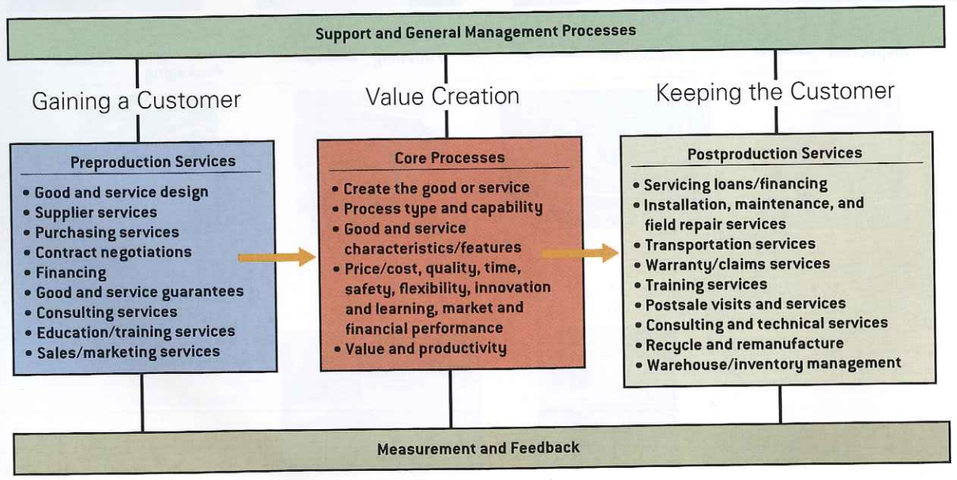
At the customer's request, Buhrke will assemble the stampings with other components to deliver a complete subassembly. Buhrke will even procure parts for assembly, such as plastics that the company does not manufacture. Buhrke is also able to package finished stampings or subassemblies. Before stampings are boxed up and shipped (and even after the incoming inspection and in-process audits), Buhrke provides a final audit inspection. Finally, Buhrke offers the convenience of shipping the finished product where and when customers want. For further information and video tours of the plant, visit www.buhrke.com.

2-2c Value Chains: Pre- and Postproduction Services Perspective

A second view of the value chain can be described from the pre- and postservice perspective as shown in Exhibit 2.4. Pre- and postproduction services complete the ownership cycle for the good or service. Preproduction services include customized and team-oriented product design, consulting services, contract negotiations, product and service guarantees, customer financing to help purchase the product, training customers to use and maintain the product, purchasing and supplier services, and other types of front-end services. The focus here is on "gaining a customer."

Postproduction services include on-site installation or application services, maintenance and repair in the field, servicing loans and financing, warranty and claim services, warehouse and inventory management for your company and sometimes for your customers, training, telephone service centers, transportation delivery

Exhibit 2.4
Pre- and Postservice View of the Value Chain



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services, postsale visits to the customer's facility by knowledgeable sales and technical-support people, recycling and remanufacturing initiatives, and other back-end services. The focus here is on "keeping the customer."

This view of the value chain emphasizes the notion that service is a critical component of traditional manufacturing processes. Preproduction services for Ford Motor Company include engineering design, supplier, sales, and leasing processes, and postproduction services include financing, maintenance and repair, warranty and claims, and customer education and training programs. Service is a key differentiating factor in the eyes of customers for many manufacturing firms. Ford Motor Company is continuing to develop a competitive strategy where "service is the centerpiece of their global strategy." Note that the Buhrke Industries Inc. value chain can also be defined using the pre- and postservice perspectives. Both perspectives enhance management's understanding of where and how they create value for customers. Automobile companies such as Ford Motor Company might use the pre- and postservice model to highlight service processes, and associated customer service encounters and experiences.

Nestlé: Selling More Than Coffee

Pre- and postproduction services also represent huge opportunities to increase revenue and provide new sources of income. For example, Nestlé once defined its business from a physical-good viewpoint as "selling coffee machines." Using service management thinking, Nestlé redefined its business from a service perspective where the coffee machine is more of a peripheral good. Nestlé decided to lease coffee machines and provide daily replenishment of the coffee and maintenance of the machines for a contracted service fee. This "primary leasing service" was offered to organizations that sold more than 50 cups of coffee per day. The results were greatly increased coffee sales, new revenue opportunities, and much stronger profits. Of course, Nestlé's service vision of its business required a completely new service and logistical value chain capability. Moreover, the difficulty of providing this service to thousands of organizations (sites) in a geographical region is a barrier to entry for competitors and a challenge for Nestlé.

2-2d The Value Chain at Amazon

To illustrate the pre- and postproduction services perspective of a value chain, we highlight Amazon.

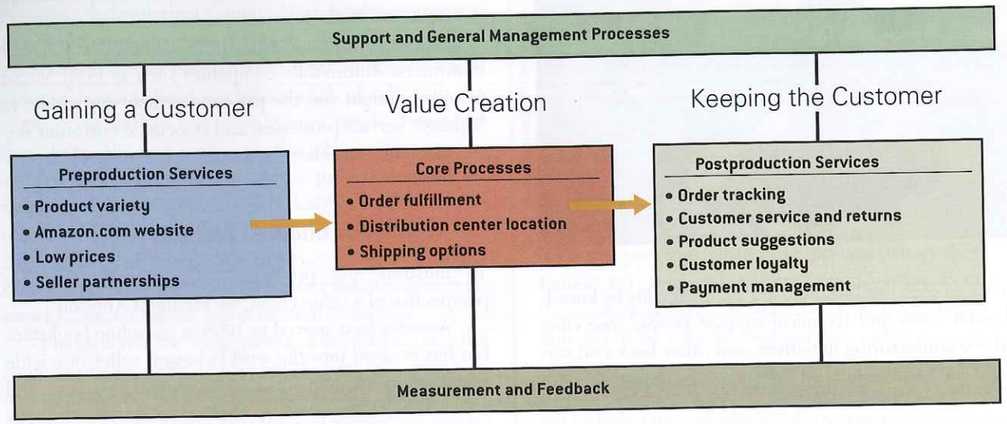
Amazon.com started in 1995 as an online bookstore but has evolved into the world's largest seller of a wide variety of products such as DVDs, apparel, furniture, and toys. Back in 2001, Amazon defined its business strategy to be "the world's most customer-centric company where customers can find and discover anything they may want to buy online." It provides customer value by focusing on the complete customer experience that begins when a customer visits its website and continues through ongoing customer relationship management activities long after an individual order is processed. Exhibit 2.5 depicts Amazon's value chain from the perspective of the model shown in Exhibit 2.4. This pre- and post production view of the value chain helps in understanding the complete customer experience that the company strives to achieve.

Preproduction services that focus on gaining a customer include:

- **Product variety**—Amazon sells pretty much everything that you can imagine—books, music CDs, DVDs, digital music, Android apps, electronics, software, kitchen appliances, toys, sporting goods, jewelry and watches—the list keeps growing. Amazon began to manufacture its own products and services, such as the Kindle e-book reader and the Kindle Store. In 2010, e-book sales exceeded those of hardcover books. Amazon's virtual storefront provides

Exhibit 2.5

A Value Chain Model of Amazon



much greater product selection than can be found in a typical "bricks-and-mortar" store.

- **Amazon.com website**—Amazon's website facilitates the customer experience. Customers can conveniently shop by department, search products, see new releases, peruse their browsing history, access account information, manage orders and credit cards, and so on. From an efficiency perspective, order entry uses customer labor!
- **Low prices**—Amazon strives to offer the lowest prices possible. It does this through operations and supply chain management—continually improving efficiencies and leveraging economies of scale.
- **Seller and distributor partnerships**—Amazon partners with third-party sellers who would ordinarily be competitors, thus expanding its offerings and providing competitive prices and services to its customers. Amazon also partners with third-party transportation firms such as UPS and FedEx to deliver orders to customers.

Amazon creates and delivers value to customers through a set of key core processes. At Amazon, these include:

- **Order fulfillment**—Before 2009, Amazon had about 13 million square feet of space in its fulfillment and distribution centers. Over the next three years, it added an additional 44 million square feet, and it continues to grow. Amazon's fulfillment centers are designed for efficient order picking and packaging, using information technology, bar code sorting, and order-matching processes to ensure accuracy. Its information system stores the locations of individual products and creates routes for order pickers.
- **Distribution center location**—Amazon is building new fulfillment centers within 200 miles of major metropolitan markets. Being closer to customers not only provides faster service (even moving toward same-day delivery) but also reduces transportation costs.
- **Shipping options**—Amazon offers free shipping for many orders over $35. Customers can split orders for faster service. For a fixed annual fee, Amazon Prime provides unlimited two-day shipping and optional next-day delivery for an additional low price.
- **Seller Support**—Sellers are an important customer group. Amazon Services launched a new version of Amazon WebStore (http://webstore.amazon.com), providing business customers with new capabilities, greater control, increased flexibility, and lower pricing. Amazon WebStore is a full-featured e-commerce system that enables small- to medium-sized sellers to easily design, build, and manage their multichannel e-commerce businesses using Amazon's technology. Companies such as Black and Decker, Honeywell, ToyWatch, MTV, Martha Stewart, Motorola, Samsonite, and Timex use Amazon's WebStore.

Postproduction services, which focus on keeping the customer include:

- **Order tracking**—Amazon sends e-mail updates to inform customers when products ship. Through its website, customers can view current and past orders.
- **Customer service and returns**—New, unopened items can be returned within 30 days. Damaged or defective items will be replaced or exchanged.

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Amazon provides return labels and authorization forms that can be printed.

- **Product suggestions**—Amazon provides customized featured recommendations based on past orders and searches on its website and via e-mail. Items can be saved on a "Wish List" for future reference.
- **Customer loyalty**—Amazon Prime members receive free movies and a lending library for books. Prime members typically spend more than other customers; this feature helps develop customer loyalty.
- **Payment management**—Customers can easily manage credit and gift cards and can store their shipping and credit card information and order goods with just one click.

As we see, the value chain for Amazon includes many features and services that extend far beyond a physical-goods-focused value chain paradigm. Competitors are responding to Amazon's growing marketplace dominance. For example, Walmart is turning some of their stores into mini-distribution hubs to support online ordering. Instead of fulfilling orders from large distribution centers, Walmart ships online orders directly to stores for customer pickup or gives orders to UPS and FedEx for delivery. This "ship-to-store" strategy is working, with 10 percent of all online orders fulfilled in this fashion. Walmart saves money on shipping and is leveraging their online store by its physical presence.

2-3 VALUE CHAIN DECISIONS

Organizations face numerous decisions in designing and configuring their value chains. Looking back at Exhibits 2.1 and 2.3, we see that these decisions must include the number, type, and location of manufacturing plants, distribution centers, retail stores, repair facilities, and customer service or technical support centers; the choice of technology and processes to make goods and deliver services; ways of managing information flow throughout the value chain; the selection of suppliers and partners; and the integration of all the pieces into an effective and efficient system.

The **operational structure** *of a value chain is the configuration of resources, such as suppliers, factories, warehouses, distributors, technical support centers, engineering design and sales offices, and communication links.* Different management skills are required for different operational structures. For example, Walmart's value chain, though very large, is focused on purchasing and distribution, and is controlled from a centralized location in Bentonville, Arkansas. In contrast, General Electric's value chain, which encompasses such diverse businesses as medical imaging, jet engines, appliances, and electrical power generation, are all quite different. Each business is a profit center with its own unique market and operating conditions. Consequently, the operational structure is decentralized.

Technology enables processes and value chains to lower the cost of goods and services, speed delivery, and provide customization where required. Examples include rental car transponders to speed checkout and check-in, computer-driven machines to produce manufactured parts, geographic and wireless information systems to locate vehicles and inventory, and electronic patient medical records.

2-3a Outsourcing and Vertical Integration

One of the most important strategic decisions a firm can make about its value chain is whether to vertically integrate or outsource key business processes and functions. **Vertical integration** *refers to the process of acquiring and consolidating elements of a value chain to achieve more control.* Some firms might consolidate all processes for a specific product or product line in a single facility; for example, Henry Ford's early factories did everything from steelmaking to final assembly. Although such a strategy provides more control, it adds more complexity to managing the value chain. In

The **operational structure** of a value chain is the configuration of resources, such as suppliers, factories, warehouses, distributors, technical support centers, engineering design and sales offices, and communication links.

Vertical integration refers to the process of acquiring and consolidating elements of a value chain to achieve more control.

contrast, today's automobile production is characterized by a complex network of suppliers. Decentralizing value chain activities lessens the control that a firm has over cost, quality, and other important business metrics, and often leads to higher levels of risk.

Companies must decide whether to integrate backward (acquiring suppliers) or forward (acquiring distributors), or both. **Backward integration** *refers to acquiring capabilities toward suppliers*, whereas **forward integration** *refers to acquiring capabilities toward distribution or even customers*. Large companies such as Motorola, Siemens, and Sony have the resources to build facilities in foreign countries and develop a high level of vertical integration. Their objective is to own or control most, if not all, of the supply chain. Many large chemical manufacturers, for example, such as DuPont, British Petroleum, Haimen Jiangbin, and GFS Chemicals, are buying raw material suppliers and integrating backward. At the same time, chemical companies in industrial countries are acquiring smaller and more profitable specialty manufacturers of chemicals and advanced materials, a form of forward integration. Recently, Delta Air Lines purchased a $150 million refinery in an effort to reduce its expenses for jet fuel, the largest expense for an airline and also the most difficult to forecast and manage.

Outsourcing *is the process of having suppliers provide goods and services that were previously provided internally*. Outsourcing is the opposite of vertical integration in the sense that the organization is shedding (not acquiring) a part of its organization. The organization that outsources does not have ownership of the outsourced process or function. Some large U.S. banks and airlines, for example, have outsourced their telephone call service centers to third-party suppliers within or outside the United States.

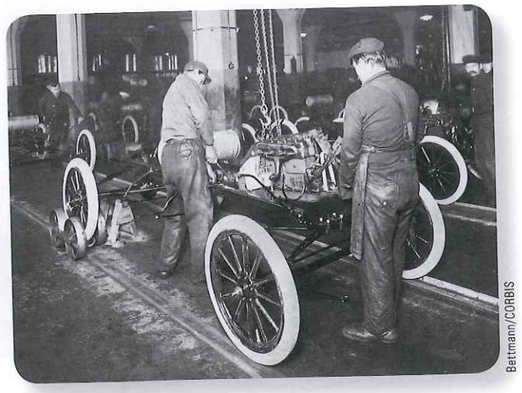
The United States has experienced three waves of outsourcing:

- The first wave involved the exodus of *goods producing jobs* from the United States in many industries several decades ago. Companies relied on foreign factories for the production of computer components, electronics, and many other goods. Gibson Guitars, for example, produces its Epiphone line in Korea.

Backward integration refers to acquiring capabilities toward suppliers.

Forward integration refers to acquiring capabilities toward distribution or even customers.

Outsourcing is the process of having suppliers provide goods and services that were previously provided internally.



Bettmann/CORBIS

- The second wave involved *simple service work*, such as standard credit card processing, billing, keying information into computers, and writing simple software programs. Accenture, for example, has information technology and bookkeeping operations in Costa Rica.
- The third, and current wave, involves *skilled knowledge work*, such as engineering design, graphic artists, architectural plans, call center customer service representatives, and computer chip design. For example, Fluor Corporation of Aliso Viejo, California, uses engineers and draftspeople in the Philippines, Poland, and India to develop detailed blueprints and specs for industrial construction and improvement projects.[5]

2-3b The Economics of Outsourcing

The decision on whether to outsource is usually based on economics, and break-even analysis can be used to provide insight into the best decision.

If a company decides to make a part, it typically incurs fixed costs associated with purchasing equipment or setting up a production line. Fixed costs do not vary with volume and often include costs of a building, buying or leasing equipment, and administrative costs. However, the variable cost per unit will be less if the work is outsourced to some external supplier. Variable costs are a function of the quantity produced and might include labor, transportation, and materials costs.

Define

VC_1 = Variable cost/unit if produced
VC_2 = Variable cost/unit (i.e., purchase price/unit) if outsourced
FC = fixed costs associated with producing the part
Q = Quantity produced (volume)

Then

$$\text{Total cost of production} = (VC_1)Q + FC$$
$$\text{Total cost of outsourcing} = (VC_2)Q \quad [2.1]$$

If the total cost of outsourcing is less than the total cost of in-house production, then clearly outsourcing is the better decision; if not, then the firm should produce in-house.

We may also find the break-even quantity to identify the ranges of values for which outsourcing or in-house production would be the best decision. To find the break-even quantity, set the total cost of production equal to the total cost of outsourcing, and solve for Q:

$$(VC_2)Q = (VC_1)Q + FC$$
$$(VC_2)Q - (VC_1)Q = FC$$
$$(VC_2 - VC_1)Q = FC$$

The break-even quantity is

$$Q^* = \frac{FC}{VC_2 - VC_1} \quad [2.2]$$

If Q is less than Q^*, then the least-cost decision is to outsource; otherwise, it is to produce in-house. Whenever the anticipated volume is greater than Q^*, the firm should produce the part in-house; otherwise it is best to outsource.

2-3c Value Chain Integration

For complex value chains that incorporate numerous suppliers, facilities, and outsourced processes, firms need an approach to coordinate and manage information, physical goods, and services among all the players in the value chain. **Value chain integration** *is the process of managing information, physical goods, and services to ensure their availability at the right place, at*

Value chain integration is the process of managing information, physical goods, and services to ensure their availability at the right place, at the right time, at the right cost, at the right quantity, and with the highest attention to quality.

SOLVED PROBLEM

Suppose that a manufacturer needs to produce a custom aluminum housing for a special customer order. Because it currently does not have the equipment necessary to make the housing, it would have to acquire machines and tooling at a fixed cost (net of salvage value after the project is completed) of $250,000. The variable cost of production is estimated to be $20 per unit. The company can outsource the housing to a metal fabricator at a cost of $35 per unit. The customer order is for 12,000 units. What should it do?

Solution:

VC_1 = variable cost/unit if produced = $20
VC_2 = variable cost/unit if outsourced = $35
FC = fixed costs associated with producing the part = $250,000
Q = quantity produced

Using Equation 2.1, we find that the total cost of production is

$$(\$20)(12{,}000) + \$250{,}000 = \$490{,}000$$

and the total cost of outsourcing is

$$(\$35)(12{,}000) = \$420{,}000$$

Therefore, outsourcing is less expensive. Alternatively, using Equation 2.2, we obtain

$$Q^* = \frac{250{,}000}{35-20} = 16{,}667$$

In this case, because the customer order is only for 12,000 units, which is less than the break-even point (Q^*), the least-cost decision is to outsource the component.

Exhibit 2.6 shows the results of using the Excel Break-Even Template to compute the costs and find the optimal decision. The Excel Goal Seek tool may be used to find the break-even point. Select Goal Seek from the appropriate Excel menu, and a small dialog box will appear. In the "Set Cell" field, enter B15 (or simply click on this cell); in the "To Value" field, enter 0; and in the "By changing cell" field, enter B4 (or again, simply click on the cell). When you click OK, Excel will find the production volume in cell B4 that results in a cost difference of 0 in cell B15. This is the break-even point.

Exhibit 2.6

Excel Break-Even Template (This worksheet is available in the OM5 Spreadsheet Templates on the CourseMate Web site.)

	A	B	C	D
1	**Outsourcing Break-Even Analysis**			
2	**Enter data only in yellow cells.**			
3				
4	**Production volume**	12,000		
5				
6	**Produced In-House**			
7	**Fixed cost**	$250,000.00		
8	**Unit variable cost**	$20.00		
9				
10	**Outsourced**			
11	**Unit cost**	$35.00		
12				
13	**Total In-House Production Cost**	$490,000.00		
14	**Total Outsourced Cost**	$420,000.00		
15	**Cost difference (In-House - Outsourced)**	$70,000.00		
16	**Optimal Decision**	Outsource		

the right time, at the right cost, at the right quantity, and with the highest attention to quality. (A focus solely on coordinating the physical flow of materials to ensure that the right parts are available at various stages of the supply chain, such as manufacturing and assembly plants, is commonly called *supply chain integration*.) For goods-producing firms, it requires consolidating information systems among suppliers, factories, distributors, and customers; managing the supply chain and scheduling factories; and studying new ways to use technology.

Value chain integration includes improving internal processes for the client, as well as external processes that tie together suppliers, manufacturers, distributors, and customers. Other benefits are lower total value chain costs to the client, reduced inventory obsolescence, better global communication among all parties, access to new technologies, and better customer service. Some firms, such as Walmart, manage value chain integration themselves. Others make use of third-party "system integrators" such as Exel (www.exel.com) to manage the process. Exel manages value chain activities across industries and geographic regions to reduce costs, accelerate product movement, and allow manufacturers and retailers to focus on their core business. Exel is able to deliver services and solutions such as consulting, e-commerce, transport, global freight, warehousing, home delivery, labeling, and co-packing, on a local, regional, or global basis.

AP Images/PRNewsFoto/Travelocity

Value chain integration in services—where value is in the form of low prices, convenience, and access to special time-sensitive deals and travel packages—takes many forms. For example, third-party integrators for the leisure and travel industry value chains include Orbitz, Expedia, Priceline, and Travelocity. They manage information to make these value chains more efficient and create value for their customers. Many financial services use information networks provided by third-party information technology integrators such as AT&T, Sprint, IBM, and Verizon to coordinate their value chains. Hospitals also use third-party integrators for both their information and physical goods, such as managing patient billing and hospital inventories.

2-4 OFFSHORING AND RESHORING

As we discussed at the beginning of this chapter, offshoring represents one of the most controversial topics in business today. **Offshoring** *is the building, acquiring, or moving of process capabilities from a domestic location to another country location while maintaining ownership and control.* **Reshoring** *is the process of moving operations back to a company's domestic location.*

Offshoring decisions involve determining what value creation, support, and/or general management processes should move to other countries. For example, a company might move a soda-bottling factory from the United States to India. The company benefits from lower wages, avoiding country trade tariffs, and access to local markets and customers. Recently, we have seen a number of foreign firms build factories in the United States. For example, Rolls-Royce makes jet engine parts in the United States for assembly in Europe and Asia, taking advantage of lower energy costs and a more stable economic environment. However, such a decision does not compromise the company's product development or other proprietary activities. At the other extreme, a high-tech company might establish a facility in China that develops, engineers, and manufactures new products. Such a decision might leave it vulnerable to protecting trade secrets.

Some global trade experts recommend keeping some primary processes or key parts of a manufacturing process out of foreign lands to protect the firm's core competencies. We can pose four possible scenarios. In the first scenario, all key processes remain in the home country, even though the firm sells its products overseas. An example would be Harley-Davidson. The second scenario represents a low degree of offshoring in which some noncritical support processes are moved overseas. Examples would be Microsoft and American Express. A third scenario is for a company to offshore many of its primary as well as support processes while keeping its management processes consolidated at the corporate headquarters, such as Coca-Cola and FedEx. Finally, true global multinational firms, such as Procter

Allen-Edmonds Shoe Corporation: Not Everyone Offshores

At a time when more than 98 percent of all shoes sold in the United States are made in other countries, Allen-Edmonds Shoe Corp. is a lonely holdout against offshoring. Moving to China could have saved the company as much as 60 percent. However, John Stollenwerk, chief executive, will not compromise on quality and believes that Allen-Edmonds can make better shoes and serve customers faster in the United States. An experiment in producing one model in Portugal resulted in lining that wasn't quite right and stitching that wasn't as fine. Stollenwerk noted "We could take out a few stitches and you'd never notice it—and then we could take out a few more. Pretty soon you've cheapened the product, and you don't stand for what you're about."[6] Instead, Allen-Edmonds invested more than $1 million to completely overhaul its manufacturing process into a leaner and more efficient system that could reduce the cost of each pair of shoes by 5 percent. One year after implementing its new production processes, productivity was up 30 percent; damages were down 14 percent; and order fulfillment neared 100 percent, enabling the company to serve customers better than ever.[7]

Offshoring is the building, acquiring, or moving of process capabilities from a domestic location to another country location while maintaining ownership and control.

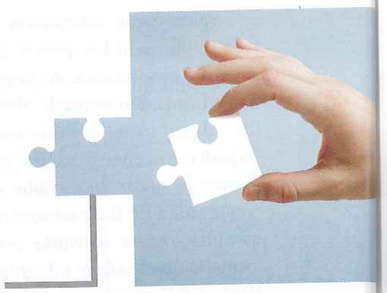
Reshoring is the process of moving operations back to a company's domestic location.

& Gamble and Honda, locate all of their key processes across the globe for more effective coordination and local management. The global alignments, of course, may change over time.

The decision to offshore or outsource involves a variety of economic and noneconomic issues. Exhibit 2.7 summarizes the key issues in these decisions.

When many manufacturers began outsourcing to Asia in the early 1990s, they were focused strictly on low labor cost. This cost differential is narrowing. In addition, outsourcing can create numerous problems. For instance, the logistics of shipping from Asia can be complex. Travel expenses for executives and other employees needed to teach or monitor operations can mount up. Quality is more difficult to control, as is enforcing intellectual property rights. Some foreign manufacturers, for example, began using inferior materials or parts, despite contractual agreements. When all these factors are considered, some argue that the total cost of production in the United States is actually cheaper. As a result, many firms are "reshoring"—bringing operations back to the United States.[8] A nonprofit organization, the Reshoring Initiative (www.reshorenow.org) seeks to revitalize U.S. manufacturing

The decision to offshore or outsource involves a variety of economic and noneconomic issues.



by helping companies better understand the total cost of offshoring, so they can make more informed decisions.

A **multinational enterprise** is an organization that sources, markets, and produces its goods and services in several countries to minimize costs, and to maximize profit, customer satisfaction, and social welfare.

2-5 VALUE CHAINS IN A GLOBAL BUSINESS ENVIRONMENT

Although not every organization operates in the global business environment, modern technology and distribution have made it feasible and attractive for both large and small companies to develop value chains that span international boundaries. *A* **multinational enterprise** *is an organization that sources, markets, and produces its goods and services in several countries to minimize costs, and to maximize profit, customer satisfaction, and social welfare.* Examples of multinational enterprises include British Petroleum, General Electric, United Parcel Service, Siemens,

Exhibit 2.7
Things to Consider When Making Offshore Decisions

Economic reasons ↑	Low labor costs
	Lower import duties and fees
	Lower capital costs
	Grow global market share
	Avoid national currency fluctuations
	Preempt competitors from entering global market(s)
	Hire worldwide skills and knowledge workers
	Build robust value chain networks for global markets
	Build relationships with government officials
	The negative impact and media attention on remaining employees
	Potential loss of intellectual property
	Lose control of key processes
	Develop secure sources of supply and reduce risks
	Build relationships with suppliers
	Avoid environmental regulations and laws
	Possible political instability in offshore country
	Lack of communication and/or technical skills
↓ Noneconomic reasons	Learn foreign markets and cultures

Procter & Gamble, Toyota, and the International Red Cross. Their value chains provide the capability to source, market, create, and deliver their goods and services to customers worldwide.

Multinational enterprises operate complex value chains that challenge operations managers. Some issues that operations managers must confront in a global business environment include (1) how to design a value chain to meet the slower growth of industrialized countries and more rapid growth of emerging economies; (2) where to locate manufacturing and distribution facilities around the globe to capitalize on value chain efficiencies and improve customer value; (3) what performance metrics to use in making critical value chain decisions; and (4) how to decide if partnerships should be developed with competitors to share engineering, manufacturing, or distribution technology and knowledge.

To gain a better understanding of value chains in a global context, we present a case study of Inditex and its flagship brand, Zara, next.

2-5a A Global Value Chain: Inditex/Zara

To be successful in fashion, companies must continually provide the latest products and capitalize on tomorrow's trends, not yesterday's (as they say on *Project Runway*: "In fashion, one day you're in; the next day you're out!") Inditex is a global fashion retailer based in La Coruna, Spain. Its most-recognized brand is Zara, with approximately 6,000 stores in over 85 countries. What makes Zara unique is its value chain model that focuses on two basic rules: "Give customers what they want, and get it to them faster than anyone else."[9] As an example, Zara delivers new items to its stores twice weekly, taking less than two weeks from design to delivery!

To accomplish this, the company must understand changing consumer trends and have the agility to rapidly produce and deliver appealing products that will sell before consumer tastes change again. This requires a highly responsive value chain that seamlessly links market sensing, design, and production processes with customers. To avoid overstocks of items that don't sell, the company initially sends only a few pieces of new styles but can quickly deliver more if they become hot items. Store managers report this information daily. Marketing analysts then study the data and the voice of the customer (using comments acquired by the sales staff), monitor trends from fashion leaders in Paris and Milan, and even track Web blogs to ensure that their goods meet different customer needs in each region. Design information is communicated to a team of in-house designers who quickly develop new designs and send them to factories to be manufactured. So instead of producing up to six months in advance of the selling season, Inditex observes what goods are selling, makes more of them, and eliminates those that aren't selling, without having to keep and discount outdated inventory.

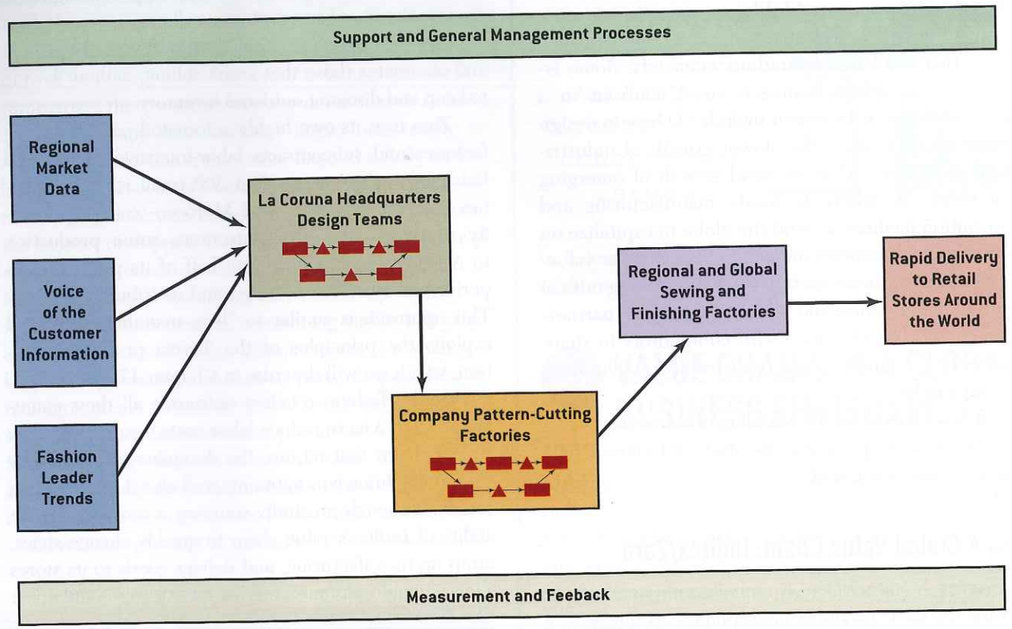
Zara uses its own highly automated pattern-cutting factories and subcontracts labor-intensive sewing and finishing work to more than 300 small regional facilities in Spain, Portugal, and Morocco (called "proximity sourcing") but also outsources some production to Asian factories. More than half of its production is performed close to its design and distribution centers. This approach is similar to "lean manufacturing" and exploits the principles of the Toyota production system, which we will describe in Chapter 17. In contrast, most other fashion retailers outsource all their manufacturing to Asia to reduce labor costs, resulting in slow supply chains that require the designers to make early style and volume commitments well ahead of the selling season. Although proximity sourcing is more costly, the ability of Inditex's value chain to quickly change styles, ramp up manufacturing, and deliver goods to its stores allows them to capitalize on the hottest trends and offset the labor costs by increased revenue. In fact, its supply chain can deliver most goods in 24 hours in Europe and the United States, and in 48 hours in Asia and Latin America. Exhibit 2.8 summarizes the key elements of Inditex's global value chain.

Sustainability is also an important component of Inditex's value chain. In its 2012 Annual Report (http://www.inditex.com/en/downloads/annual_report_2012.pdf), the company states:

> Inditex's business model is based on the premise that all its processes must be sustainable and responsible. This concept of sustainability in Inditex not only covers the entire value chain but is also considered the focal point of all its strategic decisions. In this regard, it is understood to be a responsibility that is shared by all Inditex's members of staff.... All of these [suppliers], as well as each factory where production is carried out, must be explicitly bound by the values of social and environmental responsibility that defines Inditex, through the Department of Corporate Social Responsibility, the Department of the Environment and the commercial and purchasing teams.... Inditex guarantees its customers products that meet the most exacting health and safety standards.

Exhibit 2.8

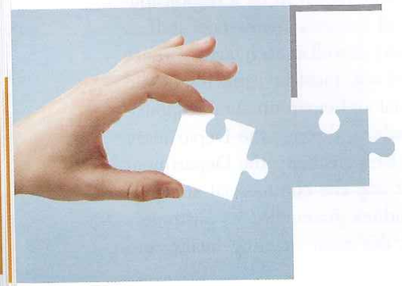
Inditex's Global Value Chain



2-5b Issues in Global Value Chain Decisions

Complex global value chains are more difficult to manage than small domestic value chains. Some of the many issues include the following:

- Global value chains face higher levels of risk and uncertainty, requiring more inventory and day-to-day monitoring to prevent product shortages. Workforce disruptions such as labor strikes and government turmoil in foreign countries can create inventory shortages and disrupting surges in orders.
- Transportation is more complex in global value chains. For example, tracing global shipments normally involves more than one mode of transportation and foreign company. Even a natural disaster can create havoc in a global supply chain (see the box about the Japanese earthquake).
- The transportation infrastructure may vary considerably in foreign countries. The coast of China, for example, enjoys much better transportation, distribution, and retail infrastructures than the vast interior of the country.
- Global purchasing can be a difficult process to manage when sources of supply, regional economies, and even governments change. Daily changes in international currencies necessitate careful planning and in the case of commodities, consideration of futures contracts.



An organization and government's response to a disaster is only as good as its value chain operations and logistic (supply chain) capability.

- International purchasing can lead to disputes and legal challenges relating to such things as price fixing, nongreen practices, and quality defects. International quality, cost, and delivery disputes have few legal options, and therefore it is imperative that global supplier relationships are well established.
- To extend the firm's value chain to other nations requires an understanding of national cultures and practices. For example, because Chinese words are pictures, the Chinese think more in terms of holistic thoughts and process information emphasizing the big picture over details. Americans think sequentially, focus on details, and individualistically. They break complex situations into a series of smaller issues such as delivery dates, price, and quantity. Such differences can cause confusion, or at worst, ill-will among the constituents.[10]
- Privatizing companies and property is another form of major change in global trade and regulatory issues. Eastern European nations, China, Brazil, and Russia are other countries initiating private ownership of assets such as land, equipment, and businesses. This privatization movement also helps improve the efficiency and effectiveness of global supply chains.
- The pre-planning, response, and recovery from natural or anthropogenic disasters, often called *disaster or emergency management,* is another important part of value chain management. When disasters occur, such as earthquakes, tsunamis, volcanoes, chemical spills, droughts, airplane crashes, or terrorist attacks, organizations or governments worldwide must respond. An organization or government's response to a disaster is only as good as its value chain operations and logistic (supply chain) capability (see the boxes on Japanese earthquake and the Iceland volcano).

In making global value chain decisions, managers must ask and answer some difficult questions.[11] For example, why go global? Is it to sell products and services to the local market, to export products to other markets, or to source materials, components, labor, or knowledge?

THE JAPANESE EARTHQUAKE DISRUPTS GLOBAL VALUE CHAINS

Pictura Collectus/Alamy

On March 11, 2011, a devastating earthquake and tsunami in Japan caused ripples among global supply chains, particularly in the automotive industry. As Japan is an important source for automotive parts, graphic chips, and other high-tech components, the disaster caused General Motors to shut down a Louisiana factory that makes pickup trucks. North American Toyota plants experienced shortages of 150 critical parts and reduced operations to 30 percent of normal capacity. Companies scrambled to find suppliers in other countries such as China, Taiwan, and South Korea. Subsequently, Toyota announced that it was working to create a robust supply chain that would recover within two weeks in the event of a similar disaster.[12]

Do customers require a presence in these markets? What are different global customer and market segments? Are there key competitors in these regions? Which functions (sales, engineering, manufacturing, purchasing, finance, etc.) need to be present in the region? What is the best way to organize our presence in the region (facilities, joint ventures, alliances, licensing arrangements, etc.)? How will we enter the region? How long will it take to be operational? Who will do the globalization work in our company? How much travel are they willing to do, and for how long? Are core staff willing to relocate? Do local suppliers and governments support sustainability initiatives? What is our disaster management plan? Clearly, a global value chain strategy places numerous demands on operations as well as other functions and their employees, and requires effective planning and execution.

2-6 SUSTAINABLE VALUE CHAINS

Leading organizations are paying increased attention to the sustainability of their environmental, social, and economic systems, and the design and management of value chains can have a significant impact on these. Sustainability is vital to long-term business survival. It not only improves the organization's perception among consumers, but it also improves the bottom line through reduced costs. In addition, sustainable practices can lead to increased revenues. For example, organizations that emit greenhouse gases, such as factories and electrical utilities, may one day buy and sell carbon credits in a commodities-type stock market. In addition, many customers favor products and services that are designed and produced in a sustainable way.

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Sustainability in Nike's Value Chain

Nike states its sustainability imperative on its website http://www.nikeinc.com/pages/responsibility:

> It's not just about getting better at what we do—addressing impacts throughout our supply chain—it's about striving for the best, creating value for the business and innovating for a better world.

Its website provides a variety of information, such as a corporate responsibility report, sustainable business performance summary, how sustainability is practiced in designing products and manufacturing, and the impacts the company has had. For example, Nike has a "Reuse-a-Shoe" program that recycles any brand of athletic shoes. The recycled materials are used for playgrounds, tracks, and other applications. In 2012, Nike created a supplier evaluation system to evaluate sustainable production practices along with traditional dimensions of quality, cost, and delivery. We encourage you to check it out.

OM plays a critical role in achieving environmental, social, and economic sustainability because the protection of the environment, workforce and community health and safety, and costs and profits are strongly driven by an organization's operations as well as the life cycles of its products. Every time a good, service, process, or value chain is created or redesigned, OM is involved.

2-6a Green Operations and Vocabulary

The terms *green operations, green manufacturing,* and *green practices* are often used to describe sustainability activities that involve operations and the value chain. The emergence of green thinking has also introduced a new set of vocabulary for managers; see the accompanying box for some examples.

Sustainable environmental practices have caught on with some of the biggest and most powerful companies in the world such as Walmart, McDonald's, Hewlett-Packard, Ritz-Carlton, Nike, and many others. Walmart, for example, has set ambitious goals to operate solely on renewable energy, create zero waste, and sell goods and services that conserve resources. It also plans to require more than 60,000 suppliers by 2015 to source 95 percent of its production from factories receiving one of the retailer's two highest rankings in environmental and social audits. Many small firms have invested in energy efficiency programs, including alternative energy sources, hybrid or alternative fuel vehicles, and employee incentives to cut back on driving and find better routes and traffic patterns.[13]

Many OM practices can improve environmental sustainability in value chains. These include designing goods and services using recyclable and environmentally friendly materials, remanufacturing, designing facilities and using equipment that conserves energy, using electronic media and technology to reduce paper and fuel, using transportation modes that minimize costs and carbon output, and cleaning and reusing water used for manufacturing.

GREEN VOCABULARY

Biodegradable: Capable of decomposing naturally within a relatively short period of time.

Carbon Footprint: An estimate of how much carbon dioxide an entity (e.g., a person, physical good, service, manufacturing facility, packaging, vehicle, office building) produces and releases into the atmosphere.

Carbon Neutral: Reducing energy use and compensating for the amount of carbon dioxide an entity generates through either obtaining energy from renewable sources or 0% setting.

Carbon Offsets: Credits earned for activities that help balance carbon dioxide (CO_2) emissions, such as planting trees.

Environmental Accounting: An approach to accounting that refers to the modification of standard accounting methods to incorporate the use or depletion of natural resources; sometimes referred to as "green accounting," "resource accounting," or "integrated economic and environmental accounting."

Passive Solar: This refers to capitalizing on the warmth and light of the sun with simple strategies instead of complex technologies, such as the use of windows and heat-absorbing and/or reflective materials as opposed to heating and cooling systems.

Photovoltaics: A solar power technology that uses cells, panels, or arrays to convert light from the sun directly into electricity.

Rapidly Renewable Materials: Resources that can be rapidly replenished as they are used, such as some woods, grasses, and cork.

Solar Thermal Panel: A device that collects energy from the sun and converts it into heat for domestic water systems and/or space-heating systems.

Sustainable Architecture: A general term that describes environmentally conscious design of structures such as roads, buildings, dams, and airports that minimizes the negative environmental impact of these structures by enhancing efficiency and moderation in the use of materials, energy, and development space.

Zero-Carbon Buildings: Buildings that produce no emissions of carbon dioxide from any of their systems and appliances.

Zero-Energy Buildings: These structures incorporate systems to both generate and conserve energy, so net energy consumption over a period of a year is zero.

Source: Green Glossary, American Hotel & Lodging Association, March 5, 2010, http://www.ahla.com/Green.aspx?id525034.

OM TOOLS FOR SUSTAINABILITY

Many organizations have been using OM tools and principles in sustainability efforts. These tools—such as lean thinking, kaizen, Six Sigma, and value stream mapping—will be described in other chapters of this book. The results speak for themselves. For example, Baxter Healthcare Corporation, a manufacturer of medical products, implemented sustainability tools that helped the company double in size while keeping total waste generation close to 1996 levels. One application expects to save 170,000 gallons of water per day. Lockheed Martin Corporation, a defense contractor, applied OM tools to its chemical and waste-management activities, reducing chemical inventories and eliminating the chemical warehouse and obsolescence of chemicals in inventory. The 3M Company reduced volatile air emissions by 25 percent and waste by 20 percent, and improved energy efficiency by 20 percent. 3M has been using "Pollution Prevention Pays" projects since 1975 to prevent pollution in its products and manufacturing processes rather than after the products are created.[14]

Discussion Questions

1. Provide an example where you have compared a good or service by its value and compared with perceived benefits and price. How did your assessment of value lead to a purchase or nonpurchase decision?
2. What implications have the three waves of outsourcing had on the U.S. economy?
3. One study that focused on the impact of China trade on the U.S. textile industry noted that 19 U.S. textile factories were closed and 26,000 jobs were lost in 2004 and 2005. If these factories had not closed, it would have cost U.S. consumers $6 billion more in higher textile prices. Assuming these facts are true, offer an argument for or against offshoring U.S. jobs.
4. Explain why it is important for operations managers to understand the local culture and practices of the countries in which a firm does business. What are some of the potential consequences if they don't?
5. Explain Apple's value proposition and why it can charge more than competitors for similar products.

Problems and Activities

Note: An asterisk denotes problems for which a spreadsheet template on the CourseMate Web site may be used.

1. What is the best way to increase value the most, given the following information for one customer?

   Base Case: Perceived benefits = $50 and Price = $10.00

   Improvement Option A: Perceived benefits = $65 and Price = $13.00

   Improvement Option B: Perceived benefits = $65 and Price = $12.50

   Improvement Option C: Perceived benefits = $60 and Price = $12.50
2. Describe a value chain based upon your work experience, summer job, or experience as a customer. Sketch a picture of it (as best you can). List suppliers, inputs, resources, outputs, customers, and target markets in a format similar to that in Exhibit 2.1, or use a pre- and postproduction paradigm similar to that in Exhibit 2.3.
3. Research current articles relating to offshoring or outsourcing and focus on business, operations, and political issues. Summarize your findings in a one- to two-page typed paper.
4. Research and write a short paper on companies that have recently reshored their operations back to the United States or another host country.
5. Select two organizations and provide examples of their value chains using the framework in Exhibit 2.2.
6.* Marine International manufactures an aquarium pump and is trying to decide whether to produce the filter system in-house or sign an outsourcing contract with Bayfront Manufacturing to make the filter system. Marine's expertise is producing the pumps itself, but it is considering producing the filter systems also. To establish a filter system production area at Marine International, the fixed costs is $400,000 per year, and it estimates the variable cost of production in-house at $12.25 per filter system. If Marine outsources the production of the filter system to Bayfront, Bayfront will charge Marine $20 per filter system. Should Marine International outsource the production of the filter system to Bayfront if Marine sells 25,000 pumps a year?
7.* A firm is evaluating the alternative of manufacturing a part that is currently being outsourced from a supplier. The relevant information is as follows:

   For in-house manufacturing:

   Annual fixed cost = $100,000

   Variable cost per part = $140

   For purchasing from supplier:

   Purchase price per part = $160

   a. Using this information, find the best decision if the demand is 4,000.

   b. Determine the break-even quantity for which the firm would be indifferent between manufacturing the part in-house or outsourcing it.
8.* Refer to the information provided in question 7 to answer the following:

   a. If demand is forecast to be 5,500 parts, should the firm make the part in-house or purchase it from a supplier?

   b. The marketing department forecasts that the upcoming year's demand will be 5,500 parts. A new supplier offers to make the parts for $158 each. Should the company accept the offer? If so, how much can they save?

   c. What is the maximum price per part the manufacturer should be willing to pay to the supplier if the forecast is 5,500 parts, using the information in the original problem (question 7)?
9.* A university currently has a recycling program for paper waste. The fixed cost of running this program is $10,000 per year. The variable cost for picking up and disposing of each ton of recyclable paper is $40. If the work is outsourced to a recycling company, the cost would be $65 per ton.

   a. If the forecasted demand is 275 tons, what should the university do?

   b. Find the break-even point.

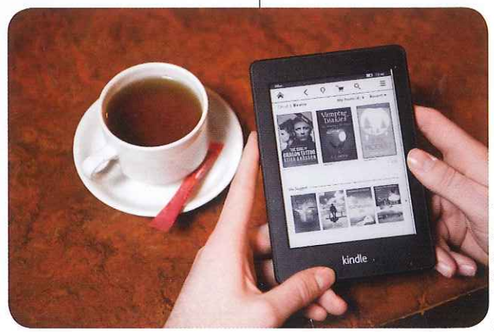
   c. If the university recycles 200 tons each year, what should it do?
10. Research and find a value chain integrator in a goods- or service-focused value chain and write a short paper (maximum of two typed pages) on how it does its job within the supply chain. What value does the integrator bring to the supply chain and its suppliers and customers?
11. Summarize the key issues that managers face with global value chains in comparison with domestic value chains. What must an organization do to address these issues?
12. Research and find an organization that has a disaster or emergency readiness plan and write a short paper (maximum of two typed pages) on the topic. Focus your discussion on value chain operations and logistic (supply-chain) capability. Cite your sources.
13. Research and find a good or service with a quantifiable carbon footprint. Write a short paper (maximum of two typed pages) on the topic, and if possible, how the carbon footprint was computed. Cite your sources.
14. Research and find a good or service that is biodegradable or carbon neutral. Be prepared to present your findings to the class in a short two- to five-minute discussion.
15. Research any topic discussed in this chapter and write a box feature similar to those in the book about what you found. Develop a creative title, cite your sources, and explain to the class what lessons can be learned from the box (maximum of two typed pages).

Bookmaster Case Study

"I'm going to Bookmaster to buy a book," Drew yelled as he walked out of his apartment. "I'll be back in about an hour," he continued, as his roommate lay on the sofa after a hard night of partying. As he drove to the bookstore, he caught a red stoplight at the first highway intersection. He always hated this intersection because the light took four minutes to complete a cycle. After seven traffic lights he arrived at the store parking lot only to find a city bus blocking the driveway entrance, so he parked on the street and walked about 1,000 feet to the store entrance. There he encountered a lady in a wheelchair exiting the store, so he patiently held the doors open for her and her friend. After his 25-minute ordeal to get to the store, he went up to the information booth, waited until the current customer completed her query, and then asked the customer relations associate (CRA), if they had the book. After a quick search on the store's computer, Millie said, "Yes, we have copies. The book is $39.95."

"I'll take you to the book," Millie said with a smile. Upon wandering the aisles of books, she came to the shelf where the book should have been residing. But after a careful search, the book was missing. The store computer said they had two copies, but they were not on the shelf as expected. After an extended search only one Bookmaster store across town had this book.

"Do you want to drive over there and get it," she asked again with a smile, "or would you like me to order it for you? It only takes a



Future Publishing/Getty Images

Kindle and iPad designs impose various restrictions on their use.

couple of days to get the book over to this store." "No, I don't want to drive over to that store—it's 15 miles away," Drew said with a sigh. (Pause) As he began to walk out of the store Millie asked, "Why don't I check to see if an e-book exists?" After examining the computer, Millie said, "Yes, this book is in digital form. It costs $19.95 as an e-book." "Thanks, Millie, I'll go back home and see if I can download it to my computer. I don't have an iPad or Kindle reader yet—they're too expensive," Drew said as he began the difficult journey back to his apartment.

Kindle and iPad designs impose various restrictions on their use. For example, Apple's hardware and software locks purchased media to Apple's platform; Apple's development model requires a nondisclosure agreement and the centralized approval process for apps. Of particular concern is the ability for Apple to remotely disable or delete apps, media, or data on the iPad at will. Another tough issue is who owns and controls the digital rights to digital content such as e-books, music, apps, movies, and games. The creators of digital content are concerned about diminished or no royalties due to piracy of their work.

CASE QUESTIONS FOR DISCUSSION

1. Draw the "bricks-and-mortar" process stages of the value chain by which hard-copy books are created, produced, distributed, and sold in retail stores. How does each player in the value chain make money? (You can use the exhibits in this chapter to help you identify major stages in the value chain.)
2. Draw the process stages for creating and downloading an e-book today. How does each player in this new electronic/digital value chain make money?
3. Compare and contrast value chain design and structure in the previous two questions from customer and management viewpoints. What are the advantages and disadvantages to each value chain design?
4. What is the role of operations in each of these value chain designs and structures?
5. What other criteria and issues are important in critiquing these two different value chain designs?

STUDY TOOLS 2

LOCATED AT THE BACK OF THE TEXTBOOK

- ☐ Tear-Out Chapter Review Card

LOCATED AT WWW.CENGAGEBRAIN.COM

- ☐ Key Term Flash Cards
- ☐ Practice Quizzes to prepare for tests
- ☐ "Beat the Clock" and "Quizbowl" to master concepts
- ☐ "Crossword Puzzle" to review key terms
- ☐ Spreadsheet Templates
- ☐ Videos of real-company OM examples