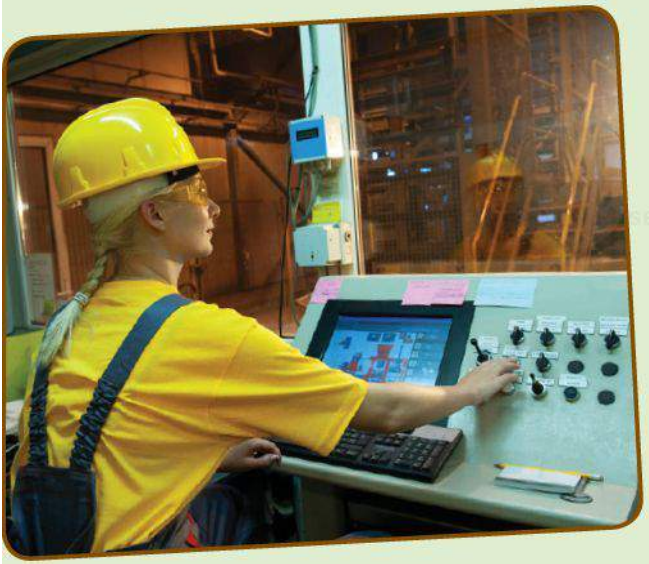
PART

3

Managing Operations and Information



To be successful, Canadian business firms must produce high-quality goods and services, and they must achieve high levels of productivity when doing so. Businesses must also manage information and report their activity to various stakeholders. The opening cases in the chapters in this section describe the challenges and opportunities that exist when business firms manage operations and information.

Part Summary

Part 3, Managing Operations and Information, provides an overview of two key issues that are important to a firm's survival: the efficient production of high-quality goods and services, and understanding the basic principles of accounting.

- In **Chapter 10, Operations Management, Productivity, and Quality**, we examine how business firms manage the production of both physical goods and intangible services, and how they plan, organize, and control the production process. Included in this chapter is a discussion of the importance of both productivity and quality, and the various approaches that companies have taken to improve the productivity and quality of their output.
- In **Chapter 11, Understanding Accounting**, we examine the role of accountants in gathering, assembling, and presenting financial information about a company. We also look at the tools accountants use, the statements they prepare to report a firm's financial standing, and their use of ratio analysis to assess a firm's financial strength.

chapter

10

Operations Management, Productivity, and Quality

After reading this chapter, you will be able to:

LO-1 Explain the meaning of the term *production* (or *operations*) and describe the four kinds of *utility* it provides.

LO-2 Identify the characteristics that distinguish *service operations* from *goods production* and explain the main differences in the *service focus*.

LO-3 Describe two types of *operations processes*.

LO-4 Describe the factors involved in *operations planning* and *operations control*.

LO-5 Explain the connection between *productivity* and *quality*.

LO-6 Understand the concept of *total quality management* and describe nine tools that companies can use to achieve it.

LO-7 Explain how a *supply chain strategy* differs from traditional strategies for coordinating operations among businesses.

SCANLIFE

Too Many Recalls

During the last decade, Toyota has been extremely successful in the marketplace, and in 2009 it overtook General Motors as the largest car manufacturer in the world. Toyota has received lots of positive publicity about "The Toyota Way," which emphasizes efficient production methods, continuous improvement, and high-quality products. Toyota's production system was so impressive that executives from other automobile companies regularly toured Toyota's manufacturing plants in an attempt to discover Toyota's secret.

But trouble started for Toyota in mid-2009 when it reported the first operating loss in its history. Things got worse in November 2009, when Toyota announced that it was recalling more than 5 million of its cars because accelerator pedals were getting jammed in the driver's side car mat and causing the car to surge forward uncontrollably. That was bad enough, but in January 2010 Toyota announced another recall—this one involving 2.3 million vehicles (270 000 in Canada)—that also had to do with jamming accelerators. Production and sales were halted on eight of Toyota's most popular vehicles: the Corolla, RAV4, Camry, Avalon, Matrix, Highlander, Tundra, and Sequoia. These models account for 60 percent of Toyota sales in Canada. In February 2010, the highly publicized Prius was also recalled, and later Sienna vans.

These recalls created an uproar among Toyota owners, who were suddenly scared to drive their cars. Toyota worked frantically with its supplier, CTS Corp., to figure out a way to fix the problem. The solution was to insert a steel reinforcement bar in the accelerator pedal assembly, which reduced the tension that was

How Will This Help Me?

You will benefit in three ways by reading and understanding methods that managers use for managing production operations and improving quality: (1) as an *employee*, you'll get a clearer picture of why everyone in a business should be concerned about productivity and quality, and how your job depends on the goods and services your company provides; (2) as a *manager*, you'll understand that if companies want to remain competitive they must continually analyze their production methods so they can efficiently produce high-quality products and services; and (3) as a *consumer*, you'll gain an appreciation of the significant efforts that companies expend in order to efficiently produce high-quality goods and services for consumers.

causing the pedal to stick. CTS began producing the redesigned pedal in just a few days. Toyota admitted that the accelerator had a design flaw and that CTS was not at fault (CTS also produces accelerator pedals for Honda and Nissan and no problems have been found in those cars). In an effort to reassure the public, senior executives from the company went on TV to tell customers that they were going to fix the problem quickly and get redesigned accelerator pedals onto the recalled cars.

The recall was a public relations nightmare for Toyota because the company had always emphasized its reputation for producing high-quality automobiles. In 2009, Toyota had 10 cars rated as the best in 18 vehicle categories by J.D. Power and Associates, and many consumers in Canada and the U.S. did, in fact, have the perception that Toyota produced higher-quality cars than those produced by Ford, Chrysler, and GM. But this incident has changed those perceptions. In May 2010, a *Consumer Reports* survey found that Toyota lost the top spot in terms of customer loyalty (it was passed by both Ford and Honda). And in the 2010 Initial Quality Survey conducted by J.D. Power and Associates, Chrysler, Ford, and GM had fewer design-related problems and defects than their foreign competitors. That was the first time in nearly 50 years that domestic carmakers had beaten foreign rivals in quality.

A Canadian class-action lawsuit against Toyota and CTS Corp. claimed that Toyota knew (or should have known) that there were design defects in the electronic throttle control system. Toyota also faced a lawsuit in the U.S. because of 19 deaths caused by jammed accelerators. The law firm bringing the suit claimed that Toyota knew about the defect, but didn't do anything about it.

Toyota is not alone in having quality problems that require the recall of products. Consider what happened to Mattel, the company that makes the famous Barbie doll and many other popular toys. In the 1990s, Mattel began contracting out its manufacturing activities to companies in China in an effort to reduce costs and to remain competitive. Before long, however, the company had to recall some toys because of safety concerns. During the past few years, these recalls have increased substantially, and millions of toys that were made in China have since been recalled. Products like Barbie doll accessories and small cars—totalling 11.5 million pieces—were recalled in 2007 because they contained lead paint and small magnets that could be easily removed and possibly swallowed by children.

When analyzing why quality problems arise, it is important to understand the distinction between toy design and toy manufacturing. Toy *design* occurs at toy companies like Mattel. Design problems can be things like sharp edges on a toy that could lead to a cut, small detachable parts (balls and beads), long strings that could cause strangulation, and buttons (a choking hazard). In contrast, toy *manufacturing* is carried out by manufacturers (who are often overseas). Manufacturing problems include the use of substandard material (which causes parts to break), faulty electric circuits, and lead paint that is not approved. Manufacturing defects occur because of errors or negligence, and manufacturers can prevent defects with proper attention to quality control.

Mattel initially blamed the Chinese manufacturers for the quality problems, but when independent researchers looked at the situation and concluded that most of the problems were design problems, not manufacturing problems, Mattel had to backpedal. The Chinese manufacturer did use lead paint in the toys, but that did not relieve Mattel of the responsibility for its presence in the toys. Mattel needed to develop proper systems to engage more directly and closely with its overseas manufacturers.

Mattel does deserve credit for later publicly admitting that it was its design flaw that caused the problem, and for taking steps to ensure that all of the affected products were recalled. The company announced the recall by placing ads on high-traffic internet sites, created a website that clearly outlined the recall, and also provided consumers with downloadable application forms and paid shipping mailers. In addition, Mattel's CEO took responsibility for the recall, and in a prepared public apology stated that the company "takes full responsibility for these recalls and apologizes personally to you, the Chinese people, and all of our customers who received the toys." This type of public admission of guilt was unprecedented in recent history. For its efforts in ensuring that all the affected toys were safely removed from stores and homes, Mattel was named one of the "World's Most Ethical Companies" in 2009 by Ethisphere.

LO-1 What Does "Production" Mean Today?

Everywhere you go today, you encounter businesses that provide goods and services to their customers. You wake up in the morning, for example, to the sound of your favourite radio station. You stop at the corner store for a newspaper on your way to the bus stop, where you catch the bus to work or school. Your instructors, the bus driver, the clerk at the 7-Eleven store, and the morning radio announcer are all examples of people who work in **service operations**. They provide you with tangible and intangible service products, such as entertainment, transportation, education, and food preparation. Firms that make tangible products—radios, newspapers, buses, textbooks—are engaged in **goods production.**

Although the term *production* has historically referred to the production of physical goods, the concept as we now use it also includes services. Many of the things that we need or want, from health care to fast food, are produced by service operations. As a rule, service-sector managers focus less on equipment and technology than on the human element in operations. Why? Because success or failure may depend on provider–customer contact. Employees who deal directly with customers affect customer feelings about the service. As we will see, a key difference between production and service operations is the customer's level of involvement in the production process. But provider–customer contact is also important in the production of physical goods (see the boxed insert entitled "Open Source Automobile Manufacturing").

Although companies are typically classified as either goods producers or service providers, the distinction is often blurred. All businesses are service operations to some extent. When you think of General Electric, for example, you most likely think of appliances and jet engines. However, GE is not just a producer of physical goods. GE's "growth engines"—its most vibrant business activities—are service operations, including media and entertainment (NBC Universal), consumer and commercial finance, investment, transportation services, health care information, and real estate, which account for the majority of the company's revenues.[1]

The boxed insert entitled "The Unicycle Motorbike" describes one entrepreneur's efforts to produce a physical product that is environmentally friendly.

Creating Value through Production

To understand production processes, you need to understand the importance of products—both goods and services. Products provide businesses with economic results (profits, wages, goods purchased from other companies), and products provide customers with **utility** (want satisfaction).

By making a product available at a time when consumers want it, production creates **time utility**, as when a company turns out ornaments in time for Christmas. By making a product available in a place convenient for consumers, production creates **place utility**, as when a local department store creates a "Trim-a-Tree" section. By making a product that consumers can take pleasure in owning, production creates **ownership (possession) utility**, as when you take a box of ornaments home and decorate your tree. By turning raw materials into finished goods, production creates **form utility**, as when an

SERVICE OPERATIONS Production activities that yield tangible and intangible service products.

GOODS PRODUCTION Production activities that yield tangible products.

UTILITY The power of a product to satisfy a human want; something of value.

TIME UTILITY That quality of a product satisfying a human want because of the time at which it is made available.

PLACE UTILITY That quality of a product satisfying a human want because of where it is made available.

OWNERSHIP (POSSESSION) UTILITY That quality of a product satisfying a human want during its consumption or use.

FORM UTILITY That quality of a product satisfying a human want because of its form; requires raw materials to be transformed into a finished product.

General Electric (GE) can be classified as both a goods producer (for example of the GE Wind Turbine) and a service provider (for example, of media and entertainment shows such as Saturday Night Live).

OPERATIONS (OR PRODUCTION) MANAGEMENT A set of methods and technologies used in the production of a good or a service.

PRODUCTION MANAGERS Managers responsible for ensuring that operations processes create value and provide benefits.

ornament maker combines glass, plastic, and other materials to create tree decorations.

Operations (or **production**) **management** is the systematic direction and control of the processes that transform resources into finished goods and services.

As Figure 10.1 shows, **production managers** must bring raw materials, equipment, and labour together under a production plan that effectively uses all the resources available in the production facility. As the demand for a product increases, managers must schedule and control work to produce the amount required. Meanwhile, they must control costs, quality levels, inventory, and plant and equipment.

LO-2 Differences between Service and Manufacturing Operations

Both service and manufacturing operations transform raw materials into finished products. In service operations, however, the raw materials, or inputs, are not things like glass or steel. Rather, they are people who have either unsatisfied needs or possessions needing care or alteration. In service operations, finished products or outputs are people with needs met and possessions serviced.

Thus, there is at least one obvious difference between service and manufacturing operations. Whereas goods are *produced*, services are *performed.* Service operations are

E-BUSINESS AND SOCIAL MEDIA SOLUTIONS

Open Source Automobile Manufacturing

In the early 1900s, Henry Ford revolutionized the automobile industry by applying the assembly-line approach to manufacturing, bringing prices down, and making cars more affordable for the masses. What would he think of the latest innovation in the industry: open-source design? Jay Rogers, of Local Motors, is building a community of engineers to design cars. Local Motors is a mass participation designer and niche product provider that has developed a unique solution for a very old industry.

Open-source is usually associated with new technology; it became popular in the 1990s with the creation of software programs like Linux (computer operating system) and Mozilla (Firefox), the popular web browser. The approach is gaining popularity in various areas as companies tap into the power of the internet and social media. *Crowdsourcing* involves posting challenges or questions in the form of an open call. This can be accomplished in an unsophisticated manner through general sites like wikiHow and Yahoo! Answers. But companies like Toronto-based Innovations Exchange have gone a step further and created a website to link companies with a community of marketers, engineers, and designers to build customer solutions. Organizations pay to post challenges and then individuals or teams tackle the problems. For example, two New York college buddies earned a prize (US$40 000) for creating a better yogourt container. Now, yogourt containers are one thing, but can this really work for car manufacturers?

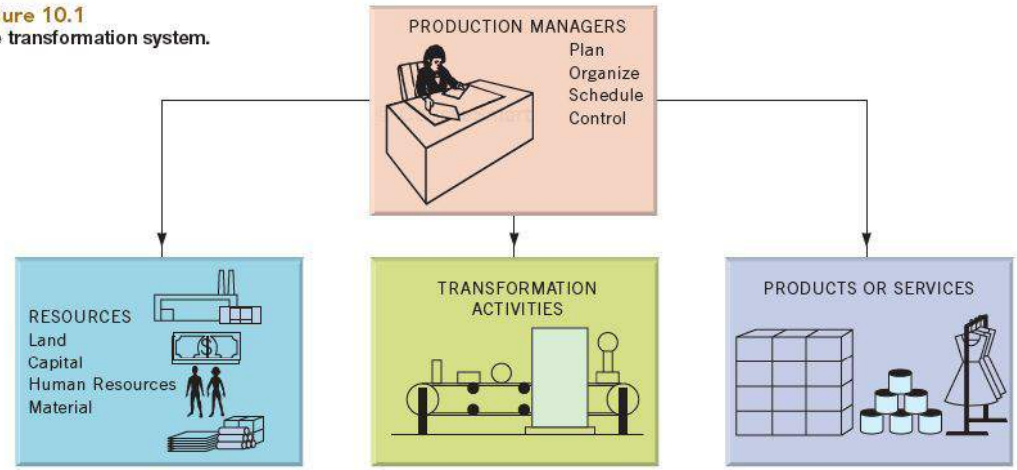
Automobile manufacturing has traditionally been characterized by secrecy. Designs are tightly guarded until they are unveiled at major car shows. Local Motors is flipping this traditional approach around. It posts a challenge (competition rules and an ignition kit) that addresses a certain car component and invites engineering volunteers to upload sketches and ideas. Participants can submit their designs for assessment and feedback. The final designs are then posted in the "design garage" to be evaluated and voted on by the community and the company. Prizes are awarded to the winners. Once there is enough support for a model, the car is manufactured in limited batches.

According to Jay Rogers, this unique development approach reduces his breakeven point to as little as 200 cars per model. Inclusiveness is part of the DNA of this company, and activity does not end with the design. Car owners can be involved in the actual manufacturing process (up to 60 hours) under the supervision of staff. This approach appeals to the typical car enthusiast, who is likely to offer opinions on the site. Local Motors aims to revolutionize the industry by using radical design, production, and engineering concepts. It's off to a good start.

Critical Thinking Questions

1. What do you think of this approach to car manufacturing and design?
2. Do you believe that this approach can work for major manufacturers like GM or Honda?

Figure 10.1
The transformation system.



ENTREPRENEURSHIP AND NEW VENTURES

The Unicycle Motorbike

The Uno, touted as the world's first unicycle motorbike, was invented by Ben Gulak, a 19-year-old student from Milton, Ontario. Eye-catching because of its space-age design and reminiscent of something you might have seen on the once-popular TV cartoon show *The Jetsons,* the Uno is an electric-powered motorcycle that uses gyroscope technology. It's kind of like the Segway (an electric scooter) in that it's controlled completely through body movements.

Gulak made a conscious decision to ensure his invention provided more than just transportation. It had to possess the cool factor because "if something doesn't look cool, people just won't be interested." Gulak got the idea for the bike while on a family vacation in China in 2006. Struck by the unbelievable pollution he saw there, he decided to develop an environmentally friendly alternative vehicle for densely populated urban centres. A test run of a prototype resulted in a chipped kneecap, but he didn't let that slow him down. The gyro control system needed some fine-tuning so that the machine would move more smoothly. He also had a custom motorcycle manufacturer build the body parts out of foam and fibreglass, based on Gulak's drawings. The Uno can travel up to 15 m.p.h., but Gulak is aiming to reach 40 m.p.h. It can run for about 2.5 hours on a single charge.

So far, Gulak's parents have bankrolled his research efforts to the tune of $50 000. But that money is now gone, and the bike is not quite ready for production. So, how does a 19-year-old get the money to advance his prototype development? He applies to CBC's *Dragon's Den,* of course! In November 2008, Gulak wowed the dragons with his Uno prototype, and on-air he landed a $1.25 million investment to be used for research purposes. In exchange, the dragons were given a 20 percent stake in his business. Since the show, however, four of the dragons have reneged on their offers and now dragon Brett Wilson is the only investor remaining. According to Wilson, "Now it's just me and I'm in for $250 000." However, Gulak has not let this setback dampen his enthusiasm. "I really believe in this product and would really like to see it to production," he says.

Popular Science magazine listed the Uno among the top ten inventions for 2008. And, a profile on the Discovery Channel and a request to do an appearance on the *Tonight Show* in the U.S. haven't been bad for publicity either. Who knows? With the right combination of engineering and business skills, Gulak just might be able to make this machine fly someday.

Critical Thinking Question

1. Discuss the concepts of production value, transformation, and operations planning as they apply now, or may in the future, to the production of Gulak's Uno. Could any of these factors be reasons why the dragons backed out of the deal?

OPERATIONS PROCESS A set of methods and technologies used in the production of a good or a service.

more complicated than goods production in four aspects: (1) interacting with consumers, (2) the intangible and unstorable nature of some services, (3) the customer's presence in the process, and (4) service quality considerations.

Interacting with Consumers Manufacturing operations emphasize outcomes in terms of physical goods—for example, a new jacket. But the products of most *service* operations are really combinations of goods and services—both making a pizza *and* delivering (serving) it. Service workers need different skills. For example, gas company employees may need interpersonal skills to calm frightened customers who have reported gas leaks. Thus, the job includes more than just repairing pipes. In contrast, factory workers who install gas pipes in manufactured homes without any customer contact don't need such skills.

Services Can Be Intangible and Unstorable Often, services can't be touched, tasted, smelled, or seen, but they're still there. An important satisfier for customers, therefore, is the *intangible* value they receive in the form of pleasure, gratification, or a feeling of safety. For example, when you hire an attorney, you purchase not only the intangible quality of legal expertise but also the equally intangible reassurance that help is at hand.

Many services—such as trash collection, transportation, child care, and house cleaning—can't be produced ahead of time and then stored for high-demand periods. If a service isn't used when available, it's usually wasted. Services, then, are typically unstorable.

The Customer's Presence in the Operations Process Because service operations transform customers or their possessions, the customer is often present in the operations process. To get a haircut, for example, most of us have to go to the barbershop or hair salon. As physical participants in the operations process, consumers can affect it. As a customer, you expect the salon to be conveniently located (place utility), to be open for business at convenient times (time utility), to provide safe and comfortable facilities, and to offer quality grooming (form utility) at reasonable prices (value for money spent). Accordingly, the manager sets hours of operation, available services, and an appropriate number of employees to meet customer requirements. But what happens if a customer, scheduled to receive a haircut, also asks for additional services, such as highlights or a shave, when he or she arrives? In this case, the service provider must balance customer satisfaction with a tight schedule. High customer contact has the potential to significantly affect the process.

The growth of e-commerce has introduced a "virtual presence" of the customer, as opposed to a physical presence. Consumers interact electronically, in real time, with sellers, collecting information about product features, delivery availability, and after-sales service. Many companies have invited "the virtual customer" into their service systems by building customer-communications relationships. For example, the online travel agency Expedia.ca responds to your personalized profile with a welcome email letter, presents you with a tailor-made webpage the next time you sign in, offers chat rooms in which you can compare notes with other customers, and notifies you of upcoming special travel opportunities.

The hair styling service being provided to this customer illustrates the three key features of service operations: *intangibility* (customer pleasure or satisfaction with the service), *customization* (the service each person gets is customized for them), and *unstorability* (the service cannot be produced ahead of time).

Service Quality Considerations Consumers use different measures to judge services and goods because services include intangibles, not just physical objects. Most service managers know that quality of work and quality of service are not necessarily the same thing. Your car, for example, may have been flawlessly repaired (quality of work), but you'll probably be unhappy with the service if you're forced to pick it up a day later than promised (quality of service).

LO-3 Operations Processes

An **operations process** is a set of methods and technologies used in the production of a good or a service. At the most fundamental level, operations processes for the production of physical products are either *make-to-order* (producing custom-designed products for special order) or *make-to-stock* (producing standard items in large quantities for consumers in general). We can classify services according to the *extent of customer contact* required.

Goods-Producing Processes Operations processes in manufacturing firms can be classified based on the kind of *transformation technology* that is used, or based on whether the operations process combines resources or breaks them into component parts.

Types of Transformation Technologies Manufacturers use the following types of transformation technologies to turn raw materials into finished goods:

- In *chemical processes,* raw materials are chemically altered. Such techniques are common in the aluminum, steel, fertilizer, petroleum, and paint industries.
- *Fabrication processes* mechanically alter the basic shape or form of a product. Fabrication occurs in the metal forming, woodworking, and textile industries.
- *Assembly processes* put together various components. These techniques are common in the electronics, appliance, and automotive industries.
- In *transport processes,* goods acquire place utility by being moved from one location to another. For example, bicycles are routinely moved by trucks from manufacturing plants to consumers through warehouses and discount stores.
- *Clerical processes* transform information. Combining data on employee absences and machine breakdowns into a productivity report is a clerical process. So is compiling inventory reports at a retail outlet.

Analytic versus Synthetic Processes An **analytic process** breaks down basic resources into their component parts. For example, Rio Tinto Alcan manufactures aluminum by extracting it from an ore called bauxite. The reverse approach, a **synthetic process,** combines a number of raw materials to produce a finished product such as fertilizer or paint.

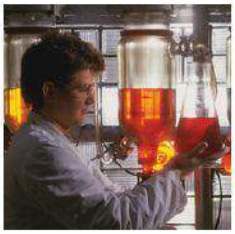
ANALYTIC PROCESS Any production process in which resources are broken down into their component parts.

SYNTHETIC PROCESS Any production process in which resources are combined.

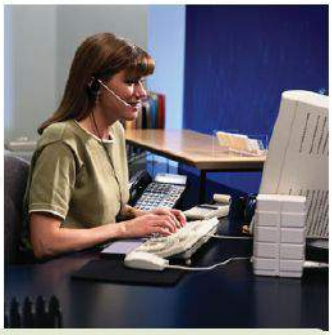
HIGH-CONTACT SYSTEM A system in which the service cannot be provided without the customer being physically in the system (e.g., transit systems).

Service-Producing Processes One useful way of classifying services is to determine whether a given service can be provided without the customer being part of the production system.

High-Contact Processes Think for a moment about the service provided by your local public transit system. When you purchase transportation, you must board a bus or train, so public transit is a **high-contact system**. For







As these photos show, various industries use different transformation techniques: chemical (top left), fabrication (top centre), assembly (top right), transport (bottom left), and clerical (bottom right).

LOW-CONTACT SYSTEM A system in which the service can be provided without the customer being physically in the system (e.g., lawn care services).

this reason, transit managers must worry about the cleanliness of the trains and buses and the appearance of the stations. This is usually not the case in low-contact systems. Large industrial concerns that ship coal in freight trains, for example, are generally not concerned with the atmosphere inside those trains. Dental and medical services, hair salons, and guided tours are also high-contact systems.

Low-Contact Processes Consider the cheque-processing operations at your bank. Workers sort the cheques that have been cashed that day and dispatch them to the banks on which they were drawn. This operation is a **low-contact system** because customers are not in contact with the bank while the service is performed. They receive the service—their funds are transferred to cover their cheques—without ever setting foot in the cheque-processing centre. Gas and electric utilities, auto repair shops, and lawn care services are also low-contact systems.

In a high-contact service, the customer must be present in the operations process.

Business Strategy as the Driver of Operations

There is no one standard way for doing production. Rather, it is a flexible activity that can be moulded into many shapes to give quite different capabilities for different purposes. How, then, do companies go about selecting the kind of production that is best for them? Its design is best driven from above by the firm's business strategy.

In this section we present examples of four firms—two in goods production and two in services—that have contrasting business strategies and, as we shall see, have chosen different operations capabilities. All four firms are successful, but they've taken quite different operations paths to get there. As shown in Table 10.1, each company has identified a business strategy that it can use for attracting customers in its industry. For Toyota, *quality* was chosen as the strategy for competing in selling cars. The U.S.-based Save-A-Lot grocery stores, in contrast to others in the grocery industry, offer customers *lower prices*. The *flexibility* strategy at 3M emphasizes new product development in an ever-changing line of products for home and office. FedEx captures the overnight delivery market by emphasizing delivery *dependability*.

Business Strategy Determines Operations Capabilities Successful firms design their operations to support the company's business strategy.[2] In other words,

Table 10.1 Business Strategies That Win Customers for Four Companies

Company	Strategy for Attracting Customers	What the Company Does to Implement Its Strategy
Toyota	Quality	Cars perform reliably, have an appealing fit-and-finish, and consistently meet or exceed customer expectations at a competitive price
Save-A-Lot	Low Price	Foods and everyday items offered at savings up to 40 percent less than conventional food chains
3M	Flexibility	Innovation, with more than 55 000 products in a constantly changing line of convenience items for home and office
FedEx	Dependability	Every delivery is fast and on time, as promised

production operations are adjusted to support the firms' target markets. Since the four firms have different business strategies, we should expect to see differences in their operations. The top-priority **operations capability (production capability)**—the activity or process that production must do especially well, with high proficiency—is listed for each firm in Table 10.2, along with key operations characteristics for implementing that capability. Each company's operations capability matches up with its business strategy so that the firm's activities—from top to bottom—are focused in a particular direction.

As you can see in Table 10.2, Toyota's top priority is quality, so its operations—inputs, transformation activities, and outputs—are devoted first and foremost to quality. All production processes, equipment, and training are designed to build better cars. The entire culture supports a quality emphasis among employees, suppliers, and dealerships. As noted in the opening case, Toyota had a significant setback with respect to quality in 2010, but its problems will likely motivate its managers to redouble their efforts to produce high-quality cars. If Toyota had chosen to compete as the low-price car in the industry, as some successful car companies do, then a cost-minimization focus would have been appropriate, and Toyota's operations would have a different form.

Expanding into Additional Capabilities Over time, excellent firms learn how to achieve more than just one competence. For example, in addition to dependability, FedEx is noted for world-class service quality and cost containment, too. But in its earlier years, its primary and distinguishing capability was dependability, the foundation upon which future success was built.

OPERATIONS CAPABILITY (PRODUCTION CAPABILITY) The activity or process that production must do especially well and with high proficiency.

LO-4 Operations Planning

Managers from many departments contribute to the firm's decisions about operations management. As Figure 10.2 shows, however, no matter how many decision makers are involved, the process can be described as a series of logical steps. The success of any firm depends on the final result of this logical sequence of decisions.

The business plan and forecasts developed by top managers guide operations planning. The business plan outlines goals and objectives, including the specific goods and services that the firm will offer. Managers also develop

Table 10.2 Operations Capabilities and Characteristics for Four Companies

Operations Capability	Key Operations Characteristics
Quality (Toyota)	■ High-quality standards for materials suppliers
	■ Just-in-time materials flow for lean manufacturing
	■ Specialized, automated equipment for consistent product build-up
	■ Operations personnel are experts on continuous improvement of product, work methods, and materials
Low Cost (Save-A-Lot)	■ Avoids excessive overhead and costly inventory (no floral departments, sushi bars, or banks that drive up costs)
	■ Limited assortment of products, staples, in one size only for low-cost restocking, lower inventories, and less paperwork
	■ Many locations; small stores—less than half the size of conventional grocery stores—for low construction and maintenance costs
	■ Reduces labour and shelving costs by receiving and selling merchandise out of custom shipping cartons
Flexibility (3M)	■ Maintains some excess (expensive) production capacity available for fast start on new products
	■ Adaptable equipment/facilities for production changeovers from old to new products
	■ Hires operations personnel who thrive on change
	■ Many medium- to small-sized facilities in diverse locations, which enhances creativity
Dependability (FedEx)	■ Customer automation: uses electronic and online tools with customers to shorten shipping time
	■ Wireless information system for package scanning by courier, updating of package movement, and package tracking by customer
	■ Maintains a company air force, global weather forecasting centre, and ground transportation for pickup and delivery, with backup vehicles for emergencies
	■ Each of 30 automated regional distribution hubs processes up to 45 000 packages per hour for next-day deliveries

FORECASTS Estimates of future demand for both new and existing products.

CAPACITY The amount of a good that a firm can produce under normal working conditions.

long-range production plans through **forecasts** of future demand for both new and existing products. Covering a period of two to five years, the production plan specifies the number of plants or service facilities and the amount of labour, equipment, transportation, and storage that will be needed to meet demand. It also specifies how resources will be obtained. There are five main categories of operations planning: *capacity, location, layout, quality,* and *methods planning.*

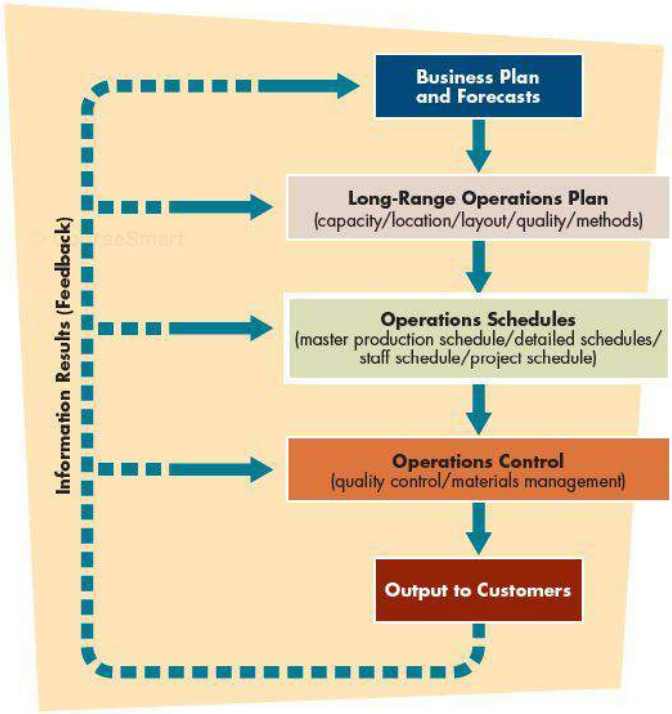


Figure 10.2
Operations planning and control.

Capacity Planning

The amount of a product that a company can produce under normal working conditions is its **capacity**. A firm's capacity depends on how many people it employs and the number and size of its facilities.

Capacity Planning for Producing Goods Capacity planning means ensuring that a firm's capacity just *slightly* exceeds the normal demand for its product. If capacity is too small to meet demand, the company must turn away customers, and it will forgo profit opportunities. If capacity is too large, the firm wastes money by having a plant that is too large and has too many employees.

Capacity Planning for Producing Services In low-contact systems, capacity should be set at the level of *average demand.* Orders that arrive faster than expected can be set aside in a "to be done" file and processed later during a slower period. In high-contact systems, managers must plan capacity to meet *peak demand.* A supermarket, for instance, has far more cash registers than it needs on an average day. But on a Saturday morning or during the three days before Christmas, all registers will be running at full speed. By introducing self-service check-in machines and manned "bag drop" stations, Alaska Airlines doubled its capacity, halved its staffing needs, and cut costs, all the while speeding travellers through the check-in process.[3]

Location Planning

Because the location of a factory, office, or store affects its production costs and flexibility, sound location planning is crucial. Depending on the site of its facility, a company should be capable of producing a low-cost product or may find itself at an extreme cost disadvantage relative to its competitors.

Location Planning for Producing Goods In goods-producing operations, location decisions are influenced by proximity to raw materials and markets, availability of labour, energy and transportation costs, local regulations and taxes, and community living conditions. Slovakia, for example, is fast becoming the "Detroit" of Europe. With an existing Volkswagen plant producing 850 000 cars a year, two more giant automakers—Peugeot Citroën (French) and Hyundai Motor Company (Korean)—opened new plants in 2006. Slovakia has a good supply of skilled workers, a good work ethic, wages below those of the surrounding countries, a good railroad system, and nearby access to the Danube River.[4]

Location Planning for Producing Services Low-contact services can be located near resource supplies, labour, or

transportation outlets. For example, the typical Walmart distribution centre is located near the hundreds of Walmart stores it supplies, not near the companies that supply the distribution centre. Distribution managers regard Walmart stores as their customers. To better serve them, distribution centres are located so that truckloads of merchandise flow quickly to the stores.

On the other hand, high-contact services must locate near the customers who are a part of the system. Accordingly, fast-food restaurants such as Taco Bell, McDonald's, and Burger King have begun moving into non-traditional locations with high traffic—dormitories, hospital cafeterias, museums, and shopping malls.

Layout Planning

Once a site has been selected, managers must decide on plant layout. Layout of machinery, equipment, and supplies determines whether a company can respond quickly and efficiently to customer requests for more and different products, or whether it will find itself unable to match competitors' production speed or convenience of service.

Layout Planning for Producing Goods In facilities that produce goods, layout must be planned for three types of space:

1. *Productive facilities:* workstations and equipment for transforming raw materials
2. *Non-productive facilities:* storage and maintenance areas
3. *Support facilities:* offices, restrooms, parking lots, cafeterias, and so forth

When producing goods, alternatives for layout planning include *process*, *cellular*, and *product layouts*.

Process Layouts In a **process layout**, which is well suited to *job shops* specializing in custom work, equipment and people are grouped according to function. In a woodworking shop, for example, machines cut the wood in an area devoted to sawing, sanding occurs in a dedicated area, and jobs that need painting are taken to a dust-free area where all the painting equipment is located. The various tasks are each performed in specialized locations.

The job shop produces many one-of-a-kind products, and each product requires different kinds of work (see Figure 10.3a). Whereas Product X needs only three production steps prior to packaging, Product Y needs four. Machine shops, custom bakeries, and dry cleaning shops often feature process layouts.

Cellular Layouts The **cellular layout** is used when a group of similar products follows a fixed flow path. A clothing manufacturer, for example, may establish a cell, or designated area, dedicated to making a family of pockets—for example, pockets for shirts, coats, blouses, trousers, and slacks. Within the cell, various types of equipment (e.g., for cutting, trimming, and sewing) are arranged close together in the appropriate sequence. Figure 10.3b shows two production cells, one each for Products X and Y, while all other smaller-volume products are produced elsewhere in the plant.

Product Layouts In a **product layout**, equipment and people are set up to produce one type of product in a fixed sequence of steps that are arranged according to its production requirements (see Figure 10.3c). Product layouts are efficient for producing large volumes of product quickly and often use **assembly lines**. Automobile, food processing, and television assembly plants use product layouts. In an attempt to improve productivity even more, many companies have introduced **lean manufacturing**, which emphasizes the elimination of all forms of waste, including overproduction, excess inventory, and wasted motions. In spite of its recent quality problems, Toyota is the recognized leader in lean manufacturing. Bombardier Aerospace (Montreal) and St. Joseph's Healthcare (Hamilton) are two Canadian organizations that have adopted Toyota's ideas about lean manufacturing.[5] Louis Vuitton, the maker of luxury handbags, has adopted lean manufacturing in order to quickly respond to changes in customer preferences.[6]

Other Developments in Layout Flexibility With a **flexible manufacturing system (FMS)**, a single factory can produce a wide variety of products. Automobile manufacturers, for example, now build several models of cars using the same basic "platform" (the underbody of the car). Nissan, Toyota, and Honda make the majority of their cars using FMS, and North American carmakers are now rapidly adopting the strategy.[7] The Oakville,

PROCESS LAYOUT A way of organizing production activities such that equipment and people are grouped together according to their function.

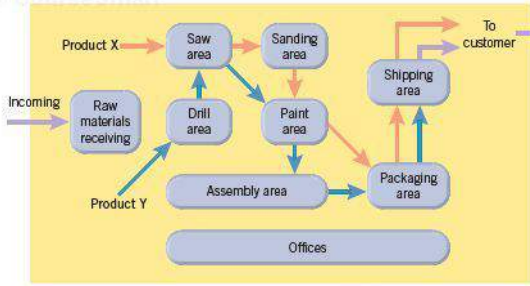
CELLULAR LAYOUT Used to produce goods when families of products can follow similar flow paths.

PRODUCT LAYOUT A way of organizing production activities such that equipment and people are set up to produce only one type of good.

ASSEMBLY LINE A type of product layout in which a partially finished product moves through a plant on a conveyor belt or other equipment.

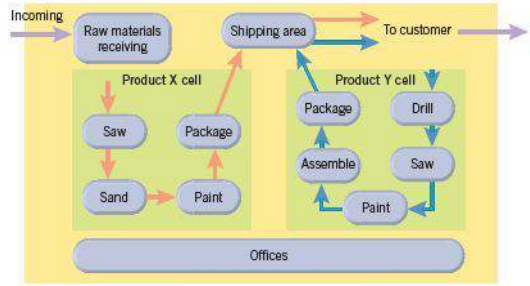
LEAN MANUFACTURING A system designed for smooth production flows that avoid inefficiencies, eliminate unnecessary inventories, and continuously improve production processes.

FLEXIBLE MANUFACTURING SYSTEM (FMS) A production system that allows a single factory to produce small batches of different goods on the same production line.



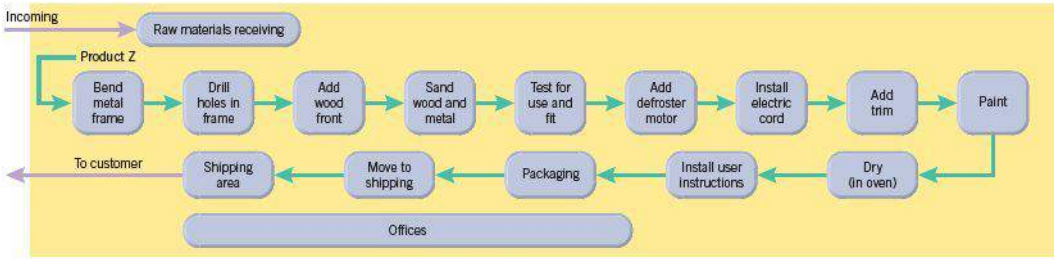
(a) Process Layout for Wood Shop

Arrows indicate unique path of workflow for each product.
Orange = Product X; Blue = Product Y



(b) Cellular Layout for Wood Shop

Arrows indicate unique path of workflow for each product.
Orange = Product X; Blue = Product Y



(c) Product Layout—Assembly Line

Arrows indicate the fixed path of workflow for all units of Product Z

Figure 10.3
Layouts for producing goods.

Ontario, Ford plant is the first flexible assembly plant in Canada.[8]

Some companies have experimented with so-called **soft manufacturing**—reducing huge FMS operations to smaller, more manageable groups of machines. Automation is less likely to fail when relegated to jobs it does best, while human workers perform the assembly-line jobs that require dexterity and decision making. Both are supported by networks of computers programmed to assist in all sorts of tasks.

The very latest development is the **movable factory**. Because FMS is so expensive, some developing countries with lots of labour but little capital are buying up equipment from industrialized countries that is still relatively modern and then using it to produce new and untested products in their own country. For example, a used press from the Buffalo-Niagara region, which is capable of shaping steel with its 14 000 tonnes of pressure per square inch, will be used to manufacture the internal workings of new Chinese nuclear power plants.[9]

Layout Planning for Services In a low-contact system like the mail-processing facility at UPS or FedEx, the system looks very much like a product layout in a factory. Machines and people are arranged in the order in which they are used in the mass processing of mail. In contrast, FedEx Kinko's Office and Print Centers use process layouts for diverse custom jobs. Specific functions such as photocopying, computing, binding, photography, and laminating are each performed in specialized areas of the store.

High-contact service systems are arranged to meet customer needs and expectations. For example, a cafeteria focuses both layout and services on the groups that constitute its primary market—families and elderly people. As shown in Figure 10.4, families enter to find an array of highchairs and rolling baby beds that make it convenient to wheel children through the line. Meanwhile, servers are willing to carry trays for elderly people and for those pushing strollers.

Quality Planning

In planning production systems and facilities, managers must keep in mind the firm's quality goals.[10] Thus any complete production plan includes systems for ensuring that goods are produced to meet the firm's quality standards. The issues of productivity and quality are discussed in more detail later in this chapter.

SOFT MANUFACTURING Emphasizes computer software and computer networks instead of production machines.

MOVABLE FACTORY Purchasing relatively modern production equipment and transporting it to another location to create a new manufacturing plant, typically in a developing country.

Methods Planning

In designing production systems, managers must clearly identify all production steps and the specific methods for performing them. They can then work to reduce waste, inefficiency, and poor performance by examining procedures on a step-by-step basis, an approach sometimes called *methods improvement*.

Methods Improvements in Goods Improvement of production for goods begins when a manager documents the current method using a diagram called the *process flow chart*. The chart identifies the sequence of production activities, movements of materials, and work performed at each stage as the product flows through production. The flow can then be analyzed to identify wasteful activities, sources of delay in production flows, and other inefficiencies.

Methods Improvements in Services Similar procedures are useful in designing and evaluating low-contact service systems. At a bank, for example, the cash-management

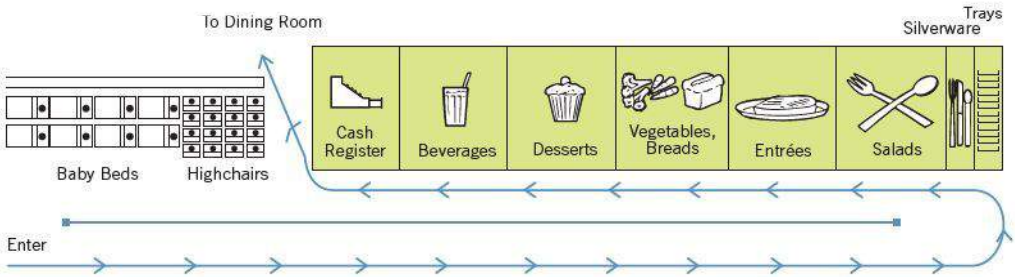
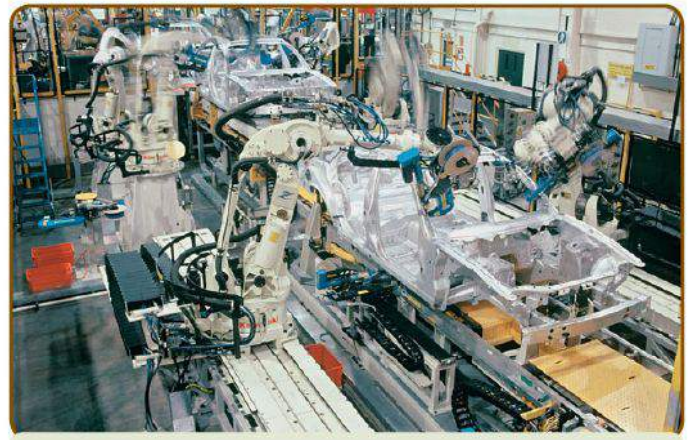


Figure 10.4
Layout of a typical Piccadilly cafeteria.

MASTER PRODUCTION SCHEDULE
Schedule showing which products will be produced, when production will take place, and what resources will be used.

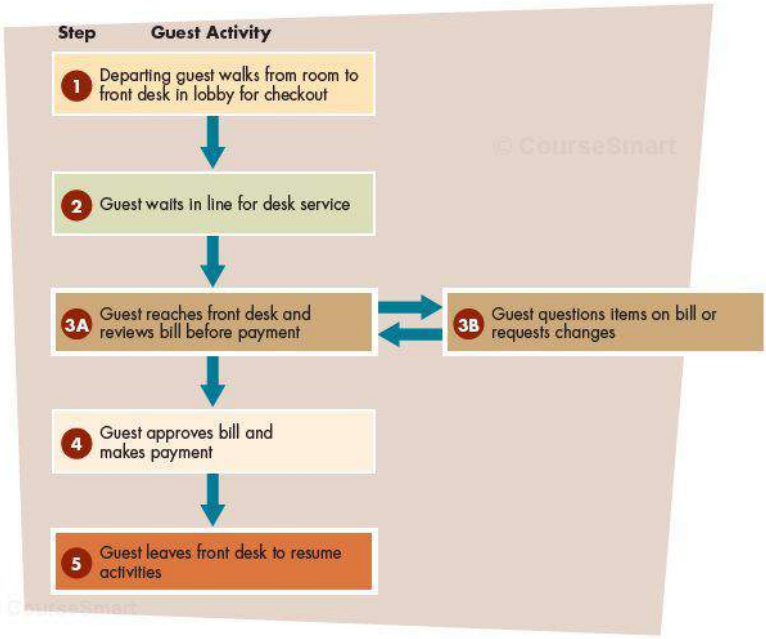


For its new XJ sedan, Jaguar wanted to use an aluminum unibody construction because it is lighter and more efficient than steel. But spot welding weakens aluminum, so at its factory in Castle Bromich in the United Kingdom, engineers built an assembly line of 88 robots equipped with tools to drive more than 3,000 rivets into each car.

unit collects accounts receivable for corporate clients; the sooner cheques are collected and deposited, the sooner the client begins collecting interest.In high-contact services, the demands of systems analysis are somewhat different. Here, the steps in the process must be analyzed to see where improvements can be made. Consider the traditional checkout method at hotels. The process flowchart in Figure 10.5 shows five stages of customer activities. A more efficient checkout method eliminates steps 1, 2, 3A, and 5. Customers now scan their bills on the TV in their rooms before departure. If the bill is correct, no further checkout is required, and the hotel submits the charges against the credit card the customer showed at check-in.

Operations Scheduling

Once plans identify the necessary resources and how to use those resources to reach a firm's quantity and quality goals, managers must develop timetables for acquiring the resources. This aspect of operations is called *scheduling*.



Scheduling Goods Operations

A **master production schedule** shows which products will be produced, when production will occur, and what resources will be used during the scheduled time period. Consider the case of Logan Aluminum Inc., which produces coils of aluminum that its main customers, Atlantic Richfield and Alcan Aluminum, use to produce aluminum cans. Logan's master schedule extends out to 60 weeks and shows which types of coils, and how many of each, will be made during each week.

Figure 10.5
Flowchart of traditional guest checkout.

This information is not complete, however. For example, manufacturing personnel must also know on which days each type of coil will be run. Machine start-up and stop times must be assigned, and employees must be given scheduled work assignments. Short-term *detailed schedules* answer questions like these on a daily or weekly basis. These schedules use incoming orders and weekly sales forecasts to determine what size and variety of coils to make within a specified time period.

Scheduling Service Operations

In low-contact services, *work scheduling* may be based either on the desired completion date or on the time of order arrival. For example, several cars may be scheduled for repairs at a local garage. Thus, if your car is not scheduled for work until 3:30 p.m., it may sit idle for several hours even if it was the first to be dropped off. In such businesses, reservation and appointment systems can help to smooth demand.

In high-contact services, the customer is part of the system and must be accommodated. Thus, precise scheduling of services may not be possible in high-contact systems. For example, if a hospital emergency room is overloaded, patients cannot be asked to make an appointment and come back later.

LO-5 Operations Control

Operations control requires production managers to monitor production performance by comparing results with detailed plans and schedules. If schedules or quality standards are not met, these managers must take corrective action. **Follow-up**—checking to ensure that production decisions are being implemented—is an essential and ongoing facet of operations control. Operations control involves *materials management* and *production process control.* Both activities ensure that schedules are met and that production goals are fulfilled, both in quantity and in quality.

Materials Management

Materials management involves planning, organizing, and controlling the flow of materials. Even before production starts, materials management focuses on product design by emphasizing materials **standardization**—the use, where possible, of standard and uniform components rather than new or different components. Standardization simplifies paperwork, reduces storage requirements, eliminates unnecessary material flows, and saves money by reducing the number of different parts that are needed. The five major areas of materials management are *transportation, warehousing, inventory control, supplier selection,* and *purchasing*.

- **Transportation** includes the means of transporting resources to the company and finished goods to buyers.
- **Warehousing** is the storage of both incoming materials for production and finished goods for physical distribution to customers.
- **Inventory control** includes the receiving, storing, handling, and counting of all raw materials, partly finished goods, and finished goods. It ensures that enough material inventories are available to meet production schedules.
- **Supplier selection** means finding and choosing suppliers of services and materials to buy from. It includes evaluating potential suppliers, negotiating terms of service, and maintaining positive buyer–seller relationships.
- **Purchasing** is the acquisition of all the raw materials and services that a company needs to produce its products; most large firms have purchasing departments to buy proper materials in the amounts needed. The boxed insert entitled "For the Greener Good" describes the purchasing strategies of Walmart as it tries to reduce its environmental footprint.

OPERATIONS CONTROL Managers monitor production performance by comparing results with plans and schedules.

FOLLOW-UP Checking to ensure that production decisions are being implemented.

MATERIALS MANAGEMENT Planning, organizing, and controlling the flow of materials from purchase through distribution of finished goods.

STANDARDIZATION Using standard and uniform components in the production process.

TRANSPORTATION The means of transporting resources to the company and finished goods to buyers.

WAREHOUSING The storage of both incoming materials for production and finished goods for physical distribution to customers.

INVENTORY CONTROL In materials management, receiving, storing, handling, and counting of all raw materials, partly finished goods, and finished goods.

SUPPLIER SELECTION Finding and determining suppliers to buy from.

PURCHASING The acquisition of all the raw materials and services that a company needs to produce its products.

Production Process Control

Tools for process control include *worker training, just-in-time production systems, material requirements planning,* and *quality control.*

Worker Training When providing services, employees are both the producers of the product and the salespeople.

JUST-IN-TIME (JIT) PRODUCTION SYSTEMS A method of inventory control in which materials are acquired and put into production just as they are needed.

Thus, human relations skills are vital for anyone who has contact with the public. Managers realize how easily service employees with poor attitudes can reduce sales. Conversely, the right attitude is a powerful sales tool. Disney World has a team of sweepers constantly at work picking up bits of trash as soon as they fall to the ground. When visitors have questions about directions or time, they often ask one of the sweepers. Because their responses affect visitors' overall impressions of Disney World, sweepers are trained to respond in appropriate ways. Their work is evaluated and rewarded based on strict performance appraisal standards.[11]

Just-in-Time Production Systems To minimize manufacturing inventory costs, many companies use **just-in-time (JIT) production systems**. JIT brings together all the needed materials and parts at the precise moment they are required for each production stage, not before. JIT reduces inventory of goods in process to practically nothing, and saves money by replacing stop-and-go production with smooth movement. Once smooth movements become the norm, disruptions become more visible and thus are resolved more quickly. At Mount Sinai Hospital in Toronto, individual suppliers no longer go to the hospital to deliver the items. Rather, all suppliers deliver their products to Livingston Healthcare Services Inc., which stores these items and fills Mount Sinai's order once each day. Mount Sinai no longer keeps any inventory.[12] Sobeys, the grocery chain, has invested in more efficient inventory management that has allowed it to reduce the size of storage rooms

THE GREENING OF BUSINESS

For the Greener Good

When retail giant Walmart decided to make changes to the way it conducts business in an effort to be more environmentally friendly, critics and supporters alike could not have fathomed the effect it would have on their suppliers, employees, and consumers. In 2005, Walmart unveiled an environmental plan that was designed to boost energy efficiency, cut down on waste, and reduce greenhouse gases. The decision to be environmentally friendly throws the burden back onto their suppliers, because Walmart closely monitors its overseas suppliers to make sure they meet social and environmental standards. More specifically, Walmart announced it would evaluate the suppliers not only on price but also on the environmental sustainability of their packaging.

The result? Walmart saw unprecedented amounts of innovation in packaging in the first six months of 2007, more than in the previous five years combined. The changes have also impacted Walmart's bottom line by lowering shipping costs and reducing waste, which in turn reduces expenses. Walmart says its goal is to reduce packaging by 5 percent by 2013. If everyone complies, this is a very attainable target.

It might seem that so much change so fast would be disruptive to operations. But it was business as usual. Walmart used the same *tactics* it uses to show its commitment to low prices, but the environmental *message* was different. Skeptics have been pleasantly surprised by the shift in focus, but some are concerned about the success and sustainability of Walmart's suppliers. Historically, Walmart's aggressive approach has been criticized for pushing some companies toward drastic changes in the name of cost savings, and in some cases, for driving companies out of business. Even with all this negative publicity, critics now concede that Walmart has the potential to use its power for good by persuading suppliers to make the necessary changes that will reduce greenhouse gas emissions.

Making changes to packaging could, in some cases, lead to production changes in the product itself. Walmart believes that there are financial incentives for every company that makes environmentally friendly changes to its production processes.

Critical Thinking Questions

1. Walmart has mandated very strict policies regarding packaging. Explain the consequences of these policies for Walmart's suppliers.
2. As a consumer, would you make a conscious choice to shop only at stores that sell environmentally friendly products? Why or why not?

Just-in-time (JIT) production, a type of lean manufacturing, brings together all needed materials at the precise moment they are required for each stage in the production process.

by 10 percent because products now move more quickly to the shelves.[13]

Material Requirements Planning **Material requirements planning (MRP)** uses a **bill of materials** that is basically a "recipe" for the finished product. It specifies the necessary raw materials and components (ingredients), the order in which they should be combined (directions), and the quantity of each ingredient needed to make one "batch" of the product (say, 2000 finished telephones). The recipe is fed into a computer that controls inventory and schedules each stage of production. The result is fewer early arrivals, less frequent stock shortages, and lower storage costs.

Manufacturing resource planning (also called **MRP II**), is an advanced version of MRP that ties together all parts of the organization into the company's production activities. For example, MRP inventory and production schedules are translated into cost requirements for the financial management department and personnel requirements for the human resources department. Information on capacity availability for new-customer orders goes to the marketing department.

Quality Control **Quality control** refers to the management of the production process so as to manufacture goods or supply services that meet specific quality standards. McDonald's, for example, is a pioneer in quality control in the restaurant industry. The company oversees everything from the farming of potatoes for French fries to the packing of meat for Big Macs. Quality-assurance staffers even check standards for ketchup sweetness and French fry length. We discuss quality control in more detail in the following section, where we focus on the connection between productivity and quality.

The Productivity–Quality Connection

Productivity measures how much is produced relative to the resources used to produce it. By using resources more efficiently, the quantity of output will be greater for a given amount of input. But unless the resulting goods and services are of satisfactory quality, consumers will not want them. **Quality**, then, means fitness for use—offering features that consumers want.

Meeting the Productivity Challenge

A nation's productivity determines how large a piece of the global economic resource pie it gets. A country with more resources has more wealth to divide among its citizens. A country whose productivity fails to increase as rapidly as that of other countries will see its people's standard of living fall relative to the rest of the world.

Measuring Productivity How do we know how productive a country is? Most countries use **labour productivity** to measure their level of productivity:

$$\text{labour productivity of a country} = \frac{\text{gross domestic product}}{\text{total number of workers}}$$

MATERIAL REQUIREMENTS PLANNING (MRP) A method of inventory control in which a computerized bill of materials is used to estimate production needs so that resources are acquired and put into production only as needed.

BILL OF MATERIALS Production control tool that specifies the necessary ingredients of a product, the order in which they should be combined, and how many of each are needed to make one batch.

MANUFACTURING RESOURCE PLANNING (MRP II) An advanced version of MRP that ties together all parts of the organization into the company's production activities.

QUALITY CONTROL The management of the production process so as to manufacture goods or supply services that meet specific quality standards.

QUALITY A product's fitness for use in terms of offering the features that consumers want.

LABOUR PRODUCTIVITY Partial productivity ratio calculated by dividing gross domestic product by total number of workers.

The focus on labour, rather than on other resources (such as capital or energy), is popular because most countries keep records on employment and hours worked.

Productivity among Global Competitors Productivity levels vary widely from country to country. A 2008 study of the productivity of 35 countries, which was carried out by the Organisation for Economic Co-operation and Development (OECD), showed that productivity was highest in Luxembourg and lowest in Chile (see Figure 10.6). Canada ranked fifteenth.[14]

Back in 1960, Canada ranked third among the 20 countries that were then part of the OECD, but Canada now ranks only seventeenth among the 30 countries that are currently part of the OECD. Since the late 1980s, all but two OECD countries have had better productivity records than Canada. During 2000–2010, Canadian productivity grew at an annual rate of 1 percent, while the U.S. achieved a 2.5 percent growth rate.[15]

These trends are a big concern because without strong productivity growth rates, the standard of living of Canadians will fall. Michael Porter, a Harvard University expert on international competitiveness, says that Canada has historically lived off its rich diet of natural resources, but in the future it will have to put more emphasis on innovation if it hopes to be successful in international markets.[16]

Domestic Productivity Nations must pay attention to their domestic productivity regardless of their global standing. A country that improves its ability to make something out of its existing resources can increase the wealth of all its inhabitants. Conversely, a decline in productivity shrinks a nation's total wealth. Additional wealth from higher productivity can be shared among workers (as higher wages), investors (as higher profits), and customers (as stable prices). When productivity drops, however, wages can be increased only by reducing profits (penalizing investors) or by increasing prices (penalizing customers).

Manufacturing versus Service Productivity Manufacturing productivity is higher than service productivity. For many years, it was widely believed that the service sector suffered from "Baumol's Disease," named after economist William Baumol. He argued that since the service sector focused more on hands-on activity that machines couldn't replace, it would be more difficult to increase productivity in services. Baumol noted, for example, that it would always require four musicians to play a Mozart quartet. But the Opera Company of Brooklyn is challenging that notion. It now puts on the opera *The Marriage of Figaro* with only 12 musicians and a technician who oversees a computer program that plays all the other parts. The orchestra's productivity has increased sharply because it does not have to pay for the usual complement of musicians.[17]

Industry Productivity Industries differ in terms of their productivity. Agriculture is more productive in Canada than in many other nations because we use more sophisticated technology. In an effort to increase productivity, Canfor Corporation developed a system called Genus, which it is using to manage its forestry operations. Genus, a computerized database containing geographic information and other essential data about Canfor's vast lumber and pulp operations in British Columbia and Alberta, will be used as a strategic planning tool to determine how the company should adjust its logging plans to reflect market demand.[18]

Company Productivity High productivity gives a company a competitive edge because its costs are lower. As a result, it can offer its product at a lower price (and gain more customers), or it can make a greater profit on each item sold. The productivity of individual companies is therefore important to investors, workers, and managers.

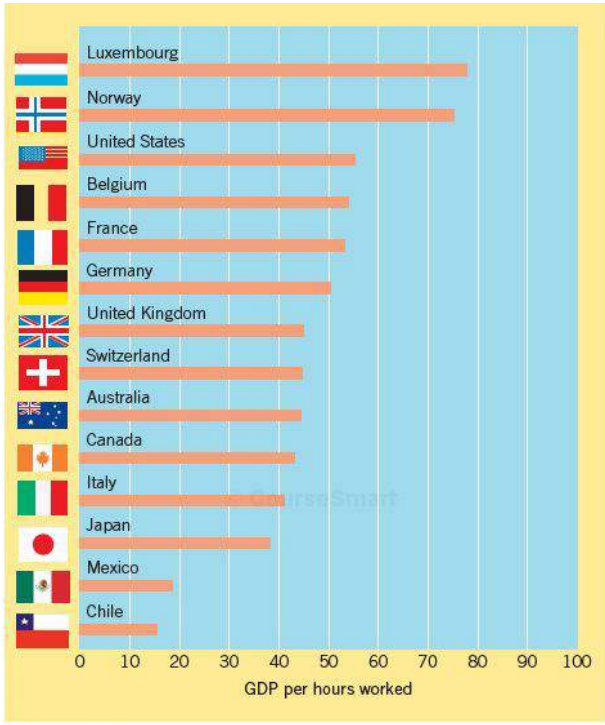


Figure 10.6
International productivity comparisons, 2008 (selected countries).

Meeting the Quality Challenge

Business has not always recognized the importance of quality. In the decades after the Second World War, American business consultant W. Edwards Deming tried to persuade U.S. firms that they needed to improve quality at least as much as quantity. Like many a prophet, he was not honoured in his homeland. But his arguments won the Japanese over. Through years of meticulous hard work, Japan's manufacturers have changed "Made in Japan" from a synonym for cheap, shoddy merchandise into a hallmark of reliability. Eventually, North American businesses came to understand that Deming was right.

Quality advocates such as Joseph Juran and Kaoru Ishikawa introduced methods and tools for implementing quality. Ishikawa, for example, developed "fishbone diagrams," also known as "cause-and-effect diagrams" or "Ishikawa diagrams," that help employees figure out the causes of quality problems in their work areas. The diagram in Figure 10.7, for instance, was designed to help an airport manager find out why the facility had so many delayed departures. Focusing on five major categories of possible causes, the manager then noted several potential causes of the problem in each. (It turns out that there weren't enough tow trucks to handle baggage transfers.)[19]

LO-6 Managing for Quality

Total quality management (TQM) includes all of the activities necessary for getting high-quality goods and services into the marketplace. TQM emphasizes that no defects are tolerable, and that employees are responsible for maintaining quality standards. For example, at Toyota's Cambridge, Ontario, plant workers can push a button or pull a rope to stop the production line when something is not up to standard.[20]

TOTAL QUALITY MANAGEMENT (TQM) A concept that emphasizes that no defects are tolerable and that all employees are responsible for maintaining quality standards.

A customer focus is the starting point for TQM. It includes using methods for determining what customers want, and then making sure that all the company's activities and people are focused on fulfilling those needs. Total participation is critical; if all employees are not working toward improved quality, the firm is wasting potential contributions from its human resources, and is missing a chance to become a stronger competitor in the marketplace. TQM in today's competitive markets demands unending and continuous improvement of products, after-sales services, and all of the company's internal processes, such as accounting, delivery, billing, and information flow.

Consider the example of Standard Aero in Winnipeg, which is in the business of aircraft overhaul. When the company instituted TQM, the process began with the formation of a "change council" consisting of the CEO and five senior managers. Next, a nine-person task force was formed that consisted of employees who had done the full range of jobs on one of Standard's major overhaul contracts. The task force's first job was to find out what the customer wanted. It did this by designing a

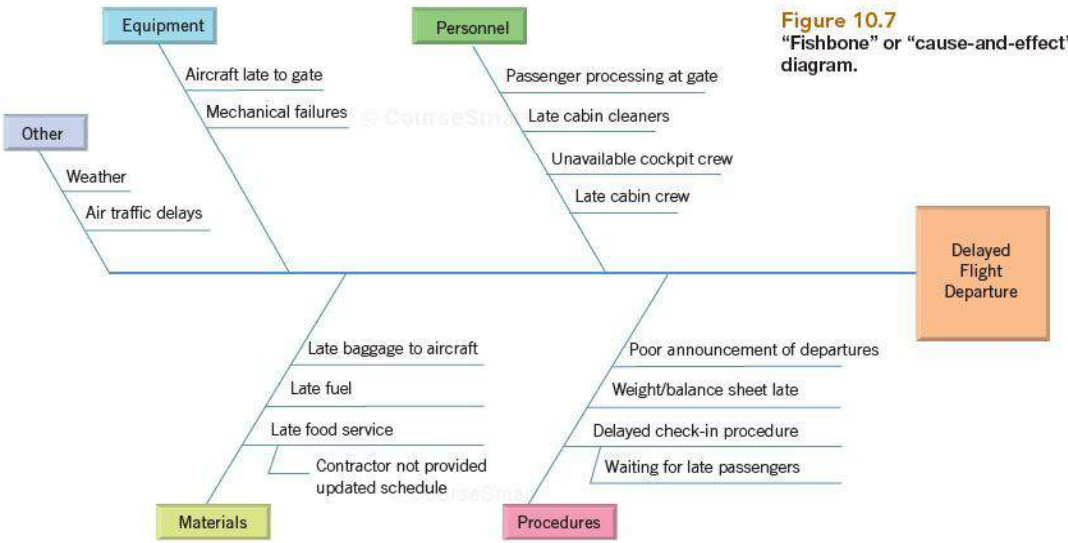


Figure 10.7
"Fishbone" or "cause-and-effect" diagram.

PERFORMANCE QUALITY The overall degree of quality; how well the features of a product meet consumers' needs and how well the product performs.

QUALITY RELIABILITY The consistency of quality from unit to unit of a product.

QUALITY OWNERSHIP The concept that quality belongs to each employee who creates or destroys it in producing a good or service; the idea that all workers must take responsibility for producing a quality product.

questionnaire and visiting customer plants around the world to gather information. It also worked within Standard Aero to determine exactly how the company did its aircraft overhaul work. After weeks of analysis, the task force was able to reduce the time required for overhaul work significantly. For example, the number of times a certain gearbox was handled as it moved through the repair process was reduced by 84 percent.[21]

Planning for Quality Planning for quality should begin before products are designed or redesigned. Managers need to set goals for both quality levels and quality reliability in the beginning. **Performance quality** refers to the features of a product and how well it performs. For example, Maytag gets a price premium because its washers and dryers offer a high level of performance quality. Customers perceive Maytag products as having more advanced features and being more durable than other brands.

Performance quality may or may not be related to quality reliability in a product. **Quality reliability** refers to the consistency or repeatability of performance. At Courtyard by Marriott hotels, for example, consistency is achieved by maintaining the same features at all of Marriott's nearly 700 locations (high-speed internet access, meeting space, access to food and swimming pool, and 24-hour access to food).

Organizing for Quality Having a separate "quality control" department is no longer enough. Everyone from the chair of the board to the part-time clerk—purchasers, engineers, janitors, marketers, machinists, and other personnel—must work to assure quality. At Germany's Messerschmitt-Boelkow-Blohm aerospace company, for example, all employees are responsible for inspecting their own work. The overall goal is to minimize eventual problems by making the product correctly from the beginning.

Leading for Quality Too often, firms fail to take the initiative to make quality happen. Leading for quality means that managers must inspire and motivate employees throughout the company to achieve quality goals. They need to help employees see how they affect quality and how quality affects their jobs and their company. If managers succeed, employees will ultimately accept **quality ownership**—the idea that quality belongs to each person who creates or destroys it while performing a job.

Quality control means taking action to ensure that operations produce products that meet specific quality standards.

Controlling for Quality By monitoring its products and services, a company can detect mistakes and make corrections. To do so, however, managers must first establish specific quality standards and measurements. In a bank, for example, supervisors periodically evaluate transactions against a checklist. Specific aspects of each teller's work—appearance, courtesy, efficiency, and so on—are recorded. The results, reviewed with employees, either confirm proper performance or indicate changes that are needed to bring performance up to standards.

When safety and quality procedures are not regularly monitored, human and environmental disasters may result. In 2010, for example, an oil-drilling rig in the Gulf of Mexico that was leased by BP exploded and killed 11 workers. Millions of litres of oil escaped into the ocean, creating an environmental catastrophe. A *Wall Street Journal* investigation found that several quality and safety checks had not been carried out at the rig, partly because the drilling was behind schedule.[22]

Tools for Quality Assurance

In managing for quality, companies rely on assistance from proven tools. Often, ideas for improving both the

product and the production process come from **competitive product analysis**. For example, Toshiba will take apart a Xerox photocopier and test each component to see how it compares with Toshiba's competing product. It can then decide which Toshiba product features are satisfactory, which product features need to be upgraded, and whether Toshiba's production processes need improvement.

There are many specific tools that can be used to achieve the desired level of quality: *value-added analysis, statistical process control, quality/cost studies, quality improvement teams, benchmarking, getting closer to the customer, ISO 9000:2000 and ISO 14000, re-engineering,* and *adding value through supply chains*.

Value-Added Analysis **Value-added analysis** means evaluating all work activities, material flows, and paperwork to determine the value that they add for customers. Value-added analysis often reveals wasteful or unnecessary activities that can be eliminated without harming customer service. For example, when Hewlett-Packard reduced its customer contracts from 20 pages to as few as 2, computer sales rose by more than 18 percent.

Statistical Process Control Companies can improve uniformity in their outputs by understanding the sources of variation. **Statistical process control (SPC)** methods—especially process variation studies and control charts—allow managers to analyze variations in production data.

Process Variation While some amount of **process variation** is acceptable, too much can result in poor quality and excessive operating costs. Consider the box-filling operation for Honey Nuggets cereal. Each automated machine fills two 400-gram boxes per second. Even under proper conditions, slight variations in cereal weight from box to box are normal. Equipment and tools wear out, the cereal may be overly moist, and machinists make occasional adjustments. But how much variation is occurring? How much is acceptable?

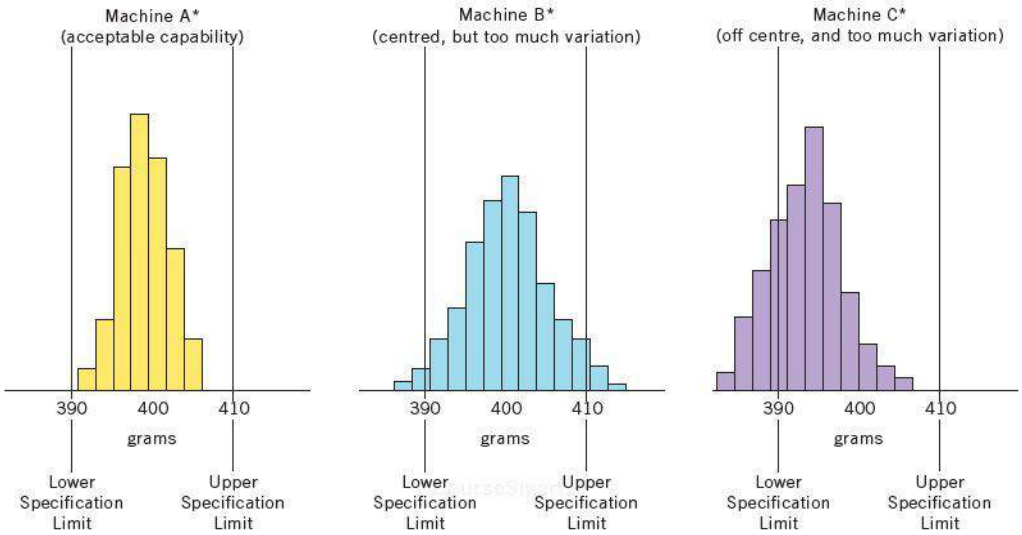
Information about variation in a process can be obtained from a *process capability study.* Boxes are taken from the filling machines and weighed. The results are plotted, as in Figure 10.8, and compared with the upper and lower *specification limits* (quality limits) for weight. These limits define good and bad quality

COMPETITIVE PRODUCT ANALYSIS Process by which a company analyzes a competitor's products to identify desirable improvements.

VALUE-ADDED ANALYSIS The evaluation of all work activities, material flows, and paperwork to determine the value they add for customers.

STATISTICAL PROCESS CONTROL (SPC) Statistical analysis techniques that allow managers to analyze variations in production data and to detect when adjustments are needed to create products with high-quality reliability.

PROCESS VARIATION Any change in employees, materials, work methods, or equipment that affects output quality.



*Distribution of weights for 500 boxes from each machine

Figure 10.8
Process variation in box filling for Honey Nuggets cereal.

CONTROL CHART A statistical process control method in which results of test sampling of a product are plotted on a diagram that reveals when the process is beginning to depart from normal operating conditions.

QUALITY/COST STUDIES A method of improving product quality by assessing a firm's current quality-related costs and identifying areas with the greatest cost-saving potential.

INTERNAL FAILURES Expenses incurred during production and before bad product leaves the plant.

EXTERNAL FAILURES Allowing defective products to leave the factory and get into consumers' hands.

BENCHMARKING Comparing the quality of the firm's output with the quality of the output of the industry's leaders.

for box filling. Boxes with more than 410 grams are a wasteful "giveaway." Underfilling has a cost because it is unlawful.

In Figure 10.8, we see that none of Machine A's output violates the quality limits, and it is fully capable of meeting the company's quality standards. But Machines B and C have problems and cannot reliably meet Honey Nuggets' quality standards. The company must take special—and costly—actions to sort the good from the bad boxes before releasing the cereal for shipment.

Control charts Knowing that a process is capable of meeting quality standards is not enough. Managers must still monitor the process to prevent its going astray during production. To detect the beginning of bad conditions, managers can check production periodically and plot the results on a **control chart**. For example, several times a day, a machine operator at Honey Nuggets might weigh several boxes of cereal together to ascertain the average weight.

Quality/Cost Studies for Quality Improvement

Statistical process controls help keep operations up to existing capabilities. But in today's competitive environment, firms must consistently *raise* quality capabilities. Managers thus face the challenge of identifying the improvements that offer the greatest promise. **Quality/cost studies** are helpful to managers because they not only identify a firm's current costs but also reveal areas with the largest cost-saving potential.[23]

For example, Honey Nuggets must determine its costs for **internal failures**. These are expenses—including the costs of overfilling boxes and the costs of sorting out bad boxes—incurred during production and before bad product leaves the plant. Despite quality control procedures, however, some bad boxes may get out of the factory, reach the customer, and generate complaints from grocers and customers. These are **external failures** that occur outside the factory. The costs of correcting them—refunds to customers, transportation costs to return bad boxes to the factory, possible lawsuits, factory recalls—should also be tabulated in the quality/cost study.

Quality Improvement Teams

Quality improvement (QI) teams are groups of employees from various work areas who meet regularly to define, analyze, and solve common production problems. Their goal is to improve both their own work methods and the products they make.[24] Many QI teams organize their own work, select leaders, and address problems in the workplace. Motorola, for example, sponsors company-wide team competitions to emphasize the value of the team approach, to recognize outstanding team performance, and to reaffirm the team's role in the company's continuous-improvement culture. Teams get higher marks for dealing with projects closely tied to Motorola's key initiatives.[25]

Benchmarking

With **benchmarking**, a company compares its current performance against its own past performance (internal benchmarking), or against the performance of its competitors (external benchmarking). As an example of the former, the percentage of customer phone calls last month requiring more than two minutes of response time may be compared to the required response time the month before that. As an example of the latter, Toronto Hospital gathered performance data on 26 indicators from various Canadian hospitals so it could determine how well it was performing compared to other organizations in the health-care industry.[26]

Getting Closer to the Customer

Says one advocate of quality improvement, "Customers are an economic asset. They're not on the balance sheet, but they should be." Struggling companies have often lost sight of customers as the driving force behind all business activity. Such companies may design products that customers do not want, ignore customer reactions to existing products, or fail to keep up with changing tastes. Meanwhile, successful businesses take steps to know what their customers want in the products they consume.

Caterpillar Financial Services won a Malcolm Baldrige National Quality Award—the prestigious award for excellence in quality—for high ratings by its customers (dealers and buyers of Caterpillar equipment). Buying and financing equipment from Caterpillar Financial became easier as it moved its services increasingly online. Customers now have 24/7 access to information on how much they owe on equipment, and they can make payments around the clock. In the past, the 60 000 customers had to phone a representative,

who was often unavailable, for these services, resulting in delays and wasted time. The improved online system is testimony to Caterpillar Financial's dedication in knowing what customers want and then providing it.[27]

At Greyhound Lines of Canada, the marketing and operations vice-president wanted to drive home the point to managers that clean restrooms are important to customers. He warned regional managers that he would visit bus depots on one hour's notice to see if the restrooms were clean enough to eat dinner in. Within weeks, photos of regional managers having dinner in spotless restrooms began pouring in to the vice-president's office.[28]

ISO 9000:2000 and ISO 14000 DuPont had a problem: A moulding press used to make plastic connectors for computers had a 30-percent defect rate. Efforts to solve the problem went nowhere until, as part of a plant-wide quality program, press operators were asked to submit detailed written reports describing how they did their jobs. After comparing notes, operators realized that they were incorrectly measuring the temperature of the moulding press; as a result, temperature adjustments were often wrong. With the mystery solved, the defect rate dropped to 8 percent.

The quality program that led to this solution is called *ISO 9000*—a certification program attesting to the fact that a factory, a laboratory, or an office has met the rigorous quality management requirements set by the International Organization for Standardization. ISO 9000 (pronounced *ICE-o nine thousand)* originated in Europe as an attempt to standardize materials received from suppliers in such high-tech industries as electronics, chemicals, and aviation. Today, more than 160 countries have adopted ISO 9000 as a national standard, and more than 400 000 certificates have been issued.[29]

The latest version, *ISO 9000:2000,* indicates that it was revised in 2000. Revised standards allow firms to show that they follow documented procedures for testing products, training workers, keeping records, and fixing defects. To become certified, companies must document the procedures followed by workers during every stage of production. The purpose is to ensure that a manufacturer's product is exactly the same today as it was yesterday and as it will be tomorrow. Ideally, standardized processes would ensure that goods are produced at the same level of quality even if all employees were replaced by a new set of workers.

The **ISO 14000** program certifies improvements in *environmental* performance. Extending the ISO approach into the arena of environmental protection and hazardous waste management, ISO 14000 requires a firm to develop an *environmental management system (EMS),* which is a plan documenting how the company has acted to improve its performance in using resources (such as raw materials) and in managing pollution. A company must not only identify hazardous wastes that it expects to create, but it must also stipulate plans for treatment and disposal. ISO 14000 covers practices in environmental labelling—the use of such terms as *energy efficient* and *recyclable*—and assesses the total environmental impact of the firm's products, not just from manufacturing but also from use and disposal.

ISO 14000
Certification program attesting to the fact that a factory, laboratory, or office has improved environmental performance.

BUSINESS PROCESS RE-ENGINEERING
Redesigning of business processes to improve performance, quality, and productivity.

SUPPLY CHAIN (VALUE CHAIN) Flow of information, materials, and services that starts with raw materials suppliers and continues through other stages in the operations process until the product reaches the end customer.

Business Process Re-engineering **Business process re-engineering** focuses on improving business processes by rethinking each of its steps, starting from scratch. *Re-engineering* is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements as measured by cost, quality, service, and speed.[30] The example given above of Caterpillar's changeover to an online system for customers is illustrative. Caterpillar reengineered the whole payments and financing process by improving equipment, retraining employees, and connecting customers to its databases. As the example illustrates, redesign is guided by a desire to improve operations and thereby provide higher-value services for the customer.

Adding Value through Supply Chains Managers sometimes forget that a company belongs to a network of firms that must coordinate their activities. As each firm performs its transformation processes, it relies on others in the network. A **supply chain** (or **value chain**) for any product is the flow of information, materials, and services that starts with raw-materials suppliers and continues adding value through other stages in the network of firms until the product reaches the end customer.[31]

Figure 10.9 shows the supply chain activities involved in supplying baked goods to consumers. Each stage adds value for the final customer. The chain begins with raw materials (grain harvested from the farm). It also includes additional storage and transportation activities, factory operations for baking and wrapping, and

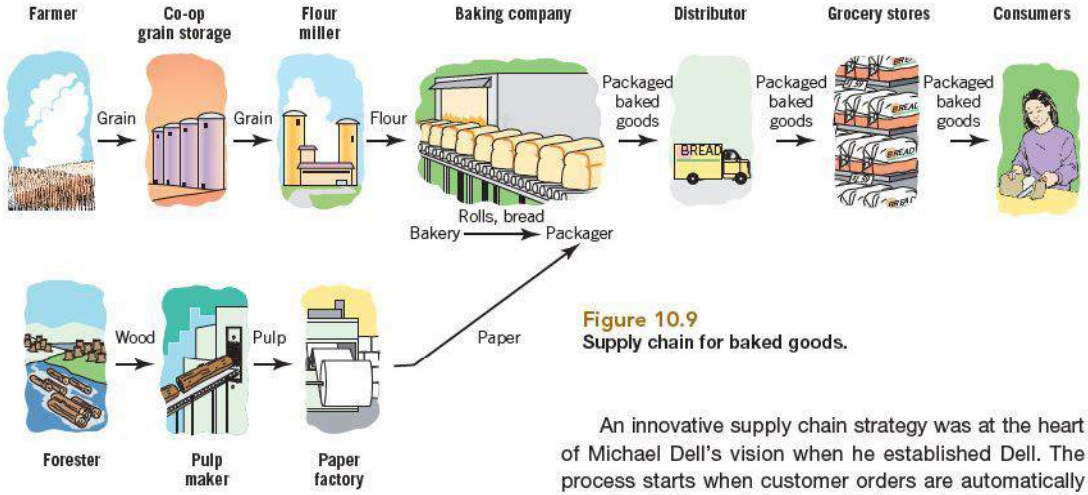


Figure 10.9
Supply chain for baked goods.

SUPPLY CHAIN MANAGEMENT (SCM) Principle of looking at the chain as a whole to improve the overall flow through the system.

distribution to retailers. Each stage depends on the others for success in getting fresh-baked goods to consumers.

LO-7 **Supply chain management (SCM)** tries to improve the overall flow through a system composed of companies working together. Because customers ultimately get better value, SCM gains competitive advantage for each supply-chain member.[32] A traditionally managed bakery, for example, would focus simply on getting production inputs from flour millers and paper suppliers and supplying baked goods to distributors. Unfortunately, this approach limits the chain's performance and doesn't allow for possible improvements when activities are more carefully coordinated. Supply chain management can improve performance and, as a result, provide higher quality at lower prices.

An innovative supply chain strategy was at the heart of Michael Dell's vision when he established Dell. The process starts when customer orders are automatically translated into updated production schedules in the factory. These schedules are used not only by operations managers at Dell but also by such parts suppliers as Sony, which adjust its own production and shipping activities to better meet Dell's production needs. In turn, parts suppliers' updated schedules are transmitted to their materials suppliers, and so on up the chain. As Dell's requirements change, suppliers up and down the chain synchronize their schedules to produce only the right materials and parts. As a result, Dell's prices are low and turnaround time for shipping PCs to customers is reduced to a matter of hours instead of days.

Fashion house Louis Vuitton, which produces upscale products like its Reade totebag, used to focus mainly on product image and product design. When an item became a hot seller, retailers often ran out of product because the company's production system and supply chain was not responsive to increased consumer demand. Vuitton has therefore revamped its systems in order to ensure that retailers always have a supply of in-demand Vuitton products on their shelves. Other luxury-goods manufacturers like Armani, Gucci, and Versace are also doing the same thing.[33]

Summary of Learning Objectives

1. **Explain the meaning of the term *production* (or *operations*) and describe the four kinds of *utility* it provides.** *Production* (or *operations*) refers to the processes and activities for transforming resources into finished services and goods for customers. Production creates *time utility* (products are available when customers want them), *place utility* (products are available where they are convenient for customers), *ownership utility* (customers benefit from possessing and using the product), and *form utility* (products are in a form that is useful to the customer).
2. **Identify the characteristics that distinguish *service operations* from *goods production* and explain the main differences in the *service focus*.** In service production, raw materials are not things but rather people, so services are performed, while goods are produced. Also, services are largely *intangible*, more likely than physical goods to be *customized* to meet the purchaser's needs, and more *unstorable* than most products. Because services are intangible, for instance, providers work to ensure that customers receive value in the form of pleasure, satisfaction, or a feeling of safety. Service providers also focus on the *customer-service link,* often acknowledging the customer as part of the operations process.
3. **Describe two types of *operations processes.*** In manufacturing, *analytic* processes break down resources into component parts and *synthetic* processes combine raw materials to produce a finished product. Services use either *high-contact* processes (the customer is in the system while the service is being performed) or *low-contact* processes (the customer is not in the system while the service is being performed).
4. **Describe the factors involved in *operations planning* and *operations control.*** *Operations planning* involves *forecasting* (determining future demand for products), *capacity planning* (calculating how much of a product can be produced), *location planning* (analyzing proposed facility sites), *layout planning* (designing a facility to enhance production efficiency), *quality planning* (ensuring that products meet a firm's quality standards), and *methods planning* (identifying specific production steps and methods for performing them). *Operations control* requires production managers to monitor production performance (by comparing results with detailed plans and schedules) and then to take corrective action as needed. *Materials management* involves the planning, organizing, and controlling of the flow of materials. There are several tools for helping managers control operations processes, including *worker training* programs, *just-in-time (JIT) production systems, material requirements planning (MRP),* and *quality control.*
5. **Explain the connection between *productivity* and *quality*.** *Productivity* is a measure of economic performance; it compares how much is produced with the resources used to produce it. *Quality* is a product's fitness for use. However, an emphasis solely on productivity or solely on quality is not enough. Profitable competition in today's business world demands high levels of both productivity and quality.
6. **Understand the concept of *total quality management* and describe nine tools that companies can use to achieve it.** *Total quality management (TQM)* includes all the activities that are necessary for getting high-quality goods and services into the marketplace. Tools that are available to managers include *value-added analysis, statistical process control methods, quality/cost studies, quality improvement teams benchmarking, getting closer to the customer, ISO 9000:2000, re-engineering, and supply chain management.*
7. **Explain how a *supply chain strategy* differs from traditional strategies for coordinating operations among businesses.** The *supply chain strategy* is based on the idea that members of the supply chain can gain competitive advantage by working together as a coordinated system of units. Sharing information allows companies to reduce inventories, improve quality, and speed the delivery of products to consumers.

Questions and Exercises

Questions for Analysis

1. What are the resources needed and the finished "products" that are produced in the following services: real estate firm, child care facility, bank, city water and electric department, and hotel?
2. Find examples of a synthetic production process and an analytic process. Then classify each according to whether it is chemical, fabrication, assembly, transport, or clerical. Explain your reasoning.

3. Pick three products (not services) that you regularly use. Then do some research to determine which of the basic production processes are used to produce these products (chemical, fabrication, assembly, transport, or clerical processes). To what extent are multiple processes used in the production of the product?
4. Pick three services (not goods) that you regularly use. Explain what customization, unstorability, and intangibility mean for each of the services. How do these factors influence the way the service is delivered to customers?
5. Develop a service flow analysis for some service that you use frequently, such as buying lunch at a cafeteria, having your hair cut, or riding a bus. Identify areas of potential quality or productivity failures in the process.
6. Historically, high productivity in the service sector has been difficult to achieve. Why was this so? What might be changing in this area that will cause service productivity to increase during the next decade?

Application Exercises

7. Develop a list of internal customers and internal suppliers for the organization where you work. Identify areas of potential quality improvement in these internal customer–supplier relationships.
8. Choose a consumer item and trace its supply chain. Identify at least four upstream stages in the chain. Can you make recommendations that would improve the supply chain?
9. Interview the owner of a local service business, such as a laundry or dry-cleaning shop. Identify the major decisions that were necessary in planning its service operations.
10. Think of an everyday activity—either personal or professional—that you would like to do more efficiently. Describe how you would use methods planning to achieve increased efficiency in that activity. Draw a process flowchart that shows the stages in the activity you chose, and then explain how you would use it.

TEAM EXERCISES

Building Your Business Skills

Making Your Benchmark in the World

Goal

To encourage students to understand ways in which benchmarking can improve quality and productivity.

Situation

As the director of maintenance for a regional airline, you are disturbed to learn that the cost of maintaining your 20-plane fleet is skyrocketing. A major factor is repair time; when maintenance or repairs are required, work often proceeds slowly. As a result, additional aircraft are required to meet the schedule. To address the problem, you decide to use a powerful total quality management tool called benchmarking. You will approach your problem by studying ways in which other companies have successfully managed similar problems. Your goal is to apply the best practices to your own maintenance and repair operation.

Method

Step 1 Working with three or four other students, choose your benchmarking target from among the following choices:

- The maintenance and repair operations of a competing airline
- The pit crew operations of a race car team
- The maintenance and repair operations of a national trucking company

Write a memo explaining the reasons for your choice.

Step 2 Write a list of benchmarking questions that will help you learn the best practices of your targeted company. Your goal is to ask questions that will help you improve your own operation. These questions will be asked during on-site visits.

Step 3 As part of a benchmarking project, you will be dealing with your counterparts in other companies. You have a responsibility to prepare for these encounters, and you must remember that what you learn during the exchange process is privileged information. Given these requirements, describe the steps you would take before your first on-site visit and outline your benchmarking code of ethics.

Follow-Up Questions

1. Why is benchmarking an important method for improving quality?
2. Why did you make your benchmarking choice? Explain why the company you selected holds more promise than other companies in helping you to solve your internal maintenance problems.
3. What kind of information would help you to improve the efficiency of your operations? Are you interested in management information, technical information, or both?
4. In an age of heightened competition, why do you think companies are willing to benchmark with each other?

Exercising Your Ethics

Calculating the Cost of Conscience

The Situation

Product quality and cost affect every firm's reputation and profitability, as well as the satisfaction of customers. This exercise will expose you to some ethical considerations that pertain to certain cost and service decisions that must be made by operations managers.

The Dilemma

As director of quality for a major appliance manufacturer, Ruth was reporting to the executive committee on the results of a program for correcting problems with a newly redesigned compressor that the company had recently begun putting in its refrigerators. Following several customer complaints, the quality lab had determined that some of the new compressor units ran more loudly than expected. One corrective option was simply waiting until customers complained and responding to each complaint if and when it occurred. Ruth, however, decided that this approach was inconsistent with the company's policy of being the high-quality leader in the industry. Insisting on a proactive, "pro-quality" approach, Ruth initiated a program for contacting all customers who had purchased refrigerators containing the new compressor.

Unfortunately, her "quality-and-customers-first" policy was expensive. Service representatives across Canada had to phone every customer, make appointments for home visits, and replace original compressors with a newer model. Because replacement time was only 30 minutes, customers were hardly inconvenienced, and food stayed refrigerated without interruption. Customer response to the replacement program was overwhelmingly favourable.

Near the end of Ruth's report, an executive vice-president was overheard to comment, "Ruth's program has cost this company $400 million in service expenses." Two weeks later, Ruth was fired.

Team Activity

Assemble a group of four students and assign each group member to one of the following roles:

- Ruth
- Ruth's boss
- A customer
- A company investor

Action Steps

1. Before hearing any of your group's comments on this situation, and from the perspective of your assigned role, take a moment to consider whether Ruth's firing is consistent with the company's desire for industry leadership in quality. Write down the reasons for your position.
2. Before hearing any of your group's comments on this situation, and from the perspective of your assigned role, consider what underlying ethical issues, if any, exist in this situation. Write down the issues.
3. Gather your group together and reveal, in turn, each member's comments on Ruth's firing. Next, reveal the ethical issues listed by each member.
4. Appoint someone to record the main points of agreement and disagreement within the group. How

do you explain the results? What accounts for any disagreement?

5. From an ethical standpoint, what does your group conclude is the most appropriate action that should have been taken by the company in this situation?
6. Develop a group response to the following question: What are the respective roles of profits, obligations to customers, and employee considerations for the firm in this situation?

BUSINESS CASE 10

Quality Problems in Service Businesses

In September 2006, the U.S. Federal Aviation Administration (FAA) gave airlines until March 2008 to inspect a certain bundle of wires located near the main landing gear in all MD-80 airliners, and, if improperly secured, to repair the bundle. Eighteen months later, some 250 000 travellers found themselves stranded as American Airlines grounded its fleet of MD-80s and cancelled nearly 3300 flights in a hurried effort to comply with the FAA directive.

How could the United States' largest carrier make such a costly and seemingly avoidable mistake? Shortly before the deadline to repair the wiring, the FAA was embarrassed by revelations that another carrier, Southwest Airlines, had violated federal regulations by flying planes that had missed their scheduled inspections. Suddenly, the FAA found itself under fire from the U.S. Congress for failing to keep closer tabs on airlines. It is not surprising, then, that the FAA became extra vigilant in inspecting the MD-80s—more vigilant, it seems, than carriers such as American had come to expect.

None of this may be much consolation to frustrated travellers. According to Bren Bowen, co-author of the 2008 Airline Quality Rating (AQR), 2007 "was the worst year ever for the U.S. airlines." The AQR measures such performance indicators as the percentage of flights arriving on time, the amount of mishandled baggage, and the number of complaints ranging from high fares to misleading advertising to discriminatory practices. Such a varied list of concerns is a reminder that the fundamental service an airline provides—getting people from point A to point B—is only the beginning of operational performance and quality. As the American Airlines incident illustrates, however, even this fundamental service is impossible to provide without a strong emphasis on quality practices.

In Canada, a different part of the travel industry is under scrutiny: travel companies and booking agents. When Conquest Vacations suddenly ceased operations in April 2009, many travellers were stranded in hotels in Mexico, the Dominican Republic, and Cuba. Many of these Canadians were told by hotel officials that they had to pay for their room after Conquest folded because their bill had not been paid by the travel company.

The Ontario government established the Travel Industry Council of Ontario (TICO) to ensure that (a) fair business practices and ethical behaviour are adhered to, and (b) Canadian travellers are not scammed or taken advantage of. But Conquest's sudden shutdown meant that TICO was not given proper notice and therefore could not provide sufficient information to travellers. The outcome has left many critics questioning the usefulness of the travel council. There is now concern about the travel industry in general, and many people are asking if there are going to be additional travel businesses that suddenly cease operations.

These problems have arisen at a time when the travel business is hurting because of the recession. Intense competition has driven down vacation prices and consumers are looking for the lowest all-inclusive deals. In an effort to remain competitive, tour companies are laying off

staff and reducing their prices to below cost. Transat A.T. Inc. cut 53 administrative jobs at their Montreal, Toronto, and Vancouver office locations, while U.S. airline subsidiary Air Transat cut about 30 administrative positions. Analyst David Newman of National Bank Financial indicated that the restructuring efforts will eliminate duplicate functions, merge divisions, and centralize administrative and support operations in a bid to "flatten the management structure."

Travel companies have assured consumers that the changes they are making will strengthen their service offering, but many customers are feeling uncertain about the level of service quality they can expect.

Customer complaints about poor service quality are obviously not limited to the travel business. To observe consumer unhappiness in action, go to Complaints.com, a forum for people who have had bad consumer experiences. Enter "missed appointment" or "late repairman" in the search engine and you will get pages of hits. Typical is this complaint about a failed window installation: "I then made an appointment for [an] employee to come to my house the next day between 2 p.m. and 4 p.m. . . . I took a day off from work and stayed home to wait for the [company] truck. Four p.m. came and went. No one from [the company] showed up or called."

ConsumerAffairs.com, an advocacy group for customers who have received poor service or purchased shoddy merchandise, also details numerous incidents in which people were left waiting helplessly for repair people who were late for scheduled appointments. Part of the problem is that the company that manufactures a product may not be the same company that provides service for that product. This is often the case with mass-produced products purchased in department stores or wholesale outlets. General Electric may make a refrigerator, but a GE repair person is not located in every town where that refrigerator is sold. Outside contractors must then be hired to perform repairs, and they may lack the specific expertise required to do the job in a timely manner.

It's not only products in need of installation or repair that can cause customers' frustrations over missed appointments. How many hours have you spent waiting in crowded doctors' offices, overbooked salons, and slow-service restaurants? In each case, even if the quality of the product or service turns out to be excellent, you may still feel dissatisfied with the overall quality of the experience. For service providers in particular, that is a failure that can be as costly as producing a defective product.

Questions for Discussion

1. What is the definition of "quality"? How do the incidents described above illustrate a lack of quality? What would constitute high quality? Explain.
2. Why do quality problems arise?
3. Consider the following statement: *"It is very difficult and expensive for companies to produce high-quality goods and services. But consumers want high-quality products at low prices, and they expect far too much from companies in terms of product quality, given the price they are willing to pay. Consumers should be more realistic in their expectations."* Do you agree or disagree with the statement? Explain your reasoning.