Operations and Supply Chain Management 3rd edition Collier Solutions Manual

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Solution and Answer Guide

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CHAPTER 1: OPERATIONS MANAGEMENT AND VALUE CHAINS

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REVIEW QUESTIONS

1. Explain the concept and importance of operations management.

   Solution
   Creating and delivering goods and services to customers depends on an effective system of linked facilities and processes, and the ability to manage them effectively around the world. Operations management (OM) is the science and art of ensuring that goods and services are created and delivered successfully to customers. OM includes the design of goods, services, and the processes that create them; the day-to-day management of those processes; and the continual improvement of these goods, services, and processes. Three issues are at the core of operations management: efficiency, cost, and quality.

2. Describe how operations management is used in work throughout business organizations.

   Solution
   Many people who are considered “operations managers” have titles such as chief operating officer, hotel or restaurant manager, vice president of manufacturing, customer service manager, plant manager, field service manager, or supply chain manager. The concepts and methods of OM can be used in any job, regardless of the functional area of business or industry, to better create value for internal customers (within the organization) and for external customers (outside the organization). OM principles are used in accounting, human resources management, legal work, financial activities, marketing, environmental management, and every type of service activity.

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3. What are Industry 4.0 and Service 4.0? Give an example in manufacturing and health care or other service industries.

Solution
Industry 4.0 is the information-intensive transformation of manufacturing in a connected environment of big data, people, processes, services, systems, and IoT-enabled industrial assets. In manufacturing, autonomous robots can quickly pick products at a warehouse to reduce costs and optimize floor space. Other manufacturing examples are 3D printing, computer-aided design software and three-dimensional displays of the part or product, and a multitude of welding, materials moving, and assembly robots tied to an automated or semi-automated control system. Smart appliances tied electronically to home comfort systems, automated truck routing and dispatching systems are other examples.

Service 4.0 is applying digitization to services that create higher productivity, innovation, and value chain advantages in service industries. Service 4.0 devices include cell phones, automated banking machines, CT and MRI scanners, electronic hotel keys and security systems, home security systems, surgical robots assistants, online banking, digital health care systems, electronic restaurant menus, and so on.

4. State three of the key activities that operations managers perform and briefly explain them.

Solution
Students should describe three of the following in their own words.

- Forecasting: Predict the future demand for raw materials, finished goods, and services.
- Supply chain management: manage the flow of materials, information, people, and money from suppliers to customers.
- Facility layout and design: determine the best configuration of machines, storage, offices, and departments to provide the highest levels of efficiency and customer satisfaction.
- Technology selection: use technology to improve productivity and respond faster to customers.
- Quality management: ensure that goods, services, and processes will meet customer expectations and requirements.
- Purchasing: coordinate the acquisition of materials, supplies, and services.
- Resource and capacity management: ensure that the right amount of resources (labor, equipment, materials, and information) is available when needed.
- Process design: select the right equipment, information, and work methods to produce high-quality goods and services efficiently.
- Job design: decide the best way to assign people to work tasks and job responsibilities.

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- Service encounter design: determine the best types of interactions between service providers and customers, and how to recover from service upsets.
- Scheduling: determine when resources such as employees and equipment should be assigned to work.
- Sustainability: decide the best way to manage the risks associated with products and operations to preserve resources for future generations.

5. Define a good and a service.

Solution
Companies design, produce, and deliver a wide variety of goods and services that consumers purchase. A *good* is a physical product that you can see, touch, or possibly consume. A *service* is any primary or complementary activity that does not directly produce a physical product. See the key terms below for the difference between durable and nondurable goods.

6. Explain how goods differ from services.

Solution
See Section 1-3:

- Goods are tangible, services are intangible.
- Customers participate in many service processes, activities, and transactions.
- Service demand is normally more difficult to predict than for goods due to weather, human behavior, etc.
- Services cannot be stored as inventory. Service capacity is the substitute for goods inventory.
- Services require service management skills whereas the production of physical goods requires only backroom skills (not front room, high customer contact skills).
- Service facilities are typically close to the customer. Convenience has value.
- Patents do not protect services.

7. Define the concept of value.

Solution
See Section 1-4. The underlying purpose of every organization is to provide value to its customers and stakeholders. The decision to purchase a good or service or a customer benefit package is based on an assessment by the customer of the perceived benefits in relation to its price. The customer's cumulative judgment of the perceived benefits leads to either satisfaction or dissatisfaction. One of the simplest functional forms of value is:

Value = Perceived benefits/Price (cost) to the customer

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8. How can an organization increase value to its customers?

Solution
See Section 1-4. To increase value, an organization must

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

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

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

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

9. Describe a customer benefit package.

Solution
"Bundling" goods, services, and digital content in a certain way to provide value to customers not only enhances what customers receive but can also differentiate the product from competitors. A customer benefit package consists of a primary good or service coupled with peripheral goods and/or services, and sometimes variants.

10. What is a peripheral good or service? Provide some examples.

Solution
Peripheral goods or services are those that are not essential to the primary good or service but enhance it. Examples: auto leasing package, designer checks, fast delivery service, airline baggage service and in-cabin food service, hotel exercise room, and so on.

11. Define "biztainment" and provide an example.

Solution
Biztainment is the practice of adding entertainment content to a bundle of goods and services in order to gain competitive advantage. Student will find examples everywhere.

- Manufacturing—old and new factory tours, showrooms, customer training and education courses, virtual tours, short films on how things are made, driving schools, history lessons on the design and development of a physical good
- Retail— on-line shopping with entertaining graphics (emoji), simulators, product demonstrations, climbing walls, music, games, contests, holiday decorations and walk-around characters, blogs, interactive store designs, aquariums, movie theaters, makeovers
- Restaurants—toys, themes, electronic menus, contests, games, characters, playgrounds, live music
- Agriculture—pick-your-own food, mazes, make-your-own wine, grape-stomping, petting zoos, farm tours

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- Lodging—kids' spas, health clubs, casinos, cable television, arcades, massage, free on-line games, arts and crafts classes, pools, family games, wildlife, miniature golf
- Telecommunications—text and video messaging with funny graphics (emoji), music and TV downloads, cool ring tones, designer phones, cell phone apps

12. Explain the difference between value chains and supply chains.

Solution
Many organizations use the terms "value chain" and "supply chain" interchangeably; however, a value chain is broader in scope than a supply chain and is easier to apply to service-providing organizations as well as to goods producing firms. A **value chain** is a network of facilities and processes that describes the flow of materials, finished goods, services, information, and financial transactions from suppliers, through the facilities and processes that create goods and services, and those that deliver them to the customer. Value chains involve all major functions in an organization. This includes not only operations but also purchasing, marketing and sales, human resource management, finance and accounting, information systems and technology, distribution, and service and support. A **supply chain** is the portion of the value chain that focuses primarily on the physical movement of goods and materials, and supporting flows of information and financial transactions through the supply, production, and distribution processes.

13. Define and explain the three major types of processes in business?

Solution
These are:

1. *Value-creation processes*, focused on producing or delivering an organization's primary goods or services that create value for customers, such as filling and shipping a customer's order, assembling a dishwasher, or providing a home mortgage.
2. *Support processes*, such as purchasing materials and supplies used in manufacturing, managing inventory, installation, health benefits, technology acquisition, day care on-site services, and research and development.
3. *General management processes*, including accounting and information systems, human resource management, and marketing.

14. What is a distribution center?

Solution
A distribution centers (DC) is a warehouse that acts as an intermediary between factories and customers, shipping directly to customers or to retail stores where products are made available to customers.

15. Contrast the three different frameworks for describing value chains.

Solution
1. An input-output framework: Inputs are transformed into value-added goods and services through processes that are supported by such resources as equipment and facilities, labor, money, and information.

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2. A pre- and post-production services framework: focuses on gaining customers (pre-) and keeping customers (post-).
3. A hierarchical supply chain perspective: A goods-producing supply chain generally consists of suppliers, manufacturers, distributors, retailers, and customers arranged in a hierarchical structure.

16. Define sustainability and explain its three dimensions.

Solution
Sustainability refers to an organization's ability to strategically address current business needs and successfully develop a long-term strategy that embraces opportunities and manages risk for all products, systems, supply chains, and processes to preserve resources for future generations.

Environmental Sustainability

- Waste management: Reduce waste and manage recycling efforts
- Energy optimization: Reduce consumption during peak energy demand times
- Transportation optimization: Design efficient vehicles and routes to save fuel
- Technology upgrades: Develop improvements to save energy and clean and reuse water in manufacturing processes
- Air quality: Reduce greenhouse gas emissions
- Sustainable product design: Design goods whose parts can be recycled or safely disposed of

Social Sustainability

- Product safety: Ensure consumer safety in using goods and services
- Workforce health and safety: Ensure a healthy and safe work environment
- Ethics and governance: Ensure compliance with legal and regulatory requirements and transparency in management decisions
- Community: Improve the quality of life through industry–community partnerships

Economic Sustainability

- Performance excellence: Build a high-performing organization with a capable leadership and workforce
- Financial management: Make sound financial plans to ensure long-term organizational survival
- Resource management: Acquire and manage all resources effectively and efficiently

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17. What percent of U.S. economy jobs are in the service sector?

Solution
According to Exhibit 1.13 all of goods producing (manufacturing, agriculture, forestry, fishing, hunting) are about 20% of U.S. jobs while the U.S. service sector represents 80% of all jobs. Does this surprise your students? Ask them, what are some service sector industries? Where does their family and friends work?

Service industries include transportation, local, state and federal governments; education, retail and wholesale trade, health care, professional services like consulting and engineering; childcare, legal services, amusement and recreational services, hotels and lodging, finance, insurance, and real estate, communications, public utilities, and many more. Facts on these industries may surprise the students. For example, membership organizations represent 2% of U.S. Jobs. There are over 33,000 PACs within 100 miles of Washington, DC, for example.

18. Describe the importance of data and business analytics in operations and supply chain management?

Solution
In OM, data are used to evaluate operations performance, quality, order accuracy, customer satisfaction, delivery, cost, environmental compliance, and many other areas of the business. Leveraging such data is fast becoming a necessity in creating competitive advantage.

Business analytics is a process of transforming data into actions through analysis and insights in the context of organizational decision making and problem solving. Business analytics is used to understand past and current performance (descriptive analytics), predict the future by detecting patterns and relationships in data (predictive analytics), and identify the best decisions (prescriptive analytics).

19. Summarize the historical development of OM.

Solution
Exhibit 1.11 offers a chronology of major themes that have changed the scope and direction of operations management over the last half-century.

20. Select one of the following challenges facing OM: customers, technology, workforce, globalization, sustainability, or optimizing supply chains, and explain its short- and long-term impact.

Solution
Sustainability, for example, requires both short- and long-term thinking and practices. Exhibit 1.13 lists sustainability practices such as waste management and workforce health and safety. Purchasing managers must evaluate suppliers on environmental, social and economic sustainability goals and daily practices. Regardless of what challenge a student may select, operations and logistic managers are responsible for many key strategic and tactical decisions concerning these six challenges.

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Discussion Questions and Experiental Activities

21. Describe a customer experience you have personally encountered where the good or service or both were unsatisfactory (e.g., defective product, errors, mistakes, poor service, service upsets, etc.). How might the organization have handled it better, and how could operations management have helped?

    Solution
    The objective of this type of question is for the student to describe what they know and you, the instructor; help put it into an OM context or framework. This question is also designed to help students internalize the concept of customer satisfaction and dissatisfaction, and potential operations management activities and decisions that can influence their experiences. For undergraduates, these experiences focus on what they know best such as restaurants, airlines, bookstores, automobile sales or repair, retail stores, and university processes. Graduate students may also include their work and business experiences, and personal experiences such as home mortgages, vacations, and childcare. As the instructor focus on the role of OM and its processes, training requirements, product and service quality, and tie to Chapter 1 ideas.

22. Search recent articles in your local newspaper and business magazines such as *Fortune, Business Week, Fast Company*, and so on and identify OM concepts and issues that are discussed. How do these fit into the classification in the box "What Do Operations Managers Do?" in this chapter?

    Solution
    The objective of this question is simply to show how OM ties to company success and begin to identify key OM topics and areas of study. Remember the students are in Chapter 1; some have no idea what OM is; others think it's all about manufacturing; and others think it has nothing to do with other functional areas or their career; so it's time to sell OM! OM applies to ALL functional areas and types of organizations!

23. Interview a manager at a local company about the work he or she performs. Identify (a) the aspects of the job that relate to OM (like the OM activities in the box on page 3, "What Do Operations Managers Do?") and (b) examples of value-creation, support, and general management processes.

    Solution
    Some of the key activities that operations managers perform include

    - **Forecasting:** Predict the future demand for raw materials, finished goods, and services.
    - **Supply Chain Management:** Manage the flow of materials, information, people, and money from suppliers to customers.
    - **Facility Layout and Design:** Determine the best configuration of machines, storage, offices, and departments to provide the highest levels of efficiency and customer satisfaction.
    - **Technology Selection:** Use technology to improve productivity and respond faster to customers.

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- **Quality Management:** Ensure that goods, services, and processes will meet customer expectations and requirements.
- **Purchasing:** Coordinate the acquisition of materials, supplies, and services.
- **Resource and Capacity Management:** Ensure that the right amount of resources (labor, equipment, materials, and information) is available when they are needed.
- **Process Design:** Select the right equipment, information, and work methods to produce high quality goods and services efficiently.
- **Job Design:** Decide the best way to assign people to work tasks and job responsibilities.
- **Service Encounter Design:** Determine the best types of interactions between service providers and customers, and how to recover from service upsets.
- **Scheduling:** Determine when resources such as employees and equipment should be assigned to work.
- **Sustainability:** Decide the best way to manage the risks associated with products and operations to preserve resources for future generations.

Try to help students identify *value-creation, support, and general management processes* in their example(s). The Human Resource Management functions, for example, are good situations to discuss support services. Primary processes, for example, are key manufacturing and engineering design activities. CFOs and CIOs, for example, are examples of general management processes that integrate and oversee things.

24. Research the digitalization of the value chain and provide one in-depth example. How does it add value?

Solution
One example is Nike's global supply chain and students will find other good examples. Nike has been digitizing its global supply chains for several decades. It makes and sells sports apparel and sneakers. The company invested heavily in data science technology acquiring Datalogue in 2021, as well as two predictive analytical tools (Zodiac in 2018 and Celect in 2019).

At the customers' end of the value chain Nike developed a number of digital apps (NIKE mobile app, NTC – Nike Training Club, NRC – Nike Run Club, etc.) to make it convenient to search and order items online with doorstep home delivery. Recently, Nike has entered the Metaverse with Nikeland, and is fast approaching ten customers using the site.

In other parts of their global supply chains, they tied factory production to smart forecasting, added dozens of global distribution centers, and launched a "sole train," a dedicated high-speed Los Angeles-to-Memphis train to transport items from west coast seaports to eastern United States markets. They improved order speed, inventory placement, and delivery scheduling that helped them triple their supply chain order processing capacity. All systems are integrated into a global supply chain system headquartered in Beaverton, Oregon.

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On the production side, Nike has introduced a wide range of technologies, including inserting radio frequency identification (RFID) tags into hundreds of millions of products to precisely track inventory, adding robots to distribution centers to speed delivery, and using machine learning and artificial intelligence to predict consumer trends. Nike is also introducing a new enterprise resource planning (ERP) tool to tie together all of these new capabilities. [https://www.supplychaindive.com/news/Nike-RFID-speed-inventory/557875/]

25. Research "digital twins" and provide two examples. How can the digital twin virtual world help goods or services in the real world? Explain.

Solution
General Electric makes extensive use of digital twins. They create an accurate virtual replica of physical objects, assets, and systems to boost productivity, streamline operations and increase profits. Digital twins are a key piece of the digital transformation puzzle. GE's jet engines are a prime example. Other examples are off-shore oil rigs, power generators, industrial pumps and compressors, locomotives, etc. According to GE digital twins allow for increased reliability and availability, reduced risk, lower maintenance costs, improved production, and fast time-to-value. [https://www.ge.com/digital/applications/digital-twin?utm_medium=Paid-Search&utm_source=Google&utm_campaign=HORZ-DigitalTwin-MoF-NA-Search&utm_content=%2Bdigital%20%2Btwin&gclid=CjwKCAjwmJeYBhAwEiwAXlg0AQ76f_HutE45oUxpnDmyDibkbwTpAA1wIPL7F8dfdriJry8CGOsIHRoCBHYQAvD_BwE]

26. Evaluate how the activities described in the box "What Do Operations Managers Do?" can be applied to a student organization or fraternity to improve its effectiveness.

Solution
Students should be able to discuss how many of the following activities can be applied.

- Forecasting: Predict the future demand for raw materials, finished goods, and services.
- Supply chain management: manage the flow of materials, information, people, and money from suppliers to customers.
- Facility layout and design: determine the best configuration of machines, storage, offices, and departments to provide the highest levels of efficiency and customer satisfaction.
- Technology selection: use technology to improve productivity and respond faster to customers.
- Quality management: ensure that goods, services, and processes will meet customer expectations and requirements.
- Purchasing: coordinate the acquisition of materials, supplies, and services.
- Resource and capacity management: ensure that the right amount of resources (labor, equipment, materials, and information) is available when needed.

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- Process design: select the right equipment, information, and work methods to produce high-quality goods and services efficiently.
- Job design: decide the best way to assign people to work tasks and job responsibilities.
- Service encounter design: determine the best types of interactions between service providers and customers, and how to recover from service upsets.
- Scheduling: determine when resources such as employees and equipment should be assigned to work.
- Sustainability: decide the best way to manage the risks associated with products and operations to preserve resources for future generations.

27. Interview a working friend or family member as to how they use operations management principles in their job and write a short paper summarizing your findings (maximum two pages).

Solution
Student responses range from family members that work in manufacturing and logistics to financial and health care organizations. A good place to begin is with the box "What Do OM Managers Do?" plus many of the other concepts in Chapter 1. For example, a family member may work in global sourcing, backroom credit card processing, or as an airline attendant. Help students understand the OM content of these jobs including service management skills.

28. Explain how the seven differences between goods and services would be applied to a major airline service. Provide airline examples that illustrate each difference.

Solution

1. **Goods are tangible, whereas services are intangible.** Fuel, airline cabin food, paper tickets, pillows, magazines, sodas and coffee, and so on are the only physical goods. Ask your students: "When you pay say $300 for a ticket, how much is for "place utility" and how much for the physical goods?" Goods are consumed, but services are experienced. A senior executive of the Hilton Corporation stated, "We sell time. You can't put a hotel room on the shelf."

2. **Customers participate in many service processes, activities, and transactions.** At boarding, while in flight, leaving the plane, at the baggage terminal, and so on. Many services require that the customer be present either physically, on a telephone, or online for service to commence. In addition, the customer and service provider often co-produce a service, meaning that they work together to create and simultaneously consume the service, as would be the case between a bank teller and a customer, to complete a financial transaction. The higher the customer participation, the more uncertainty the firm has with respect to service time, capacity, scheduling, quality performance, and operating cost.

3. **The demand for services is more difficult to predict than the demand for goods.** Airline routes are complicated with weather, other carrier schedules and reschedules, takeoff and landing delays, etc. making demand highly variable with no way to "store in inventory the seat' (see #4) Once the plane takes off, the

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revenue from an empty seat is lost forever! Customer arrival rates and demand patterns for such service delivery systems as banks, airlines, supermarkets, call centers, and courts are very difficult to forecast. The demand for services is time-dependent, especially over the short term (by hour or day). This places many pressures on service firm managers to adequately plan staffing levels and capacity.

4. **Services cannot be stored as physical inventory.** Service capacity is the substitute for physical inventory such as the number of pilots, flight attendants, fuel trucks, seats, etc. In goods-producing firms, inventory can be used to decouple customer demand from the production process or between stages of the production process and ensure constant availability despite fluctuations in demand. Service firms do not have physical inventory to absorb such fluctuations in demand. For service delivery systems, availability depends on the system's capacity. For example, a hospital must have an adequate supply of beds for the purpose of meeting unanticipated patient demand, and a float pool of nurses when things get very busy. Once an airline seat, a hotel room, or an hour of a lawyer's day is gone, there is no way to recapture the lost revenue.

5. **Service management skills are paramount to a successful service encounter.** Flight attendants, for example, must deal with many complex situations that require "service management" skills. Employees who interact with customers require service management skills such as knowledge and technical expertise (operations), cross-selling other products and services (marketing), and good human interaction skills (human resources). **Service management** *integrates marketing, human resources, and operations functions to plan, create, and deliver goods and services, and their associated service encounters*. OM principles are useful in designing service encounters and supporting marketing objectives.

6. **Service facilities typically need to be in close proximity to the customer.** Airport location is critical to minimize total distance travelled by all customers. When customers must physically interact with a service facility—for example, post offices, hotels, and branch banks—they must be in a location convenient to customers. A manufacturing facility, on the other hand, can be located on the other side of the globe, as long as goods are delivered to customers in a timely fashion. In today's Internet age many services are only a few mouse clicks away.

7. **Patents do not protect services.** Any airline could copy Southwest Airlines boarding process and patent law would not protect SW process. A patent on a physical good or software code can provide protection from competitors. The intangible nature of a service makes it more difficult to keep a competitor from copying a business concept, facility layout, or service encounter design. For example, restaurant chains are quick to copy new menu items or drive-through concepts.

29. Explain why a bank teller, nurse, or flight attendant must have service management skills. How do the required skills differ for someone working in a factory? What are the implications for hiring criteria and training?

Solution

Service-providers need technical/operations skills plus human interaction and marketing skills (i.e., *service management skills*). A bank teller, for example, must be able to complete many types of financial transactions and operate the computer and

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associated software. The teller must also interact with the customer in a pleasant way and market other financial services (cross-sell, up-sell, etc.). A factory worker can focus on technical/operations/production skills since they have no or little interaction with customers. The training for front-room service-providers is more interdisciplinary compared to backroom factory employees.

30. Do you think you will be working in manufacturing or services when you graduate? What do you think will be the role of manufacturing in the U.S. economy in the future?

Solution
This question is designed to get students to explore job opportunities and industries in both goods-producing and service-providing industries. Use the Exhibit 1.11 of "where are the jobs in the USA?" to enhance this discussion. The location of your institution may have some bearing on the answers, as some schools might be located in a more manufacturing- or service-intensive locale than others. One topic that will come up is will there be jobs in the U.S. in manufacturing? Will all US manufacturing jobs be moved to other countries? Why? What new industries are developing? Are sustainability strategies going to create new industries and jobs? *Business Week* (Oct. 2009) has several issues that addressed the role of manufacturing in the US economy including the wisdom of outsourcing and off-shoring.

Another issue is that the average U.S. college graduate will change industries and/or jobs about seven times during their careers. Thus, it is very important to be flexible and develop a good set of skills including OM!! **If the student is promoted in future jobs they will be managing resources and processes with many OM challenges regardless of functional area.** Chapter 1 provides several examples of non-OM majors needing OM skills in the workforce especially as they are promoted and are responsible for more and more processes and associated resources. OM is useful in all functional areas if you have to design and manage a process.

31. Choose one of the following services and explain, using specific examples, how each of the ways that services differ from manufactured goods apply.
    a. a family practice medical office
    b. a fire department
    c. a restaurant
    d. an automobile repair shop

Solution
Generic differences between goods and services include:

- Goods are tangible while services are intangible.
- Customers participate in many service processes, activities, and transactions.
- The demand for services is more difficult to predict than the demand for goods.
- Services cannot be stored as physical inventory.
- Service management skills are paramount to a successful service encounter.
- Service facilities typically need to be in close proximity to the customer.
- Patents do not protect services.

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Services especially in the "front office" (at points of contact with the customer) require different skills than producing physical goods, and therefore, it is difficult for firms to do both well. Yes, for example, physical inventory can compensate for poor demand forecast accuracy while service capacity is a surrogate for inventory. Therefore, services must be better at forecasting and demand/capacity planning than goods-producing firms or they will miss a sale. Another good contrast is pure production (backroom) skills versus service management (front room) skills, how they differ, and which is more difficult for employees to do successfully. All these differences, issues, and more can be discussed for each of the four example service organizations.

32. Explain how the customer benefit package is enhanced from the customer's viewpoint by adding digital content to a physical good such as an automobile, cell phone, or appliance? How is value increased?

Solution
Adding digital content to physical goods is known as the *Internet of Things (IoT)*. A search of "Internet of Things" reveals over 270 million hits so students have plenty of information on this emerging and innovative topic. Wikipedia begins describing the IoT as follows:

*The **Internet of Things** (**IoT**) is the network of physical objects—devices, vehicles, buildings and other items—embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data.[The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.*

IBM, Siemens, Toyota, Dell, and a host of other equipment manufacturers are all focused on this next generation of connected devices.

33. Draw the customer benefit package (CBP) for one of the items in the following list and explain how your CBP provides value to the customer. Make a list of a few example processes that you think would be necessary to create and deliver "each good or service" in the CBP you selected and briefly describe issues that must be considered in designing these processes.
    - a trip to Disney World
    - a new personal computer
    - a credit card
    - a fast-food restaurant
    - a wireless mobile telephone
    - a one-night stay in a hotel

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Solution
The objectives of this exercise are for the student to define a CBP (a bundle of goods and services a customer buys) and its features (like in Exhibit 1.2 and then recognize and define the process that creates and delivers each good or service to customers. How are these goods and services created and delivered? For example, if a student defines a peripheral service as "friendly service-providers with service management skills" then ask the student – What processes create this type of capabilities and skills? Answer: Hiring, training, recognition, and reward processes. Human resource managers need to understand and know how to improve their processes using OM too! Get the students participating – use their examples to illustrate key OM concepts. Help them "see OM" in their examples.

34. Why is process thinking important in operations management? Thinking of yourself as an "operations manager" for your education, how could process thinking improve your performance as a student?

Solution
Process thinking is important since processes describe "how work gets done and performance objectives are achieved" in all functional areas such as finance and human resource management, and industries such as government, health care, forestry, manufacturing, and education. Regardless of function, once you are promoted, you must manage a PROCESS! Get promoted again and you have several process managers reporting to you, not to mention all types of labor, equipment, and information resources.

At this early point in the course students know only a little bit about primary, support, and general management processes so you may have to do a tutorial using the student's example. However, students perform many processes, such as studying for an exam and managing multiple reading and homework assignments on a daily basis. Getting them to think of the process they use to accomplish such tasks helps them to understand the role of process thinking.

35. One of our former students, who had worked for Taco Bell, related a story of how his particular store developed a "60-second, 10-pack club" as an improvement initiative and training tool. The goal was to make a 10-pack of tacos in a minute or less, each made and wrapped correctly, and the total within one ounce of the correct weight. Employees received recognition and free meals for a day. Employees strove to become a part of this club, and more importantly, service times dropped dramatically. Techniques similar to those used to improve the taco-making process were used to improve other products. Explain how this anecdote relates to process thinking. What would the employees have to do to become a part of the club?

Solution
At a business like Taco Bell, consistency in food quality and service are vital to customer satisfaction. By focusing on a goal such as this, employees were forced to think in terms of the process in order to shave off time and meet the weight requirement. This led to not only a better understanding of the job but also to improved job and process designs. Employees would have to learn the job tasks and their sequence and learn how to do them efficiently. Making it a competitive activity with recognition and tangible rewards not only gave employees an incentive to do well, but also made their work more enjoyable.

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36. Review one of the operations and supply chain management professional websites and report what you find.

Solution
This question gives students a chance to explore certification programs, job opportunities, familiarize themselves with OM and SCM, and so on. A list of example OSCM websites is in the box on page 26.

37. Select an organization you are familiar with and draw and describe its value chain using one of the three value chain frameworks (i.e., the input-output, pre- and post-services or the hierarchical model) described in this chapter.

Solution
Some of the more interesting ones are for services such as high schools, churches, relief agencies like the Red Cross, criminal investigations, police work, trash pickup and disposal, car dealerships, and so on. If time permits, allow a few students to show their diagrams and explain to the class.

38. Search the Web for either (a) an organization that has defined its sustainability strategy and policy, and give examples of how they are implementing it, or (b) an organization that has received negative or controversial media coverage for its ethical or sustainability practices. Write a paper describing what you found (maximum of two typed pages).

Solution
Almost all organizations are now on the sustainability bandwagon so students will find a rich discussion of sustainability focused on everything ranging from setting carbon standards to government policy to individual organization strategy. The following firms have extensive sustainability strategies: McDonalds, Federal Express, UPS, Hilton Hotels, SW Airlines, General Electric, and so on. This is an opportunity to sell OM via sustainability to students so make the most of this topic.

On the flip side, there have been many reports that deal with issues such as unsafe clothing factories (e.g. the case of Nike) or manufacturing facilities (particularly in foreign countries, such as Foxconn and Apple). Students are most likely aware of these issues, but many are not. This brings up questions like a company's commitment and ability to monitor what goes on in its supplier factories. For example, did companies address the problems proactively?

39. Describe new ways for how your college or university can apply the sustainability practices in Exhibit 1.13. Summarize your results in a short paper.

Solution
Students must take the topics below and apply them to their college or university.

Exhibit 1.13 Examples of Sustainability Practices

Environmental Sustainability

Waste management: Reduce waste and manage recycling efforts

Energy optimization: Reduce consumption during peak energy demand times

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Transportation optimization: Design efficient vehicles and routes to save fuel

Technology upgrades: Improvements to save energy and clean and reuse water in manufacturing processes

Air quality: Reduce greenhouse gas emissions

Sustainable product design: Design goods whose parts can be recycled or safely disposed of

Social Sustainability

Product safety: Ensure consumer safety in using goods and services

Workforce health and safety: Ensure a healthy and safe work environment

Ethics and governance: Ensure compliance with legal and regulatory requirements and transparency in management decisions

Community: Improve the quality of life through industry-community partnerships

Economic Sustainability

Performance excellence: Build a high-performing organization with a capable leadership and workforce

Financial management: Make sound financial plans to ensure long-term organizational survival

Resource management: Acquire and manage all resources effectively and efficiently

Emergency preparedness: Have plans in place for business, environmental, and social emergencies.

Operations management plays an important role in all three of these sustainability perspectives.

40. Discuss how the three perspectives of sustainability influence (or perhaps, should influence) your personal purchasing decisions. For example, do you consider whether apparel is made in safe and ethical factories? Should companies exploit their sustainability efforts for marketing purposes? Why or why not?

Solution
Environmental responsibility is often conveyed in packaging (for example, “made from 100% recycled materials…”). However, social responsibility is not that easy to identify. As one news report stated, “It’s nearly impossible to make sure the clothes you buy come from factories with safe working conditions.” Many students probably are not sensitive or even aware of such issues. Yet, they have serious implications for OM with respect to purchasing and managing supplier relationships. The question is whether consumers actually change their behaviour. Their attitudes will eventually influence how they act in their future business careers.

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41. Research and write a short paper describing how business analytics has been applied to problems and decisions in operations management. Use the information in the box "What do Operations Managers Do?" to help your search process.

Solution
There are many examples for students to write a paper on such as

- sports analytics (Moneyball, etc.)
- credit card approval
- yield management decisions
- hedging and price-break and discount count purchasing and pricing models
- waiting line (queue) analysis and models
- clinical trials for medicines
- IBMs "Smarter Planet" examples
- UPS and Fed Ex vehicle routing and scheduling models (driver training too)
- sourcing decisions (Procter & Gamble, Nike, Victoria Secrets)

42. Select one of the OM challenges and investigate it in more detail. Prepare a 5-10-minute presentation on what you found.

Solution
Students should choose one of the following and identify emerging issues that will more depth and understanding.

- *Customers.*
- *Technology*
- *Workforce.*
- *Globalization.*
- *Sustainability.*
- *Optimizing supply chains.*
- *Exploiting Industry 4.0/Service 4.0*

The objective of this type of question is for the student to describe what they know and you, the instructor, help put it into the OM framework or context. This question is also designed to help students internalize the concept of customer satisfaction and dissatisfaction, and potential operations management activities and decisions that can influence their experiences. For undergraduates, these experiences focus on what they know best such as restaurants, airlines, bookstores, automobile sales or repair, retail stores, and university processes. Graduate students may also include their work and business experiences, and personal experiences such as home mortgages, vacations, and childcare. As the instructor focus on the role of OM and its processes, training requirements, product and service quality, and tie to Chapter 1 ideas.

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43. Geoff Colvin of Fortune magazine discussed the concept of a "friction-free economy" in which labor, information, and money move cheaply and quickly through the firm's global supply chains [Geoff Colvin, "Every Aspect of Your Business is About to Change," Fortune.com, November 1, 2015, pp. 103-112] (The term was actually coined by Bill Gates in 1997 and is now becoming a reality). Research this concept, and write a two-page paper that describes the impacts and challenges that a friction-free economy would have on operations management.

Solution

A search of the web reveals over 1.6 million hits on this topic. First, we provide a few of many definitions of a friction less economy as follows:

An extremely efficient market in which buyers and sellers can find each other easily, can interact directly, and can perform transactions with only minimal overhead costs. In economic theory a frictionless market is a financial market without transaction costs. Friction is a type of market incompleteness. A "friction-free market" refers to a market in which there is little differentiation between competing products, so that the customer has exceptional choice.

In his book *The Road Ahead*, Bill Gates made a statement that I found so apt that it appears in my standard marketing presentation on electronic commerce: "[The Internet] will carry which market information will be plentiful and transaction costs low." That phrase sums up the essence of T.G. Lewis's breezy, slapdash book, *The Friction-Free Economy: Marketing Strategies for a Wired World*. It is also echoed in the book's title. That should give a clue about one of the book's problems: Many of its ideas are borrowed. Of those that aren't, some are clever and illuminating, while others are half-baked.

Since information (bits) is basically an unlimited resource, supply can always exceed demand, and challenge traditional economic theory such as Adam Smith. With more distributed "knowledge" in the marketplace, markets for goods could clear faster and inventory build-ups could be avoided, thus smoothing out the "boom-and-bust" cycles that are typical of market economies. Also, consider publishing paper books and how that might change including OM textbooks.

Students will discuss the impacts of a friction less economy on labour markets, job displacement and shift, consumer choice, how to make a profit, performance metrics, lower (higher) wages, no middlemen in the value (supply) chain, and supplier-customer relationships. Netflix is a good example that changed the value chains it participates in. Testa is another good example of immediate software updates to its vehicle software. Have FUN with your student's answers!

One story is as follows: Say you want to buy a new refrigerator. Instead of driving to nearby stores and looking at the various models and prices or scouring newspaper ads for sales, you'll just whip up a special little software program (web crawler) and send it off to scour the global Net for refrigerators that match your needs, dimensions, warranty, color, and price range. When it finds sources that match your requirements, it'll let you know where they are. You might wind up buying a refrigerator directly from a manufacturer in northwest China.

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CASES

TEACHING NOTE: WALKER DIGITAL MUSIC SERVICES

Overview

The objectives of the case study are (1) ask students to think about goods versus services, (2) to study bricks and mortar versus internet-based digital value chains for acquiring music. Keep it simple and have fun with this class discussion—it's the students' first week of operations and supply chain management! And remember, they know more about this digital value chain than you do, so write what they say on the board with you, the instructor, adding some structure and insights! Or you can assign the student to write the case study up, in say 3-4 pages, and present to the class.

Case Questions for Discussion:

1. **What do you buy when you purchase a song on the Internet? A good? A service? Explain your answer in a couple of sentences.**

   Solution
   A service, in section 1-3, is defined as any primary or complementary activity that does not directly produce a physical product. So, music is a service. It is transferred to a customer's electronic device as electrons zipping through airways, and ordinary and fiber optic cables. You buy unlimited use of this 100 percent digital product.

   In the past, music content was embedded in a physical good, like a CD, tape, or vinyl record. As students, we'll see, that "everything" about the old versus new value chains has changed.

2. **What creates "value" when you download or stream digital music? (Hint: Make a list of perceived benefits and assume the price is low.)**

   Solution
   Write the value equation on the board. (See Section 1-4)

   Value = Perceived Benefits/Price

   Then list what the students say are **perceived benefits** such as convenience, less of my time, no traffic hassles, speed, on-the-spot satisfaction and use, fun, on-line ordering speed, flexibility, customization, more sustainable, more efficient processes, no wait time, innovative, better quality of music, use PayPal, and so on. And **price** is low! What a great combination! Wow! Why didn't we do this in 1500, 1800, 1900, or 1990?

   So, did the disruptive technology, the Internet, create value? OH, YES!

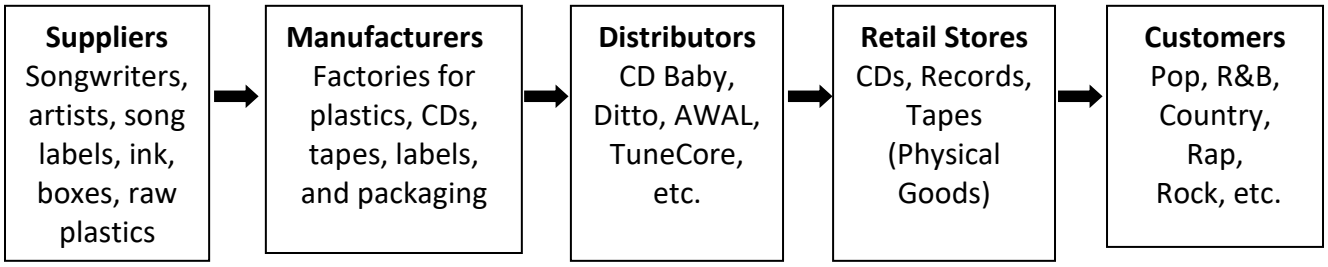
   The Internet created value for the masses, but a few players in the old value chain designs lost their firms, jobs, and income. Creative destruction was at work here. It devastated some firms and jobs.

3. **Draw the "bricks and mortar" major process stages of the value chain by which traditional records, tapes, and CDs are created, distributed, and sold in retail stores. How does each player make money? (Hint: begin the value chain with suppliers and end with customers).**

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Traditional Music Bricks and Mortar Value Chain (5 stage view)



Solution
Students can describe how the traditional value chains works. Notice each stage of the value chain requires physical (tangible) goods. This represents a HUGE asset base to create, manufacturer, distribute (trucks, airplanes, ships), retail stores (building, staff), and the customer taking home a physical product. And note the customer must go to the store to select and pick up the physical good or have Amazon deliver it.

Undergraduates may need help by you on identifying "suppliers." Oh, yes. They have never thought about suppliers! That's why they are taking an OM course. Remember, they are young and know nothing or very little about operations, logistics, and how supply cahins create value. MBAs normally get this right off, so less need to lead them. For example, what is vinyl (a plastic) and where does it come from?

Vinyl is not a natural substance but is a synthetic man-made material. It is a type of plastic that is made from ethylene (found in crude oil) and chlorine (found in regular salt). When processed, both the substances are combined to form Polyvinyl Chloride (PVC) resin, or as is commonly referred to – Vinyl. Who makes this stuff? How about Dupont, Celanese Corporation, Westlake Chemical Corporation, and so on.

Who makes packaging to store and ship vinyl records, CDs, and tapes? If you Google these, you find a host of international firms. For example, Amazon has a special shipping stiff-EZ folder and mailer to ship these physical goods. ULINE (uline.com), for one, makes cardboard boxes for shipping vinyl records.

If your students struggle with this discussion, then write one of the five major headings on the board to lead them and let them fill it in. Keep asking, "What happens next?"

Advantages of a bricks and mortar value chain include CONTROL over the artistic content and entire value chain, HIGH PRICES for suppliers, distributors and retail stores; easier to catch cheaters duplicating CDs and tapes, etc.

Disadvantages of the value chain structure include the difficulty for the customer to customize music to their tastes and most favorite songs, high price for the customer, slower speed of service, less convenient, customer must buy the entire CD or tape, a huge amount of material and package handling and rehandling with multiple trucks, forklifts, break bulk containers, and so on.

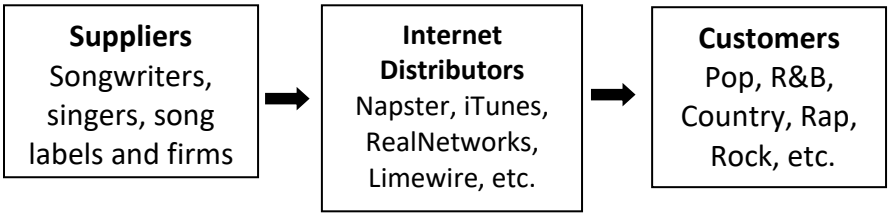
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One last point you might make is “Who lost their job?” in this bricks-and-mortar value chain? Answer: tens of thousands of people!

4. **Draw the major process stages of the value chain for downloading and streaming digital music today. How does each player make money? (Hint: Less major stages than your answer in Question 2).**

Digital Music Internet-based Value Chain



Solution
Now draw the NEW VALUE CHAIN!

In such an Internet-based digital value chain, there is little need for expensive ASSETS (no packaging, boxes, plastic, trucks, warehouses, airplanes, ships, retail stores and staff, and physical goods, and the jobs that go with them.).

Customers can download music in their homes, automobile, office, or when walking around the wireless neighborhood or city. The Internet is a disruptive technology for the music industry value chain and it dramatically reduced the costs (price).

And customer participate in the ordering and delivery of the digital asset. See Section 1-3 on the differences between goods versus services. Depending on how much time you want to spend on this case, you can go over how these seven differences between goods and services change in the new digital value chain.

Advantages of an Internet-based value chain include much LOWER PRICES for suppliers, distributors *and customers*; CUSTOMER’S ABILITY TO CUSTOMIZE a package of songs to meet individual tastes (*mass customization using self-service*), much less need for packaging material and shipping services, and incredibly fast download speeds and extraordinary customer convenience. Who has CONTROL in this digital value chain? The service-provider and the customer!

Disadvantages focus on eliminating the economic incentive for artists to record their songs, jobs lost at retail stores and warehouses and trucking and suppliers, problems with website ordering and payments and returns, privacy and malware issues purchasing on-line, and a total restructuring of the worldwide music (digital) value chain(s). Now, much of operations and logistics is embedded in the servers’ software!

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Have fun discussing this case! Ask questions such as

(1) How long does it take a customer to buy a physical good (CD, tape, record, personal computer, detergent, etc.) in a physical store? Think stop lights, traffic both ways, bad weather, rude cashiers, store doesn't have the song, etc. Answer: 1 to 3 hours depending on transport mode, etc.

(2) How long does it take you to download one song on-line? Seconds

(3) What is the percent improvement in processing time? Thousands of percent improvement in processing time

(4) What is the cost of a downloaded song? LOW

(5) Is there value to the CONVENIENCE of downloading a song at 3 am? YES

(6) How does the nature of the service encounter change between the two value chains? WOW, one is the customer's physical body trudging through the steps to buy a song in a retail store (getting dressed, driving to and from, waiting, stop lights, cashiers, etc.)

(7) What should Devon and Yoshiko Torg do? Sell the business to a bigger player, stay as they are and retire early, add more songs and files and try to grow, add an annual membership fee and build a loyal club. Their market niche has value, so maybe a bigger player might buy them out.

5. Compare and contrast the approaches questions 3 and 4. What are the big differences?

Solution

What role does operations management play in this traditional bricks and mortar value chain? Students may give examples and mention OM areas such as (1) scheduling recording sessions, delivery trucks, and retail store staff, (2) inventory management, (3) project management in getting albums, etc. to market, (4) forecasting demand by store, (5) quality management of physical goods, (6) quality of service encounters at retail stores, (7) purchasing raw materials and packaging, (8) preventive maintenance of equipment, and (9) warehousing and logistics.

What role does operations management play in an Internet-based music downloading value chain? Students may give examples and mention OM areas such as (1) scheduling recording sessions, delivery trucks, and on-line and telephone customer service staff, (2) inventory management of files on a computer, (3) project management in getting songs to the digital market, (4) song payment processes, (5) quality management of digital downloads, (6) quality of service encounters at telephone and on-line customer contact centers, (7) capacity management for on-line servers, and number of telephone and on-line customer service center staff, (8) preventive maintenance of networks and equipment, and so on.

Or you can summarize as big differences – WHO HAS CONTROL? (Owners and managers in old value chain; customers in digital value chain; empower the customer!); AMOUNT OF VALUE CHAIN ASSETS? (huge in old value chain; little in digital value chain; physical assets replaced by information); SHIFT IN CUSTOMER PARTICPATION AND THEIR ROLE (see difference 2 in Section 1-3).

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Teaching Plan

You can read this case in class in ten-fifteen minutes and then discuss in class or better yet assign for the first or second class. You can teach this case in as little as 45 minutes or spend 90 minutes depending on what you focus on and want to cover. Or give three case teams 10-12 minutes each to present their answers and diagrams to the class, and the instructor wraps it up.

Other general lessons include: (a) a disruptive technology called the Internet is redefining the value chain in this industry, (b) price and cost and speed reductions are dramatic, (c) the nature of the service encounters are greatly changed, (d) value chain capability now exists to do mass customization using self-service, (e) operations plays a major role in the old and new value chain designs and execution with OM and IT integrated in the digital value chain, and (f) this is an example of physical assets beginning replaced by information. This case also ties in very well with high or low scalability in Section 4-4.

TEACHING NOTE: MICKEY MOUSE: TO TALK OR NOT?

Overview

This is a short case intended to focus attention on services, what do operations managers do, how goods differ from services, and what creates value? The objective is to get students talking about services at the beginning of the course. Remember service operations has many titles without the word "operations" in the job title such as hotel manager, bank branch manager, hospital administrator, and retail store manager.

Case Questions for Discussion:

1. **Using the "What Do Operations Managers Do? box in the chapter, what key activities most directly relate to the case situation?**

   Solution
   Process design: select the right equipment, information, and work methods to produce high-quality goods and services.

   Job design: decide the best way to assign people to work tasks and job responsibilities

   Quality management: ensure that goods, services, and processes will meet customer expectations and requirements.

   Service encounter design: determine the best types of interactions between service providers and customers, and how to recover from service upsets.

   You can also use this case discussion to highlight a few items in Exhibit 1.1 contrasting goods versus services (process design, job/service encounter design, quality)

2. **Provide one good and bad example "moment of truth" if Mickey Mouse talks to customers?**

   Solution
   - A good example is using the person's name to personalize service.
   - A good example is telling a kid he loves them.

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- A good example is telling a kid he or she is cute.
- A good example is suggesting they obey their mommy or daddy.
- A bad example is impatience with the person and abruptly truncates the conversation.
- A bad example is saying the wrong thing to a child such as “where’s daddy” to a single female parent.
- A bad example is a strong accent may destroy the magic.
- A bad example is the service provider being overwhelmed by too many simultaneous conversations and somehow insults young customers and their parents.

There are many articles on “customer experiences,” “customer-driven businesses,” and “biztainment” that relate to this case study, so the instructor might want to search the internet for background articles. Enhancing the customer experience leads to greater competitive advantage, capturing new customers, improved employee morale and attitude, and increased sales, and revenue. A talking Mickey Mouse has risks and rewards. Mr. Walt Disney didn’t want Disney characters to talk because there were too many opportunities for errors and service upsets. Talking characters ruined the magic.

3. What are some advantages and disadvantages of talking Disney characters from a service perspective?

Solution

Advantages of Disney Characters Talking to Customers

- Build customer relationships and loyalty
- Create an interactive set of service encounters
- Can use the kid’s name in service encounters
- Customize conversation to each customer (mass customization)

Disadvantages of Disney Characters Talking to Customers

- Customers may not like what Disney character says, their tone of voice, local dialects, faint or weak voice, etc.
- Lose partial control of Disney “magical” service encounters.
- Ruin the magic – imaginary “ideal” of a Disney character; imagination is better than reality.
- Requires better hiring and training programs (and probably higher cost)

To-date, the results of this Disney experiment have been mixed with many stories pro and con; some bad service upsets make the newspapers. Kids and their parents might not like what the Disney character says, their tone of voice or accent or their mannerisms. When Mickey Mouse talks to customers, the opportunity for errors (service upsets) increase but also the opportunity to make customers happy. Was Mr. Disney right or wrong?

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TEACHING NOTE: ZAPPOS, A SUBSIDIARY OF AMAZON

Overview

The objective of this case is to introduce students to a web-based firm where the motto is "Deliver WOW through service" and the student can begin to understand issues such as:

(1) How goods and services are bundled together (i.e., the customer benefit package) to create value.
(2) What primary, support and management processes might be needed to create and deliver each good or service.
(3) What might be the focus of OM topics as shown in Exhibit 1.1 to the application of Zappos business such as technology, physical goods and service quality, inventory and warehousing, process design, and service encounter design.

You might also want to put up the Zappos web page (www.zappos.com) during the classroom discussion and browse through it pointing out OM related issues and topics. Zappos is now owned by Amazon but Zappos maintains its own brand, website, and operations and logistics headquartered in Las Vegas, Nevada. Zappos, a subsidiary of Amazon, was founded by Nick Swinmurn in 1999 with a company name of Shoesite.com. Amazon bought Zappos in 2009.

The case is an introductory case so the discussion should focus on what the student might know from reading Chapter 1 only. Therefore, keep things simple, focus on (a) goods and services and their differences, (b) three types of processes, (c) OM activities like forecasting, and scheduling, and (d) Zappo's requires BOTH goods and services (a CBP) to be a viable business (and the processes to create and deliver all).

Make use of Exhibits 1.1 and the box "What Do Operations Managers Do?" Students in your class will almost always have ordered something from Zappos so let them tell their story to begin class. Also, the quote that follows from the case highlights the importance of the service center, service encounters, and customer service. Amazon has recently acquired Zappos.

Over 95 percent of Zappo's transactions take place over the Web, so each actual customer phone call is a special opportunity. "They may only call once in their life, but that is our chance to wow them," Hsieh says.

Sometime during the class point out that the CEO, Jeffrey Bezos, wants to "establish an emotional connection" will all Zappos customers.

Case Questions for Discussion:

1. **Draw and describe the customer benefit package that Zappos provides. Goods? Services? Digital Content? Who manufactures the physical goods? Who is responsible for the quality and delivery of the physical goods?**

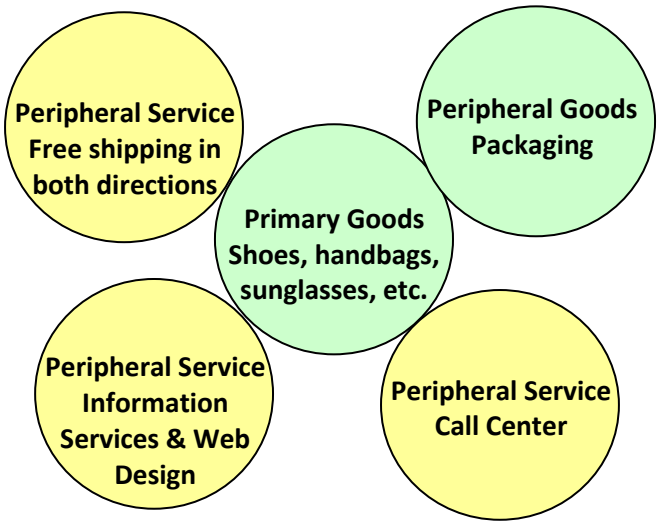
   Solution
   Students may draw something like below but expect them to not be clear on what is a good versus a service so if you grade this assignment be open-minded. Go over the definitions of goods and services in Chapter 1 as you discuss the case. Remember information of any type is a service so a call center interacts with customers and exchanges information, the Web site and pages itself are information-intensive and therefore are best defined as a service, not a physical good, etc. Some students will draw this as a "dual CBP" with goods and services at the center, and this is okay. The lesson is Zappo's sells a "bundle of goods and services via a virtual platform."

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Also, read the customer benefit section carefully as the CBP fills customer wants and needs so no wants and needs in the CBP; only what management decides to use to fulfill those needs. Example: Want and need in a hotel-safety; Management decides to fulfill those needs by – parking lot lights, keyless entry, deadbolt locks, in room safety lock vault, fire alarm, sprinkler system, and so on.

Remind the student that Zappos is an "on-line retailer" with a "virtual store." It is simply a virtual platform that produces zero physical goods! Zappos doesn't own or operate any shoe factories.



More on Zappos can be found on their web site such as http://about.zappos.com/zappos-story/in-the-beginning-let-there-be-shoes.

Some students may want to draw a "dual CBP with primary goods and primary services" like the McDonald's CBP drawn in Chapter 3 and Exhibit 3.5. This is fine and brings goods and services more in balance. The key for OM is what processes and supply chains create and deliver each good and/or service?

Note: One reason we do the CBP framework is to identify key primary and peripheral goods and services (i.e., the bundle of goods and services customers buy) and then make the point that each and every one of these goods or services requires a process to create and deliver it to customers. And OM skills are needed to design and manage processes.

Who manufactures the physical goods? Contract manufacturers mostly in Asia!

Who is responsible for the quality and delivery of the physical goods? Zappo Global Sourcing Agents (GSA) who have accounting, negotiation, quality management, logistic, human and cultural, and operations knowledge and skills. Remind your students that the (GSA) is often on the other side of the world negotiating contracts, sometimes alone! So, they are highly skilled people!

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2. Identify and describe the primary, support, and general management processes needed to execute a customer order at Zappos. (We recommend you always do this question.)

Solution

Primary processes	Support Processes	General Mgt. Process
Call center, order entry, fulfilment, picking, inbound and outbound shipping. inventory mgt., global sourcing and purchasing, billing, returns	Training, hire, medical, salary, child care	VPs of OPNS, IT, Mktg, HRM, Finance,

Also, you will have to help them with issues such as what processes create the OM capability to provide free shipping in both directions. For example, **primary processes** might be order entry, warehousing and order picking, outbound shipping, purchasing, and return shipping and receiving. **Support processes** might include salary payments, dental insurance, job training, and day care services for employees provided by other functional areas. **General management processes** might be the VP of Human Resource management who oversees all HRM functions and processes. Other integrative management processes include VP Customer Service and Call Centers, VP of Shipping, VP of Marketing, Warehouse Manager, VP of Information Systems, etc. These three headings on the board help students see that processes are creating value for customers.

*Notice that at Zappo's goods are outsourced and offshored; services are mostly done in-house! Ask the student, "**Who ensures the physical goods are of high quality?**" This question leads you into a discussion of global quality control, purchasing, inspections, sourcing, design and manufacturing engineers, etc. Also, ask, "What good is Wow Service if the physical goods are of inferior quality?" These questions create a lively class discussion!*

3. Describe how any three of the OM activities in the box "What do Operations Managers Do?" impacts the management of both the goods that Zappos sells and the services that it provides.

Solution

Students might build a table somewhat as below but at this early point in the course it will not be too detail. Below are some ideas for the table.

OM Activity	**Good or Service**
Forecasting	Goods – demand for a multitude of physical goods, many of which are fashion items
Forecasting	Services – call center volume by hour of the day (illustrates customer participation and difficulty predicting service demand)

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Facility Location	Goods – warehouses
Facility Location	Services – accounting, finance, etc. central functions, call center sites
Facility Layout	Goods – inbound and outbound flow and layout of warehouses
Facility Layout	Services – call center layouts and cubicles, corporate offices, etc.
Technology	Goods – factory technology for a wide variety of physical goods to keep costs low and quality high, etc.
Technology	Service – web design, search technology, call center technology, etc.
Product Quality	Goods – Shoes – outsourced but must be of high quality
Service Quality	Service – Call center processes, service encounters, etc.
Inventory and Capacity	Goods – Genghis system to manage warehouses, inventory, etc.
Inventory and Capacity	Service – Services can't be stored as physical inventory; call center staffing levels (see Section 3)
Process Design	Goods – outsourced manufacturing processes, physical goods quality audits, warehousing physical goods, etc.
Process Design	Services – inbound and outbound free shipping, claims processing, server capacity, etc.
Scheduling	Goods – global outsourced shipments to Zappos central warehouses; coordinate factory, shipping, and advertising schedules, etc.
Scheduling	Services – call center staff, server downtime and maintenance, etc.

You can also query the students on whether Zappo's has initiatives on sustainability such as reducing their carbon footprint, green supply chains, remanufacturing, global sourcing, and so on. What is their sustainability responsibility if they outsource?

Students may go into detail on one or more issues such as Service Encounter Design: Service encounter design and management are defined Chapter 1 so go over these definitions in class and apply to Zappos. Since service is one of the key premises of the company, service encounters with the web site (human customer-to-software) and with Zappo employees via the call center (human customer –to-human service-provider with superior service management skills) are the key to building and maintaining customer relationships (also could fit in a brief discussion of sustainability here). Remember Zappos is trying to "establish an emotional connection with all of its customers." You can also use the service complaint and recovery example in the case to illustrate service encounter, service management skills, and employee empowerment capabilities, if class time permits.

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4. Explain how this case illustrates each of the seven major differences between goods producing and service providing businesses.

Solution

Differences Between Goods and Services

1. **Goods are tangible while services are intangible.** (Does Zappo's manufacture shoes? No. The CEO says "Deliver WOW through service." And "They may only call once in their life, but that is our chance to wow them." Zappo's has a dual CBP with goods and services of roughly equal importance. That is, what does the customer buy? A bundle of goods and services.)
2. **Customers participate in many service processes, activities, and transactions.** (order entry, returns, calls to the call center—all create more uncertainty in delivery process).
3. **The demand for services is more difficult to predict than the demand for goods.** (customers can order via the web or call in at 3 am in the morning; time zones, convenience creates value, etc.)
4. **Services cannot be stored as physical inventory** (web and server capacity, call center staff and equipment capacity; capacity is the substitute for physical inventory in a service business).
5. **Service management skills are paramount to a successful service encounter** (face-to-face call center staff (humans) and the customer (humans); go over the three dimensions of service management; customer to Web page and software is also a set of service encounters but human to 100% technology interface so in some ways service management skills exists in the technology).
6. **Service facilities typically need to be in close proximity to the customer** (with Zappo's virtual store the world is its market; no bricks and mortar here except at warehouses that have to supply the stores).
7. **Patents do not protect services** (no protection from a competitor setting up a similar virtual store for global markets; can also copy the return process system, order picking system, etc).

Teaching Strategy

One suggestion is to begin class by asking the class "Have any of you bought something on-line from Zappos?" If so, let them tell their story pointing out key OM issues/capabilities. Then go over each question letting the student answer the question with your oversight. This case takes 20 to 40 minutes to teach depending on what you cover and if you show them the firm's Web page. Often we use only the first two case questions for a full 30 minute classroom discussion and then the instructor summarizes a few key lessons.

You might also note that the CEO's vision includes

- One, day 30% of all retail transactions in the U.S. will be on-line.
- People will buy from the company with the best service and best election.
- Zappos.com will be that company.

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Zappos initiated a trend among on-line retailers with FREE inbound and return shipments. L.L. Bean, for example, announced in 2011 that it would provide free shipping both ways. Why? Three-quarters of customers say that they will abandon their purchase when they can't get free shipping (according to market research)!

You can end by saying something like (i.e., lessons from the case):

(a) *OM provides the core capabilities for this on-line retailer that provides both goods and services. For example, great customer service is only as good as supply chain and process capabilities!*

(b) *The call center and web site are the gateways to Zappo's business. If they are interrupted, Zappos is cut off from its markets and customers.*

(c) *Zappos is a virtual platform that manufacturers no physical goods.*

(d) *Zappos illustrates the importance of global sourcing agents in today's markets.*

(e) *Can you identify primary, support, and general management processes in any firm?*

To-date, Zappos is a successful on-line retailer, and is now a part of Amazon.com. It will be interesting to watch the impact of Amazon on this once entrepreneurial company.

Teaching Note: Diamond Global Supply Chain—Hudson Jewelers

A complete teaching note for all chapters is available in the Instructor Resources online. Instructors should read the entire case in Appendix C and most of the case assignments at the end of each chapter. Then decide if you want to assign all or part of the case questions.

Overview

A recently engaged couple enters a Hudson Jewelers store and discovers a computer-aided-design (CAD) system to design custom rings of all types. The case describes the entire "service experience" including co-designing the ring, its manufacture, the store delivery process, and a generic view of the diamond value chain that can be the basis for a discussion of social, environmental, and financial sustainability.

Students are challenged to define the customer benefit package augmented with this new CAD technology, define the strategy and rank order of competitive priorities, draw a pre- and post-service view of the value chain, consider the advantages and disadvantages of the "design your own ring" service experience, understand the role of the servicescape and service encounter design in creating the total customer experience, what are the core (key) processes at the retail (store) level, and in the global diamond value chain.

Depending on what OM chapters you have covered when you do this case, students may also use OM concepts such as "What Do OM Managers Do?" (Chapter 1) such as staffing and forecasting customer demand, supply chain management, facility layout and design, technology, purchasing, quality control, process design, front and backroom job design, resource management, service encounter design, scheduling, and sustainability. The case can also be used to demonstrate the application of concepts such as the seven differences between goods and service (see Chapter 1) such as customers participate in many service processes, activities, and transactions (co-production), service management and technology skills required of employees, biztainment, social sustainability and child labor in diamond mines, and so on. Also, instructors can make up their own assignment questions.

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The instructor can scatter the case assignments out throughout the semester or take the last week or two of a semester to focus on the case. Or the case can be used as a course project where the instructor assigns case questions that he/she wants to focus on.

Please note that we expect undergraduate students to only cite a few points per question, not the comprehensive lists provided in this teaching note. Graduate student answers are expected to be more comprehensive with examples and more managerial insights. Also, most of us will search and buy diamonds in our lives, so this case helps everyone (faculty, students) be smarter when buying these stones.

Teaching Strategy

THE CHALLENGE IS TO APPLY OM CONCEPTS AND METHODS TO THE GLOBAL DIAMOND INDUSTRY. For many students, this case is interesting but not easy. MBAs and honor undergraduates do best with these open-ended assignment questions. The other cases in the textbook are more focused regarding OM concepts and methods.

You may decide to use parts or none of the 34 Hudson Jewelers case study questions. We use different questions in different semesters, and we use HJ case questions on topics we want to emphasize during the semester. We have never used more than 5 to10 questions during a semester and those were divided among case teams.

Student team presentations and/or teach parts of the case using the assignment questions on the board with everyone participating are ways to generate discussions about this case. We use a team approach where odd numbered teams do one set of three assignment questions and even numbered teams do a different set of case questions. The report is graded but not the informal student presentations as they flip through their typed report on a classroom view master. Below are key parts that are included in the course syllabus.

Example course syllabus explanation

Odd numbered teams hand in and answer certain questions from the **Hudson Jewelers case posted on CANVAS. Even numbered teams hand in and answer different questions about this integrative supply chain case study. Please see what questions odd and even teams answer on the next few pages of the syllabus. **Repeat the question at the top of your answer page and then answer it. Thanks!***

Example class assignment

7	Tues/Jan 27	**Team Prepare Hudson Jewelers Case Hand-in**. Answer Questions #X, #Y, and #Z. A maximum of six-page write-up by answering the case questions in a Q and A format. ***Even numbered teams hand in this assignment.***

Chapter 1 Case Questions for Discussion:

1. **Use one of the three value chain frameworks discussed in this chapter to characterize the diamond value chain. How does this value chain gain a customer? How does it create value? How does it keep a customer?**

   Solution
   For example, the pre- and post-production value chain model is depicted in Exhibit 1.8. The challenge for students is “to apply” this “value chain paradigm” to the case study. The list below is some of what you might expect to see given student experiences.

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Pre-Production Services

- Global supplier and purchasing negotiation (price of diamonds and rings)
- Employee service management and technology (CAD) training (family business)
- Free wine bar and leather sofas in store
- Sales and marketing skills (cross-sell, buy up, etc.)
- Financing (via third parties like banks or jewelry trade-in credits)
- Customer jewelry trade-ins, appraisals, and conflict-free certifications
- Physical product warranties and guarantees
- Service guarantees
- Security processes and capabilities (video cameras, safes, alarms)
- Free ring cleaning and minor repair (build trust for future business)
- Insurance (in-store and during transport—high risk)
- Technical consulting on stone quality, ring settings, and value (i.e., a job shop)
- Customized co-design of jewelry via in-store CAD (basically a family consulting business built on trust)

Global Value Chain Processes

- Forecasting demand at store and industry level
- Store job design and training (technology and service management skills)
- Retail jewelry store layouts and process flow integration
- Global purchasing (order raw materials, grade diamonds, negotiate)
- Quality standards for stones and gems (associations, grading, fraud, judgment versus measurable specifications, high performance quality versus consistent quality)
- Primary production processes (mining, grading stones, cutting and polishing, secure transport, molds and forging, jewelry final assembly some flow shop and others job shop)
- Inventory and warehouse management of stones and jewelry settings (limit supply versus demand, reserve diamond inventory, fraud)
- Security processes and capabilities (in-store and in-transit)
- Global payment systems (lines of credit, pay or ship first)
- Global insurance (risk of miss-shipments, lost stones, robbery and break-ins)

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- Technology (CAD in the front room, front and back room security systems, stone grading equipment, continuous mining equipment)
- Outsourcing certain production work (mining, grading, cutting and polishing, wax molds, security, financing)
- Environmental Sustainability (waste, energy, transportation, technology, air quality, and product design processes)
- Social Sustainability (community, product safety, ethics and government, workforce health and safety)

Post-Production

- Warranty and claims processing
- Jewelry appraisal services and documents
- In-store and on-line billing and payment
- Warehouse and inventory management (in-store and throughout value chain)
- In-store service encounter design (co-design, trust via moments of truth, ring presentation and celebration, wine, happiness)
- Recycle process for old customer jewelry
- Customer loyalty initiatives (free dinners, future discounts)
- Secure transportation services for mines, factories, warehouses, and stores
- Technical consulting services (appraisals, co-design jewelry, trade-ins)
- Sales and Marketing Experiences Post Deliver (mailing list, future discounts, free cleaning and repair)

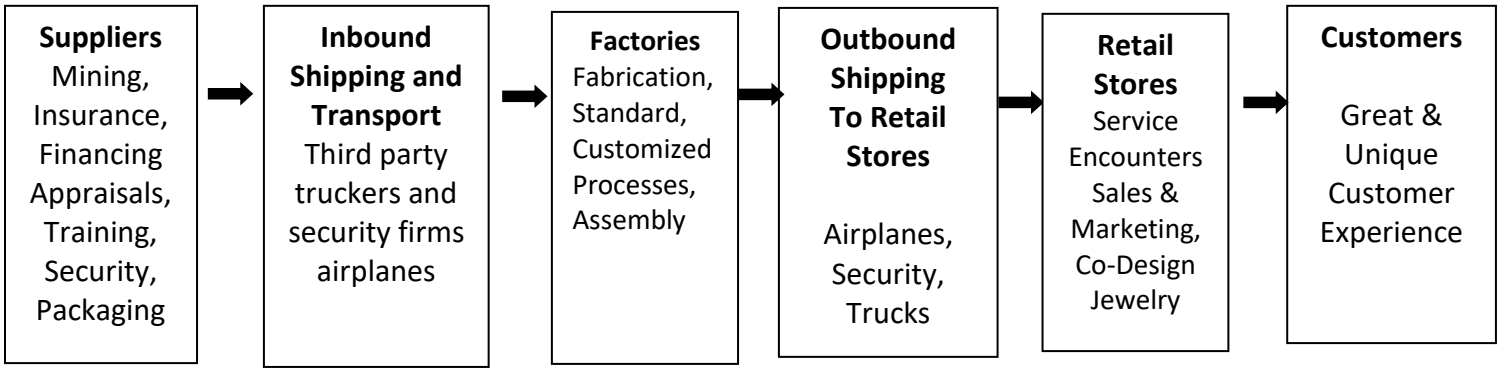
The diamond supply chain described in the make-to-order Hudson Jewelry case s study is a “pull” type of supply chain.

Undergraduate students will only point out a few of these – you will have to help them “see” these pre- and post-production goods and services. Of course, the key OM issue here is each of the above goods or services requires one or more processes to create and deliver it! Students may also use the input-output model of a value chain based on Exhibit 1.6, but this is not a case assignment question.

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Input-output Value Chain View of Hudson Jewelers



2. **Research what major diamond producers are doing regarding social, environment, and financial sustainability practices. Visit corporate annual reports, for example. Provide two or three examples.**

Solution

Corporate annual reports in the jewelry diamond industry are good places to research this question. In 2019, for example, Rio Tinto stock price has been soaring. This is an open-ended question so expect a wide variety of student or team responses. Ask your class:

- What should corporations in this industry be doing to promote environmental, social, and financial sustainability?
- What are corporations doing?
- What should they be doing?
- Who audits sustainability results?

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IMPORT CONFIRMATION

Social Sustainability

- Petra Diamonds has a complete sustainability program including helping local communities where they have operations (i.e., mine closure plans, water management, energy use, provide employment to remote locations, mining rights, social compliance matrix, and so on.
- Champion local and national regulations on protecting the environment
- Enforce the Kimberly non-conflict diamond system
- Seal non-conflict diamonds in tamper proof containers
- Register diamond shipments within the global and country economies
- Breeding programs for endangered animals and fishes
- DeBeers Canada has a sustainability policy that helps ensure the rights of aboriginal people including burial grounds, best work practices, and religious sites.
- DeBeers Canada support for local mining communities called “Social Investment.”
- DeBeers develops with local communities joint sustainability plans for soil, vegetation, wildlife, air quality, and water and energy conservation.
- DeBeers post mining system (called Environmental Management System) tries to identify and mitigate a productive, self-sustaining, and hazard free post-mining environment (site).

Environmental Sustainability

- Reduce mining footprint (square area) on surface
- Minimize waste alluvial and storage

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- Maintain biodiversity by planting and culturing endangered plants on or around the mining site
- Fund loss of fish habitat by sponsoring new lakes, preserves, and water recycling
- Black Diamond Company has a sustainability program that encourages continuous reductions in energy, water, and chemical use
- Diavik Diamond Mine in Canada sues underground haul trucks that use special energy efficient engines, recycle waste oil, decreased 10,000 tons of carbon dioxide generation in 2014, and built a wind farm.

Financial (Economic) Sustainability

- Long-term land – use planning around mines
- Champion protected areas
- Constant risk management regarding sustainability strategy, policy, and results
- Provide local jobs, pay taxes, and support the local and national economy
- Support infrastructure improvements such as roads, airstrips, power plants, and railroads
- DeBeers donates a percentage of its pre-tax profits to community causes in countries it operates in—1 to 3.5 percent. Supposedly, DeBeers paid $3 billion to African countries overall in 2013.

3. **Write a short two-page paper on "blood diamonds" and/or "ethical diamonds." Define each and explain the positives and negatives for this social sustainability issue. What should be the role of diamond producers? What is the role of operations managers in this industry?**

Solution
See the answer to Question #2 above.

Blood diamonds finance armed conflicts and civil wars. Worst cases include the conflicts in Angola and Sierra Leone (1991-2000). The conflict in the later displaced one-half of Sierra Leone' population of five million and claimed the lives of 75,000 people. The 2006 film titled *Blood Diamonds* starring Leonardo DiCaprio raised awareness of this issue in public arenas.

Ethical diamonds are certified to be free of violations in child labor, environmental pollution, worker exploitation, regulated work environments and labor laws, meet legal and regulatory requirements, poor working conditions, and so on, including financing revolution, civil wars, and armed conflicts.

Note that the question asks students to define both! Blood diamonds are a subset of non-ethical diamonds. We are sure you will be careful not to offend any student during class discussions. You, the instructor, must control the discussion.

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Diamond related corporations and the global diamond industry should promote improved sustainability practices. Global sourcing (purchasing), for example, can improve by "certifying diamonds" (much like Honda certifies a supplier) are ethical diamonds.

Brilliant Earth built their reputation on trying to guarantee ethical gems. (See answer to Case Question # 6 on reverse logistics and Brilliant Earth).

Students will also cite a series of USA Executive Orders and regulations like the Clean Diamond Trade Act in 2003 that banned blood and non-ethical diamonds but most of these actions did little to stop their illegal trade.

Other issues students will discuss may include:

- Child labor
- Forced labor
- Employee and vendor safety
- Employee health
- ISO Standards such as ISO-9001 (quality management), ISO-14000 (Environmental Management), and ISO-26000 (Social Responsibility Guidelines).
- Work hours
- Compensation
- Discrimination
- Rights of collective bargaining
- Supplier and company "certification" on sustainability issues

OM managers have a responsibility to champion ethical jewelry and diamonds throughout the supply chain. Ask your class, Do OM managers have responsibility for environmental sustainability? Social sustainability? The answer is yes in everyday operating decisions and for top management in terms of defining corporate and operational strategy and policy on sustainability.

Students can apply the concepts in Exhibit 1.13 to a jewelry store and its supply chain. They will discover that many stones are not traceable through the value chain, counterfeit conflict-free stones with documentation exist, pollution from mining exist, the Kimberley Process Certification Scheme is a nice idea with good intentions but to-date it has not worked so well, the value chain is packed with substitute and fraudulent blood, synthetic, and conflict stones; diamonds and gems don't wear out, and therefore, might be centuries old and sold and resold many times, and so on. It is a value chain with many sustainability issues.

Environment Sustainability (waste management, energy optimization, transportation optimization, technology upgrades, air quality, sustainable product design)

- Black Diamonds Vendor Code defines standards for working conditions, safety, and production process that must be environmentally responsible.

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- Some companies along the diamond supply chain use the Higgs Index to measure the environmental impact of their brands, facilities, and products.
- Black Diamond uses wind power to generate its energy for laser cutters, equipment, lighting, and CNC machines.
- Dominion Diamond adjusts its underground mine temperature to minimize greenhouse gas emissions yet keep people and equipment comfortable.
- 3D CAD at the retail store level is a technology upgrade but it uses much energy.
- Over fifty percent of a typical rough diamond is waste. (Where does it go?)
- Good and bad waste management examples exist for mines, cutting and polishing, and jewelry assembly.
- Diamonds are a sustainable product design in the sense they are reusable.
- The carbon footprint for global stone and jewelry transport is unknowable but value chain corporations could do more to reduce it.
- Mining and jewelry manufacturing need a sustainability strategy on pollution, water and energy management, and so on.
- Corporate plans for soil, vegetation, wildlife, air quality, water, and energy are a few areas of concern.
- DeBeers increased water recycling by 13% in one year without any change to operations.

Social Sustainability (product safety, workforce health and safety, ethics and governance, community)

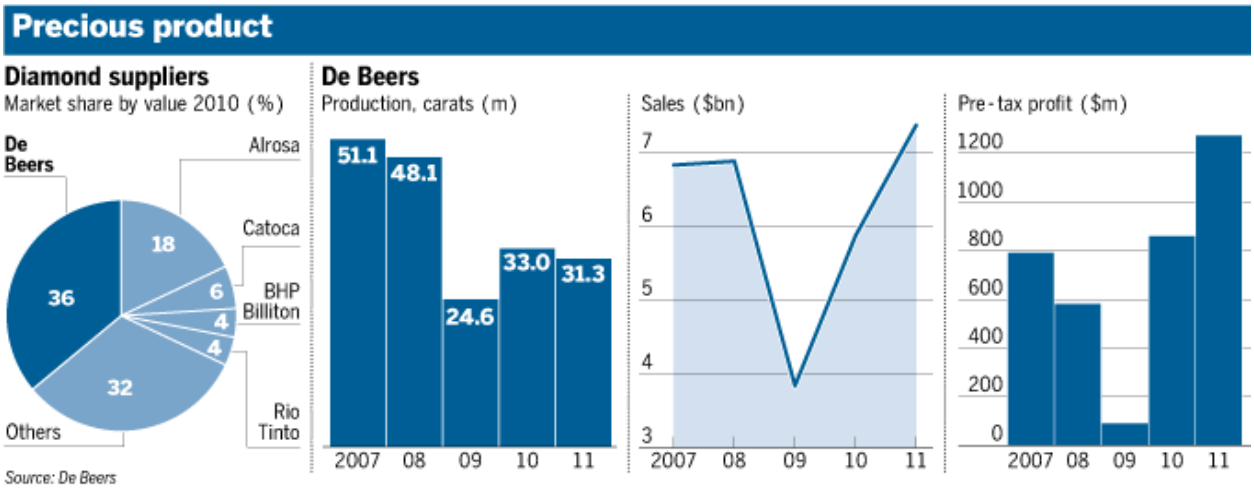
- Petra Diamonds supports funding for the prevention, treatment, and education of villages surrounding their mines for diseases such as HIV, tuberculosis, and malaria.
- Diamond and gem mines (i.e., suppliers) are notorious for bad work practices such as mine accidents, child labor, long working hours, fraud and bribes to country officials, and so on. Product safety, workforce health and safety, ethics and governance, and contributing to the quality of life of their community are all part of social sustainability. Students will provide examples of good and bad social sustainability practices.
- At the other end of the value chain retail stores normally make positive contributions to social sustainability such as sponsoring scholarships and student internships, goodwill projects via local Chamber of Commerce and other business associations, sponsor street parades and school events, and so on.
- Kimberley Certificates of Authenticity are better than nothing but they are not counter-proof.

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Economic Sustainability (performance excellence, financial management, resource management, emergency preparedness)

- Performance excellence, financial management, resource management, and emergency preparedness are the four sub perspectives.
- Security costs all along this value chain are high compared to consumer goods value chains such as Target, Wal-Mart, and Kroger.
- Students will discover much on the web and library about how value-added increases as stones are processed along the value chain.



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Chapter 1 – Operations Management Value Chains

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Purpose and Perspective of the Chapter

The first chapter introduces students to the basic concepts of operations management and value chains in both goods-producing and service-providing organizations. We explain the importance of OM, what operations managers do, the differences between goods and services, the concept of value, customer benefit packages, differences between value and supply chains, value chain frameworks, historical developments of OM, and current challenges.

Questions are provided in two categories:

1. Review questions
2. Discussion questions and experiential activities

There are no computational or Excel-based problems and exercises.

While analytics and big data are discussed in the historical developments section, there are no computational or Excel-based problems or exercises in this chapter. Exhibit 1.14 summarizes Excel spreadsheet templates available to students that will be used in the rest of the book.

The chapter has three cases plus an integrative case:

1. ***Walker Digital Music Services*** is the first case study. It focuses on the concepts of goods versus services, value, and the value chain.
2. ***Mickey Mouse: To Talk or Not?*** is the first case study. It focuses on service operations, service encounters, and job and process design.
3. ***Zappos: A Subsidiary of Amazon*** allows students to consider what operations and logistic managers do in a modern supply chain.
4. The integrative case study, ***Diamond Global Supply Chain*** - ***Hudson Jewelers***, with case assignment questions in all chapters, requires the student to characterize the jewelry store in terms of one of three value chain frameworks, research major diamond producers and their sustainability practices, and write a short paper on "blood and/or ethical diamonds," and implications for social sustainability and the role of operations managers in this industry.

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Cengage Supplements

Additional instructor and student resources for this product are available online at www.cengage.com.

List of Instructor Downloads

The following product-level supplements provide additional information that may help you prepare for your course. They are available in the Instructor Resource Center.

- Solutions and Answers Guide.
- Educator's Guide.
- PowerPoint slides
- Test bank powered by Cognero.
- Excel solution files are available for certain book exercises the require computer generated solutions (New).

List of Student Downloads

Students should download the following items from the Student Companion Center to complete the activities and assignments:

- Excel datasets.
- Excel workbooks.

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Chapter Objectives

This chapter addresses the following objectives:

LO 1-1 Explain the concept and importance of operations management.

LO 1-2 Describe what operations managers do.

LO 1-3 Explain the differences between goods and services.

LO 1-4 Define the concept of value and explain how the value of goods and services can be enhanced.

LO 1-5 Describe a customer benefit package.

LO 1-6 Explain the difference between value chains and supply chains and identify three general types of processes in a business.

LO 1-7 Contrast the three different frameworks for describing value chains.

LO 1-8 Summarize the historical development of OM.

LO 1-9 State the current and future key challenges facing OM.

Complete List of Chapter Activities and Assessments

For additional guidance, refer to the Teaching Online Guide.

Chapter Objective	PPT slide	Activity/Assessment	Duration
1-1	4-6	Activity in PPT	30 minutes
1-3	7-9	Activity in PPT	30 minutes
1-4	10	Activity in PPT	10 minutes
1-5	11-13	Activity in PPT	30 minutes
1-6	14-16	Activity in PPT	30 minutes
1-7	17-21	Activity in PPT	45 minutes
1-8	22-26	Activity in PPT	45 minutes
1-9	27	Activity in PPT	10 minutes
1-1 to 1-9	28-29	Questions, Problems, Exercises	2 hours
1-4, 1-6, 1-8		Knowledge Checks in PPT	20 minutes

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Key Terms

Biztainment is the practice of adding entertainment content to a bundle of goods and services in order to gain competitive advantage.

Business analytics is a process of transforming data into actions through analysis and insights in the context of organizational decision making and problem solving.

A **customer benefit package (CBP**) is a clearly defined set of tangible (goods content) and intangible (service-content) features that the customer recognizes, pays for, uses, or experiences.

Distribution centers (DCs) are warehouses that act as intermediaries between factories and customers, shipping directly to customers or to retail stores where products are made available to customers.

A **durable good** is one that does not quickly wear out and typically lasts at least three years.

Economic sustainability is an organization's commitment to address current business needs and economic vitality, and to have the agility and strategic management to prepare successfully for future business, markets, and operating environments.

Environmental sustainability is an organization's commitment to the long term quality of our environment.

A **good** is a physical product that you can see, touch, or possibly consume.

Industry 4.0 is the information-intensive transformation of manufacturing in a connected environment of big data, people, processes, services, systems, and IoT-enabled industrial assets.

Inventory refers to raw materials, work-in-process, or finished goods that are maintained to support production or satisfy customer demand.

Moments of truth are episodes, transactions, or experiences in which a customer comes into contact with any aspect of the delivery system, however remote, and thereby has an opportunity to form an impression.

A **nondurable good** is one that is no longer useful once it's used, or lasts for less than three years.

Operations management (OM) is the science and art of ensuring that goods and services are created and delivered successfully to customers.

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Peripheral goods or services are those that are not essential to the primary good or service but enhance it.

A **primary good or service** is the "core" offering that attracts customers and responds to their basic needs.

A **process** is a sequence of activities that is intended to create a certain result.

A **service** is any primary or complementary activity that does not directly produce a physical product.

Service 4.0 is applying digitization to services that create higher productivity, innovation, and value chain advantages in service industries.

A **service encounter** is an interaction between the customer and the service provider.

Service management integrates marketing, human resources, and operations functions to plan, create, and deliver goods and services, and their associated service encounters.

Social sustainability is an organization's commitment to maintain healthy communities and a society that improves the quality of life.

A **supply chain** is the portion of the value chain that focuses primarily on the physical movement of goods and materials, and supporting flows of information and financial transactions through the supply, production, and distribution processes.

Sustainability refers to an organization's ability to strategically address current business needs and successfully develop a long-term strategy that embraces opportunities and manages risk for all products, systems, supply chains, and processes to preserve resources for future generations.

Value is the perception of the benefits associated with a good, service, or bundle of goods and services in relation to what buyers are willing to pay for them.

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

A **variant** is a CBP feature that departs from the standard CBP and is normally location or firm specific.

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Chapter Outline

I. 1-1 Operations Management (OM) (PPT slides 4-6)
   a. 1-1 Operations Management (OM)
      1. **Operations Management (OM)** is *the science and art of ensuring that goods and services are created and delivered successfully to customers.*
      2. OM includes:
         (1) Design of goods, services, and the processes that create them
         (2) Day-to-day management of processes
         (3) Continual improvement of goods, services, and processes
      3. OM depends on:
         (1) Efficiency
         (2) Cost of operations
         (3) Quality of goods
   b. 1-1 What do Operations Managers Do?
      1. Forecasting
      2. Supply Chain Management
      3. Facility Layout and Design
      4. Technology Selection
      5. Quality Management
      6. Resource and Capacity Management
      7. Purchasing
      8. Process Design
      9. Job Design
      10. Service Encounter Design
      11. Scheduling
      12. Sustainability
   c. 1-1 Internet of Thing (IoT)
      1. **Industry 4.0**
         (1) Also called the 4th industrial revolution.
         (2) Prominent in manufacturing.
         (3) *The information-intensive transformation of manufacturing in a connected environment of big data, people, processes, services, systems, and IoT-enabled industrial assets.*
      2. **Service 4.0**
         (1) Prominent in service.
         (2) *The application of digitization to services that creates higher productivity, innovation, and value chain advantages in service industries.*

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II. 1-3 Understanding Goods and Services (PPT slides 7-9)

a. 1-3 Understanding Goods and Services

1. **Good**: *Physical product that a person sees, touches, or consumes*.
   (1) **Durable good**: a product that does not quickly wear out and lasts at least three years.
   (2) **Non-durable good**: a product that perishes and lasts for less than three years.
2. **Service**: *Primary or complementary activity that does not directly produce a physical product*.
   (1) Driven by customers and providing value and satisfaction to customers who purchase and use them.
   (2) Standardized or customized to individual wants and needs.

b. 1-3 Differences Between Goods and Services

Function	Goods	Services
Tangible	Yes	No
Requires direct involvement with customer	No	Yes
Prediction of demand	Easier	More difficult
Stored as physical inventory	Yes	No
Service management skills	Not required	Must be efficient
Location of facilities	Manufacturing facility can be anywhere	Facility must be located in proximity of client
Protected by patent	Yes	No

c. 1-3 Service Management

1. **Service management** *integrates marketing, human resources, and operations functions to*
   (1) plan
   (2) create
   (3) *deliver goods and services*
   (4) *deal with associated service encounters*
2. A **service encounter** is *an interaction between the customer and the service provider*.
   (1) Service encounters consist of one or more *moments of truth*.
3. **Moments of truth** are *any episodes, transactions, or experiences in which a customer comes into contact with any aspect of the delivery system, however remote, and has an opportunity to form an impression*.

III. 1-4 The Concept of Value (PPT slide 10)

a. 1-4 The Concept of Value

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1. **Value** is *the perception of the benefits associated with a good, service, or bundle of goods and services in relation to what a buyer pays.*
    (1) Goods or services are perceived favorably by customers if the ratio of perceived benefits to price to the customer is high.
    (2) Value = $\frac{\text{Perceived benefits}}{\text{Price (cost) to the customer}}$
2. To increase value, an organization must do one of the following
    (1) increase perceived benefits while holding price or cost constant
    (2) increase perceived benefits while reducing price or cost
    (3) decrease price or cost while holding perceived benefits constant

IV. 1-5 Customer Benefit Packages (PPT slides 11-13)

a. 1-5 Customer Benefit Packages

1. A **customer benefit package (CBP)** is *a clearly defined set of tangible and intangible features that a customer recognizes, pays for, uses, or experiences*.
    (1) A CBP consists of a *primary good or service* coupled with *peripheral goods and/or services*, and sometimes *variants*.
        (a) A **primary good or service** is *the "core" offering that attracts customers and responds to their basic needs*.
        (b) The **peripheral goods or services** are *offerings that are not essential to the primary good or service but enhance it*.
        (c) A **variant** is *a location- or firm-specific CBP attribute that departs from the standard CBP*.

b. 1-5 A CPB Example for Purchasing a Vehicle

1. Primary good: Vehicle
2. Peripheral goods:
    (1) Free gourmet coffee & tea
    (2) Free wash anytime
    (3) Replacement parts
3. Peripheral services:
    (1) Financing and leasing
    (2) Free credit reports
    (3) High-speed internet
4. Variant: Fishing pond

c. 1-5 Biztainment

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1. **Biztainment** is the practice of adding entertainment content to a bundle of goods and services in order to gain a competitive advantage.
2. Biztainment can be applied to both manufacturing and service settings:
    (1) Manufacturing
    (2) Retail
    (3) Restaurants
    (4) Agriculture
    (5) Lodging
    (6) Telecommunications

V. 1-6 Value Chains (PPT slides 14-16)

a. 1-6 Value Chains

1. A *value chain* is a network of facilities and processes.
    (1) A **value chain** describes *the flow of materials, finished goods, services, information, and financial transactions from suppliers through the facilities and processes that create goods and services and those that deliver them to the customer*.
2. A *supply chain* is a portion of the value chain.
    (1) A **supply chain** focuses primarily on the physical movement of goods and materials and supports flows of information and financial transactions through the supply, production, and distribution processes.

b. 1-6a Processes

1. A **process** is *a sequence of activities intended to create a certain result, such as a physical good, a service, or information*.
2. A practical definition of a process (source: AT&T) is
    (1) A process is how work creates value for customers.
3. Key business processes:
    (1) **Value-creation (core) processes**: producing or delivering an organization's primary goods or services that create value for customers.
    (2) **Support processes**: purchasing, managing inventory, installation, health benefits, technology acquisition, daycare services, and research.
    (3) **General management processes** focus on accounting and information systems, human resource management, and marketing.

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c. 1-6a Value-Creation Processes
    1. Value-creation processes ensure that customer wants and needs lead to perceived benefits.
    2. General management and support processes coordinate and support value creation and delivery.

VI. 1-7 Value Chain Frameworks (PPT slides 17-21)

a. 1-7a An Input-Output Framework of a Value Chain
    1. A value chain is a "cradle-to-grave" input-output model of the operations function.
    2. The value chain begins with suppliers who provide inputs to a goods- or service-providing process.
    3. Inputs are transformed into goods and services through core processes.
    4. The value chain outputs—goods and services—are provided to customers/ market segments.

b. 1-7b The Value Chain at Buhrke Industries Inc.
    1. Buhrke Industries provides stamped metal parts to several industries.
    2. Inputs are transformed into goods and services through value chain processes that are supported by resources.
    3. The value chain outputs are delivered or provided to customers and targeted market segments.

c. 1-7c Pre- and Postproduction Services Framework
    1. Pre- and postproduction services complete the ownership cycle for the good or service.
    2. Preproduction services are front-end services focused on "gaining a customer."
    3. Postproduction services are back services focused on "keeping a customer."

d. 1-7d The Value Chain at Amazon

e. 1-7e A Goods-Producing Supply Chain Structure
    1. A supply chain is a hierarchical arrangement of suppliers, manufacturers, distributors, retailers, and customers.
    2. Raw materials are transported from suppliers to manufacturing facilities for production of finished goods.
    3. Finished goods are shipped to distribution centers.
    4. **Distribution centers (DC)** are warehouses operated by distributors acting as intermediaries to the customers.

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5. **Inventory** refers to raw materials/work-in-process/finished goods maintained to support production or demand.

VII. 1-8 OM: A History of Change and Challenge (PPT slides 22-26)

a. 1-8 Eight Major Eras of Operations Management

b. 1-8f Sustainability

1. **Sustainability** refers to *an organization's ability to address current business needs strategically and develop a long-term strategy that embraces opportunities, manages risks, and preserves resources*.
2. The three main perspectives of sustainability are:
   (1) **Environmental sustainability** is *an organization's commitment to the long-term quality of the environment*.
   (2) **Social sustainability** is *an organization's commitment to maintaining healthy communities and a society that improves the quality of life*.
   (3) **Economic sustainability** is *an organization's commitment to addressing current business needs and economic vitality.*

c. 1-8f Examples of Sustainability Practices

1. **Environmental Sustainability**
   (1) Waste management
   (2) Energy optimization
   (3) Transportation optimization
   (4) Technology upgrades
   (5) Air quality
   (6) Sustainable product design
2. **Social sustainability**
   (1) Product safety
   (2) Workforce health and safety
   (3) Ethics and governance
   (4) Community
3. **Economic sustainability**
   (1) Performance excellence
   (2) Financial management
   (3) Resource management
   (4) Emergency preparedness

d. 1-8g Analytics

1. Companies leverage data to create competitive advantage using a discipline called *business analytics*.

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2. **Business analytics** is *the process of transforming data into actions through analysis and insights in the context of decision-making and problem-solving*.
3. Supplements at the end of the book provide introductions to the following analytics topics:
    (1) Probability and statistics
    (2) Decision Analysis
    (3) Break-Even Analysis
    (4) Linear Optimization
    (5) The Transportation and Assignment Models
    (6) Queueing Models
    (7) Simulation

e. 1-8g Big Data
1. **Big data** refers to *massive amounts of business data from a wide variety of sources, much of which is available in real-time*.
    (1) Big data helps retailers make optimum inventory decisions.
    (2) Big data, such as weather and traffic data, helps supply chains to improve routing and delivery decisions.
    (3) Big data helps improve manufacturing, process flow, quality, and preventive maintenance.
    (4) Big data analytics supports service businesses such as targeted advertising, virtual banking, remote medical diagnosis by artificial intelligence, self-driving vehicles, etc.

VIII. 1-9 Current and Future Challenges (PPT slide 27)

a. 1-9 Current and Future Challenges in OM
1. ***Customers*** demand goods with new and improved features.
2. ***Technology*** continues to evolve at a rapid pace.
3. Today's **workforce** requires new skills, more diversity, and better management.
4. Firms must contend with **globalization** in a "borderless marketplace".
5. **Sustainability** is a fourth major performance area in addition to the traditional cost, quality, and time.
6. ***Optimizing supply chains*** presents new challenges in terms of determining where to best source raw materials, components, and finished goods.
7. ***Exploiting Industry 4.0/Service 4.0*** will lead to applications that are customized to customers.

IX. Knowledge Checks (PPT slides 28-29)

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a. Check Your Knowledge 1.1
    1. The value of goods and services can be determined by dividing (#8, LO 1-4)
        (1) actual benefits by perceived benefits.
        (2) perceived benefits by price (cost) to customer.
        (3) cost to the seller by actual benefits.
        (4) cost to the customer by cost to the seller.
    2. Which of the following statements about value-creation (core) processes is true? (#12, LO 1-6)
        (1) They are "behind-the-scenes" processes that support primary processes.
        (2) They include the processes of inventory management and research and development.
        (3) They include the processes of human resource management and marketing.
        (4) They are focused on delivering an organization's primary goods or services that create value for customers.

b. Check Your Knowledge 1.2
    1. Which of the following statements about sustainability is true? (#16: LO 1-8)
        (1) The application of sustainable technology is limited to the agriculture industry.
        (2) The use of sustainable technology reduces short-term operational costs.
        (3) The three dimensions of sustainability are often referred to as the "triple bottom line."
        (4) The use of sustainable technology results in immediate profits.
    2. The process of transforming data into actions through analysis and insights in the context of organizational decision-making and problem-solving is (#17: LO 1-8)
        (1) inventory management.
        (2) data warehousing.
        (3) business analytics.
        (4) market basket analysis.

X. Review Questions
    a. #1 (LO 1-1, PPT slides 4-6)
    b. #4 (LO 1-2)
    c. #6 (LO 1-3, PPT slides 7-9)

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d. #7 (LO 1-4, PPT slide 10)
e. #10 (LO 1-5, PPT slides 11-13)
f. #12 (LO 1-6, PPT slides 14-16)
g. #14 (LO 1-7, PPT slides 17-21)
h. #18 (LO 1-8, PPT slides 22-26)
i. #20 (LO 1-9, PPT slide 27)

XI. Discussion Questions and Experiential Activities

a. #21 (LO 1-1, PPT slides 4-6)
b. #26 (LO 1-2)
c. #31 (LO 1-3, PPT slides 7-9)
d. #32 (LO 1-5, PPT slides 11-13)
e. #34 (LO 1-6, PPT slides 14-16)
f. #37 (LO 1-7, PPT slides 17-21)
g. #39 (LO 1-8, PPT slides 22-26)
h. #42 (LO 1-9, PPT slide 27)

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Appendix

Generic Rubrics

Providing students with rubrics helps them understand expectations and components of assignments. Rubrics help students become more aware of their learning process and progress, and they improve students' work through timely and detailed feedback. Customize these rubrics as you wish. The writing rubric indicates 40 points, and the discussion rubric indicates 30 points.

Standard Writing Rubric

Criteria	Meets Requirements	Needs Improvement	Incomplete
Content	The assignment clearly and comprehensively addresses all questions in the assignment. 15 points	The assignment partially addresses some or all questions in the assignment. 8 points	The assignment does not address the questions in the assignment. 0 points
Organization and Clarity	The assignment presents ideas in a clear manner and with a strong organizational structure. The assignment includes an appropriate introduction, content, and conclusion. The coverage of facts, arguments, and conclusions is logically related and consistent. 10 points	The assignment presents ideas in a mostly clear manner and with a mostly strong organizational structure. The assignment includes an appropriate introduction, content, and conclusion. The coverage of facts, arguments, and conclusions are most logically related and consistent. 7 points	The assignment does not present ideas in a clear manner and with a strong organizational structure. The assignment includes an introduction, content, and conclusion, but coverage of facts, arguments, and conclusions are not logically related and consistent. 0 points
Research	The assignment is based upon appropriate and adequate academic literature, including peer-reviewed journals and other scholarly work. 5 points	The assignment is based upon adequate academic literature but does not include peer-reviewed journals and other scholarly work. 3 points	The assignment is not based upon appropriate and adequate academic literature and does not include peer-reviewed journals and other scholarly work. 0 points
Research	The assignment follows the required citation guidelines. 5 points	The assignment follows some of the required citation guidelines. 3 points	The assignment does not follow the required citation guidelines. 0 points
Grammar and Spelling	The assignment has two or fewer grammatical and spelling errors. 5 points	The assignment has three to five grammatical and spelling errors. 3 points	The assignment is incomplete or unintelligible. 0 points

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Standard Discussion Rubric

Criteria	Meets Requirements	Needs Improvement	Incomplete
Participation	Submits or participates in the discussion by the posted deadlines. Follows all the assignment's instructions for the initial post and responses. 5 points	Does not participate or submit discussion by the posted deadlines. Does not follow instructions for initial post and responses. 3 points	Does not participate in the discussion. 0 points
Contribution Quality	Comments stay on task. Comments add value to the discussion topic. Comments motivate other students to respond. 20 points	Comments may not stay on task. Comments may not add value to the discussion topic. Comments may not motivate other students to respond. 10 points	Does not participate in the discussion. 0 points
Etiquette	Maintains appropriate language. Constructively offers criticism. Provides both positive and negative feedback. 5 points	Does not always maintain the appropriate language. Offers criticism offensively. Provides only negative feedback. 3 points	Does not participate in the discussion. 0 points

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