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CHAPTER 1
INTRODUCTION TO OPERATIONS MANAGEMENT

Teaching Notes

The initial meeting with the class (the first chapter) is primarily to overview the course (and textbook), and to introduce the instructor and their interest in Operations Management (OM). The course outline (syllabus), the objectives of the course and topics, chapters, and pages of text covered in the course, as well as problems/mini-cases to be done in class, videos to watch, Excel worksheets to use, etc. are announced to the class.

Many students may know little about OM and the types of jobs available. This point can be addressed in order to generate enthusiasm for the course. The Learning Objectives at the beginning of the chapter indicate the highlights of the chapter.

Answers to Discussion and Review Questions

1. Operations management is the management of processes (i.e., the sequence of activities and resources) that create goods and/or provide services.

2. Production/operations planner/scheduler/controller, demand planner (forecaster), quality specialist, logistics coordinator, purchasing agent/buyer, supply chain manager, materials planner, inventory clerk/manager, production/operations manager.

3. a. Because a large % of a company's expenses occur in operations, e.g., purchasing materials and workforce salaries, more efficient operations can result in large increases in profits.
   b. A number of management jobs are in OM.
   c. Activities in all other areas of any organization are all interrelated with OM.
   d. Operations innovations lead to marketplace and strategic benefits.

4. The three major functions of organizations are operations, finance, and marketing. Operations is concerned with the creation of goods and services identified by marketing, finance is concerned with provision of funds necessary for operations and investment of extra funds, and marketing is concerned with promoting and/or selling goods or services.

5. The operations function consists of all activities that are directly related to producing goods or providing services. It adds value during the transformation process (the difference between the cost of inputs and price of outputs). An operations manager manages the transformation function. He/she is responsible for planning and using the resources (labour, machines, and materials). The kind of work that operations managers do varies from organization to organization (largely because of the different goods or services involved). For example, a store/restaurant manager is in effect an operations manager. See Table 1-4 for examples of typical activities performed by operations managers.

6. Design decisions are usually strategic and long term (1–5 years or so ahead), whereas planning and control decisions are shorter term. In particular, planning decisions are tactical and medium term (1–12 months or so ahead), and control decisions (including scheduling and execution) are

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short term (1–12 weeks or so ahead). *Design* involves decisions that relate to goods and service design, capacity, acquisition of equipment, arrangement of departments, and location of facilities. *Planning/control activities* involve management of personnel, quality control/assurance, inventory planning and control, production planning, and scheduling.

7. Important differences between producing goods and performing services are:
   (1) Customer contact, use of inventories, and demand variability
   (2) Uniformity of input
   (3) Labour content of jobs
   (4) Uniformity of output
   (5) Measurement of productivity
   (6) Quality Assurance

8. Answers might vary for each student. Examples include Teaching, personal services such as haircut, lawn mowing, maid service, and car wash. The customer or something belonging to the customer is being transformed.

9.
   - dealing with labour difficulties, solving personnel problems, solving management problems, solving technical problems
   - making OM decisions, including general management decisions (planning, organizing, controlling, and directing)
   - innovating, personal initiatives, improving productivity
   - representing operations in upper management

10. a. The Industrial Revolution began in the 1770s in England and spread to the rest of Europe and North America in the late eighteenth century and the early nineteenth century. A number of inventions such as the steam engine, the spinning jenny, and the power loom helped to bring about this change. Later machines made of iron were built. Two concepts assisted in large-scale production: division of labour and interchangeable parts. Despite the major changes that were taking place, management theory and practice had not progressed much from early days. What was needed was a systematic approach to management.

    b. Frederick W. Taylor spearheaded the scientific management more than a century ago. The science of management movement was based on observation, measurement, analysis, improvement of work methods, and economic incentives. He also published a book titled *The Principles of Scientific Management* in 1911. Other pioneers who contributed to scientific management include Frank Gilbreth, often referred to as the father of time and motion study, and his wife Lillian Gilbreth, and Henry Gantt.

    c. An interchangeable part is a part made to such precision that all units of the part would fit any particular product it is made for. It meant that individual parts would not have to be custom-made (they were standardized). The standardized parts could also be used as replacement parts. The result was a tremendous decrease in assembly time and cost.

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d. Division of labour is breaking up a production process into a series of tasks, each performed by a different worker. It enabled a worker to learn the job and become proficient at it more quickly, and avoid the delays of having a single worker shifting from one activity to another.

11. a. The service sector accounts for more than 79 percent of jobs in Canada and this continues to increase. Some examples include government services, finance and insurance, healthcare, education, professional and technical services.

b. Manufacturing is important because it produces the goods that we use, and many service jobs are dependent on manufacturing because they support manufacturing. Manufacturing produces food and beverage, textile and clothing, petroleum, chemicals, machinery, computer and electronic products, electrical equipment, and transportation equipment.

12. A model is an abstraction of reality, a simplified representation of something. Models can be mathematical, schematic, or statistical. Models ignore the unimportant details so that attention can be concentrated on the most important aspects, thus increasing the opportunity to understand a problem and its solution. Models allow experiments that could be very costly to do in real life.

13. From Table 1-6: e.g., Frederick W. Taylor, Frank Gilbreth, Henry Gantt, Henry Ford, F.W. Harris, W. Shewhart, W. Edwards Deming, Joseph Orlicky, and Taiichi Ohno.

14. Answers might vary for each student.

a. Pros (for owning a car): convenience, flexibility
   Cons (for owning a car): costs (initial, insurance, maintenance & repairs, gas), parking

b. Pros (for buying now): availability
   Cons (for buying now): technology change, reduced cost in future

c. Pros (for new car): reliability, warrantee
   Cons (for new car): more expensive, higher insurance, higher depreciation

d. Pros (for speaking up in class): develop favourable image with instructor, feel more confident
   Cons (for speaking up in class): risk of being wrong, appearance of showing off

15. Craft production: involves skilled workers producing high variety of customized goods at low quantity, utilizing general-purpose equipment. The main advantage is the flexibility to produce a wide variety of goods providing many choices to customers. The main disadvantage is its inability to produce at low cost. Examples: custom tailor, machine shop, print shop, and landscaping.

Mass production: involves low-skilled workers producing a few standardized goods at high quantity, utilizing specialized equipment. The main advantage is low cost efficient production. The main disadvantage is that it does not allow easy changes in quantity of output, the product, or the process. Examples: paper, sugar or salt or crude oil refining, and soft drink-bottling.

Lean production (or just-in-time): involves highly skilled workers producing a high variety of goods at high quantity, using flexible equipment. It requires high level of employee involvement and teamwork. It combines the advantages of both mass production (high quantity, low cost) and craft production (variety, flexibility). Examples: automobiles, computers, and appliances.

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16. Compared to workers in mass production, much more is expected of workers in lean production. They must be able to function in teams and play active roles in operating and improving the system. This can lead to pressure and anxiety. Moreover, a flatter organizational structure means career paths are not as steep in lean production organizations. Unions often oppose conversion to a lean system because they view the added responsibility and multiple tasks as an expansion of job requirements without comparable increases in pay. In addition, workers sometimes complain that the company is the primary beneficiary of employee-generated improvements.

17. Answers might vary for each student. Use of modern technology like computers, cell phones, and microwaves has had positive effects on people's lives. Instant communication and easy access to information are some of the advantages. However, there are some downsides. As a result of technology, many of us are less active, thus have gained weight and are less healthy. Another downside is that automation has replaced jobs that were previously done by manual labour, e.g., robots for welding car bodies.

18. Long-term trends in OM include increasing use of Internet & e-commerce, other technologies, globalization, supply chain management, and sustainability. Personally, it is likely that the use of Internet for purchasing has increased, more machines and computers are being used in one's daily life, more international purchases is being made, more use of package delivery services, such as Purolator, FedEx, and UPS, is being made, and there is more recycling at work and at home.

19. Many examples are possible. These may include:
    - cheating in an exam
    - copying someone else's homework assignment
    - lying in the resume

20. Value added is defined as the difference between the cost of inputs and the value or price of output. As the inputs are transformed to outputs, value is added to products in a number of different ways. For example, value can be added by changing the product structurally (physical change) or transporting it (it may have more value somewhere else).

21. A supply chain is the sequence of organizations involved in producing and delivering a product. Supply chain management is the coordination and collaboration of members of a supply chain.

22. Sustainability refers to reduced use of resources and reduced harm to the environment so that future human existence is not threatened. Sustainability is important because life depends on clean air, water, and soil, and concern about global warming and pollution is having an increasing effect on how businesses operate. Governments are imposing stricter environmental regulations to reduce carbon footprint.

23. The processes can be classified as core, support, and managerial.
    - *Core processes* include taking customer reservations, customer communication, checking and boarding, in-flight service, and baggage handling.
    - *Support processes* include employee recruitment, training, buying aircraft, maintaining aircraft, and buying fuel and spare parts.

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- *Managerial processes* include forecasting demand, capacity and flight planning, locating maintenance facilities, scheduling planes/pilots/crew/counter staff/baggage handlers, managing inventories, and Assuring quality.

24. Business analytics is comprised of software used to build analysis models and simulations to create scenarios, understand realities, and predict future states. Business analytics includes data mining, predictive analytics (forecasting), applied analytics, and statistics.

25. An internal customer-supplier relationship involves the way two departments of an organization are connected. The supplier department provides goods and services to the customer department.

Answers to Taking Stock Questions

1. A *trade-off* is a balance achieved between two incompatible features; a compromise. It is important to consider *all* the consequences of a decision in order to make a measured decision which will have the best net result. Forgetting one advantage or disadvantage may result in a wrong decision.

2. An organization, by definition, is a group of individuals who work together to achieve a goal, make goods, or provide services. If functional areas do not collaborate, the organization is like an out-of-tune engine or unsynchronized orchestra, clearly not as effective and efficient as it could be. For example, if marketing and operations don't communicate well, either there will be lost sales or unwanted goods.

3. Technology has affected Operations in terms of computer usage (Internet, office and manufacturing software, e.g., CAD, ERP), machines (automation, e.g., CNC), and new materials (e.g., recycled plastic).

4. Because they will be deprived of education. It is well-known that level of education is a major determinant of life-long income.

Answers to Critical Thinking Exercises

1. Manufacturers have the luxury of making the products earlier than the time customers need them. Therefore, quality and timing problems can be fixed. Also, production can be evenly distributed over the work day (e.g., 8-hour a day shift as opposed to operating in the evenings or nights for services). Service providers have to present their staff and their facility in an attractive way because the customer will be able to see them. Importance of servers implies more time spent on recruiting, training, evaluating, and motivating. Services should be prepared for a wider variety of inputs (customers) and outputs. For example, an airline should be prepared to deal with problem passengers. Defining a service and measuring it are generally more difficult. Hence, improving productivity and quality of a service are generally more difficult.

2. Jobs that involve creativity are usually not well-defined. Consider, for example, teaching. There is no unique process for teaching a topic. However, there are some common steps that should be followed. Students should have the right background, the topic should be divided in easy-to-learn

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segments, qualified instructors are employed, and students are tested frequently. This is a process and can be managed. OM doesn't usually involve the technical aspects of work.

3. (a) There is a way to check the customer's driving record and credit (membership makes this process easier), (b) info. on time (a reservation system) and location where the car will be is made available to customers over the Internet, (c) a way to gain entry to the car and record the start time and mileage (e.g., issue them a security access card or key fob, and install a card or key fob RFID reader under the windshield. The reservation is sent to the car wirelessly, identifying the reserved driver and allowing the car to be started), (d) a damage diagram or tool to identify the previously-incurred damages, and providing insurance for the customers, (e) a requirement to fill the gas tank (if nearly empty) before returning the car and removing any trash, (f) a method to record the time of return and mileage, and requirement to leave the key inside the car and lock it (under-windshield card reader), (g) electronic method to bill the customer (charge by time and there could a mileage limit) and notify them using email, and (h) 24-hour customer service support in case something goes wrong (e.g., an accident).

4. Managers should strive to find solutions in the best interests of all stakeholders. Technological change such as automation, robotics, and AI may increase productivity and lead to lower production costs. It may also replace human workers, which is a cost to the community and workforce. Applying an ethical framework can help with ethical decision making.

5. a. Business people make unethical decisions for a variety of reasons including the following:
    1. Pressure from superiors
    2. Pressure for stakeholders
    3. Not being informed
    4. Keeping the company afloat
   b. Their risks for unethical behavior including the following:
    1. getting reprimanded
    2. getting fired
    3. losing reputation

Answers to Sobeys Mini-case

1. *Inputs*: groceries, staff, building, fixtures (shelves, stands, displays, etc.), tills

   Transformation process: making the groceries available to customers (purchasing, transportation, receiving, and stocking shelves, etc.)

   Output: satisfied, loyal customers

   Feedback/control: inventory control, quality control, customer service

2. a. Forecasting: to plan the store size, workforce level, and purchase quantities & inventory levels
   b. Product design & selection: to determine the merchandise mix to carry for the particular market
   c. Capacity planning: to determine the store's right size (floor size) and store hours
   d. Layout design: to determine a good floor plan (directing customers through the store)
   e. Location: to determine the right location in the city (most important for a service)
   f. Quality: a system to assure and control quality in groceries (e.g., keeping meat, dairy, etc. fresh and at the right temperature), and in customer service

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g. Inventory: to avoid stock-outs and excess inventory levels

f. Staff scheduling: to achieve minimal customer waiting *and* minimal employee idle time

Answers to Small Business Operations Mini-case

1. a. Number of yards, number of mowers, number of workers, time to mow a given area, regular maintenance, weather, length of growing season, time between necessary mowing.

   b. Mowers, parts, fuel, lubricants, fertilizer, chemicals, tools, etc.

   c. 1) Lawns, type of work, regular maintenance, workers.

      2) Weather, illness, overloads, emergencies, breakdowns.

   d. Very important. Repeat business would be greatly affected and new business depends on word of mouth and reputation.

   e. Oil change, blade sharpening, motor tune-up, mower and filter clean up, etc.

2. a. Timing: not too late but not too soon.

   b. Coverage: does not leave streaks.

   c. Length of grass: not too long but not too short depending on the weather and time of year.

   d. Trimming and clean-up (details).

3. a. Responsibility, possibly security, fringe benefits, regularity of work hours, cannot pass the buck to someone else, decision-making, etc.

   b. Responsibility, financial investment, work load, hiring of more employees, possibility of greater government regulation, personnel problems tend to increase and a general increase in all administrative work.

   c. Risk involved in starting a new type of business using new technology and making it successful, learning curve involved in the area of e-commerce, additional workload, hiring of more employees in the area of Web design, computer programmers, etc.

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4. Hazel has two options:

(1) Hazel could leave grass clippings on customers' lawns.

Advantages: Decreases her time per lawn. Grass clippings serve as a natural fertilizer. Hazel will not have to raise her prices.

Disadvantages: Customers may not like the mess left behind. In addition, over time, customers' lawns may build up thatch and have to be de-thatched.

(2) Hazel could take grass clippings to a landfill in a nearby city.

Advantages: Customers' lawns will not build up thatch. Customers will appreciate the appearance of their lawns.

Disadvantages: Hazel will need to raise prices due to her increased driving time and fuel expense.

5. Yes, since Hazel promised the part-time workers a bonus of $25 for good ideas and since this idea appears to hold promise, Hazel should honor her promise and pay the student $25. However, in the future she might want to make the bonus offer contingent on continuing employment at the time of implementation of the idea because after becoming aware that the idea was successfully implemented, the idea may become an attractive option for the competitor. In addition, she might want to include a confidentiality clause or a statement in the employment contract of the workers regarding not sharing proprietary information that may be useful to competition.

6. a. Weather, worker absences due to illness, vacations, extra requests from customers, new customers, and lost customers.

b. At times she will have excess capacity while at other times she will have too little regular capacity to handle the workload.

c. Revise schedules, work overtime if regular capacity is insufficient and/or hire additional workers, if capacity exceeds demand layoff workers or find something else productive for them to do such as maintenance of equipment, training, etc.

7. Use hand tools instead of power tools, and recycle grass clippings. Factors to take into account include cost savings, quality, risk of injury, job completion times, training, reduction in pollution (air and noise), and energy savings.

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