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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 his/her 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 him/her using email, and (h) 24-hour customer service support in case something goes wrong (e.g., an accident).

Answers to the Experiential Learning Exercises

1.

a. Quality in a fast restaurant refers to quality of food and quality of service. Quality of food pertains to the quality of raw material and cooking process. These are usually determined by tasting the food. Quality of service refers to both the servers and the environment of the restaurant. Are the employees wearing clean uniforms? Are they polite? Is the restaurant clean?

b. Other than food, packaging material, condiments, napkins, and cleaning products should be stocked.

c. Employee scheduling is very important in a service, because the customers expect a short wait time and food is not usually made before customer orders.

d. Capacity (size) of a restaurant should match its peak demand (the busiest time and day). If the restaurant is too small, it will lose a lot of customers and revenue, whereas if it is too large, then its lease cost and property tax will be too high. In either case, its profit will be less than what it could have been.

Answers to the Internet Exercises

1. *Supply Chain Management Association* has recently been formed by merger of Purchasing Management Association of Canada (PMAC) and Supply Chain & Logistics Association Canada (SCL). PMAC's members are organizational buyers or purchasing agents/managers. SCL's members are transportation coordinators and others interested in logistics. SCMA provides a certification program, an annual conference and some regional ("institute") meetings, research reports, job listing, news and events announcements, Internet links, etc.

   Canadian Institute of Traffic and Transportation (CITT)'s members are transport professionals. CITT provides a certification program, an annual conference, career center, news and events, etc.

   Canadian Supply Chain Sector Council is a Federal-government initiative to find solutions to human resource challenges in supply chains. They provide job descriptions and occupational standards, job fairs and conferences, accreditation of programs and courses, and labour market information to all the stakeholders.

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American Production and Inventory Control Society's members are primarily professionals in operations and supply chain Management. Note that APICS has regional branches in Canada. APICS provides certification programs, an annual conference, an online bookstore, job listing, news and events announcements, research reports, APICS magazine, and Industry Internet links.

American Society for Quality (ASQ)'s members are primarily professionals in quality management and engineering. Note that ASQ has regional branches in Canada. ASQ provides certification programs, an online bookstore, job listing, news and events announcements, and several magazines and journals.

Project Management Institute (PMI)'s members are primarily project management professionals. PMI provides a certification program, an online bookstore, job listing, news and events announcements, and few magazines and a journal.

2. a. Inputs are coal, iron ore, and limestone.

   b. Process operations including converting the coal into coke, melting the iron ore in a blast furnace using the coke and limestone, and making liquid iron into liquid steel in a basic oxygen furnace or an electric arc furnace. Both then use continuous casting to make steel slabs which are stored outside. When needed, slabs are reheated and rolled thinner in the roughing mill, and then rolled into rolled sheets. These hot rolled sheets are either sold or stored. Later the stored hot rolled sheets are further processed in the cold roll mill into galvanized and tin-coated sheets. Also, some tubes are made.

   c. The outputs are steel slabs, hot-rolled steel, cold-rolled steel and tubes.

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Answers to Sharing Economy Mini-case

A good source to answer this question is https://www.airbnb.ca/trust.

1. Identification:
   Guests and hosts can scan a government ID and connect other online profiles to their Airbnb account.
   Profile & Reviews:
   Get to know your guest or host through detailed profiles and confirmed reviews.
   Messaging:
   Use our messaging system to learn more about a host or ask a guest about their trip.
   A Secure Platform:
   Guests pay through Airbnb when they book a listing. Hosts receive payment through Airbnb 24 hours after guest check-in. With all the transactions taken care of, all you have to do is say "Hello."
   Hosts are protected up to $1,000,000 CAD with the Airbnb Host Guarantee.
   Customer support team.

2. The Supplier has a building or car at risk. Hence, Airbnb's Host Guarantee.

3. Regulated competitors lose customers, hence the outcry of taxi drivers and push back of hotels through city council's ban on short-term rentals.

4. A large majority of people using these systems are continuing users, so reviews are key for supplier for getting picked and for consumer having a place to stay.

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Answers to Lynn Mini-case

1. a. Demand for her services (number and size of yards) need to be forecasted.

   b. Inventories probably include mower parts, fuel, lubricants, fertilizer, chemicals, tools, etc.; replenishment decisions. She will have to check her fuel inventory regularly.

   c. She must schedule jobs (lawns) and her staff; Weather, illness, rush orders, emergencies, breakdowns can force rescheduling.

   d. Quality assurance (of worked lawn, staff, equipment, etc.) is 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, blade and filter clean-up, etc.

2. a. Pros (for working for herself): being one's own boss (control).
   Cons (for working for herself): uncertainty of income, more time consuming, harder,

   b. Pros (for expanding business): possibility of more profit
   Cons (for expanding business): more investment, more workload, more employee problems

   c. Pros (for launching a web site): more customers (it is a form of advertising)
   Cons (for launching a web site): initial & on-going costs, time for updating the information

3. Yes, because Lynn promised the student a bonus of $25 for a good idea and this idea appears to be good.

4. Using eco-friendly pesticides, weed-killers, and fertilizers; finding a use for the cut grass (e.g., animal feed); buying more efficient, less polluting lawn mowers, etc.

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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
   g. Inventory: to avoid stock-outs and excess inventory levels
   f. Staff scheduling: to achieve minimal customer waiting *and* minimal employee idle time

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Chapter 1
Business Writing Exercises

Business writing exercises are intended to help you strengthen your written communication skills while applying what you have learned to issues of managerial concern. Use the following as a guide for writing business emails.

To: Students using this book
From: W. Stevenson
Subject: Business communication using email

Email is often used to convey information within an organization, but also used to communicate with people outside the organization, such as suppliers, distributors, and, sometimes, customers.

Business emails should communicate information in an organized, concise format. Even so, their length and degree of formality depend in part on their purpose, the amount of information to convey, and the intended audience. Thus, an email reporting financial information to the chief executive officer would be more formal and probably longer than an email to employees about the company picnic. A variety of email styles can be used. The style illustrated here is informational.

- Begin by stating the purpose of the email.
- Use the next paragraph to provide important details (e.g., a proposal, main reasons for a
- decision or suggestion, or to indicate why you agree or disagree with a proposal or idea).
- Use the third paragraph for minor details.
- In a long email, you may want to end by again stating your position on the subject.

1. Suppose that your boss, Tony Roman, who is the operations manager of your company, sends you an email asking for your input on holding joint planning sessions with people from marketing and finance. A portion of that email follows:

Gail in Marketing and Jim in Finance have been bugging me lately about holding joint meetings. They're real gung-ho on this. But I'm a little concerned about agreeing to it. I don't want them to get the impression that they can come in here and tell us what to do. They don't really understand what it is we do or the kinds of problems we have. I'm sure they think we aren't doing as well as we could, but that's not any of their concern. I don't know why they just don't concentrate on what they do, and leave operations to us.

Compose an email that summarizes the potential benefits of holding joint planning meetings with Marketing and Finance.

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Chapter 1
Business Writing Exercises

2. Assume the role of a mid-level manager of a small company. The CEO, Rachael Barker, wants your views on a new computer network she is considering. The current network is adequate, but the new one will provide much greater capabilities for managing files, word processing, and accessing the database.

   Write a one-page email in which you list (1) the key factors that you believe must be taken into account in making the decision, and (2) the trade-offs that must be considered.

3. Write a brief email, responding to this one:

To: (Your name), V.P. of Manufacturing@company.com
From: Deiter Smith, Production Supervisor, second shift
Subject: Accidental spill

We recently experienced an accidental discharge of mildly toxic chemicals into the creek that runs past one of our plants. Although there have been a few complaints of contamination from downstream property owners, I don't think that the spill can be traced back to our plant. Besides, other nearby companies have been getting away with more serious abuses for years, so let them take the heat.

I am confident that this is a one-time occurrence, so let's not blow the whole thing out of proportion. If we were to have to pay for a cleanup, this would have a big impact on quarterly profits, and our stockholders wouldn't like that one bit. Furthermore, in light of our recent efforts to promote an image of an environmental-friendly company, I say we should definitely keep quiet about this and let things die down. What do you think?

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4. Go to the web site for this book (www.mhhe.com/stevenson14e), click Additional Student Resources, and then briefly look over the items in the menu. Write an email to your instructor on which of the items on the list you feel will be most helpful to you in this course.

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