Subject: Management

Production of Courseware
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Paper: Operation Management
Module: Operation Management & Its Role in Decision Making

Development Team

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### Description of Module

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<td>Basic Knowledge of Management and decision making.</td>
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| Objectives   | • Explain the scope of decision making in Operations Management.  
• Briefly describe the historical evolution of Operations Management.  
• Strategic aspect of decision making in Operations Management.  
• Current issues in business that impact Operations management  
• Various techniques and tools (models, quantitative methods, analysis of trade-offs) use by Operation Managers to take operation decisions.  
• Describe the operations function and the nature of the operations manager's job. |
| Keywords     | Decision Making, Processes, Operation Management, Analytical tools |
Quadrant-I

Learning Objectives:
The module provides an introduction to operations management and its role in decision making.

Learning Outcomes:
On successful completion of this module, students should be able to:
1. Define the term ‘Operations Management’
2. Explain the scope and importance of decision making in operation management.
3. Identify similarities and differences between production and service operations.
4. Briefly describe the historical evolution of operations management.
5. Current issues in business that impact Operations Management
6. Strategic aspect of decision making in Operation Management.
7. Various techniques and tools (models, quantitative methods, analysis of trade-offs) use by Operation Managers to take operation decisions.
8. Describe the operations function and the nature of the operations manager's job.

Throughout this module, learner shall understand broad range of decisions that operations managers must make. Also, it covers introduced to the tools necessary to handle those decisions.

Introduction
Operations Management (OM) aims to manage processes engaged in production, distribution of products/ or services. Therefore, it includes set of activities (including product creation, development, production, distribution and reverse logistics).
The creation of goods or services involves transforming or converting inputs into outputs. Various inputs such as capital, labor, and information are used to create goods or services
using one or more transformation processes (e.g., storing, transporting, and repairing). To ensure that the desired outputs are obtained, an organization takes measurements at various points in the transformation process (feedback) and then compares them with previously established standards to determine whether corrective action is needed (control). Figure 1.1 depicts the conversion system.

![Conversion System Diagram]

**Figure 1.1: Operation Function involves the conversation of Inputs and Outputs**

Operations management inclusive all operations within the organization (viz. Managing purchases, Material Management (MM) and inventory control, Production Planning and Production Management (PP/PM) Quality Control (QC) and Quality Assurance (QA), storage, Sales and Distribution (S&D) and logistics Management and evaluations). The prime focus
during the operation management is on efficiency and effectiveness of processes. Therefore, OM includes substantial measurement and analysis of internal processes. Ultimately, the nature of how operations management is carried out in an organization depends very much on the nature of products or services in the organization. For example, In the domain of retail, manufacturing, wholesale, etc. successful operation management involves several decisions in accordance to time and space. We can broadly classify them as Design/ Strategic decisions and operations decisions.

The strategic decisions are the design and policy decisions. The operational decisions relate to day-to-day activities: managing the flow of material and product and other aspects of the Operation Management in accordance with strategic decisions.

**Importance of Operations Management**

Operations and sales are the two line functions in a business organization. All other functions—accounting, finance, marketing, IT, and so on—support the two line functions. Among the service jobs that are closely related to operations are financial services (e.g., stock market analyst, broker, investment banker, and loan officer), marketing services (e.g., market analyst, marketing researcher, advertising manager, and product manager), accounting services (e.g., corporate accountant, public accountant, and budget analyst), and information services (e.g., corporate intelligence, library services, management information systems design services).

![Figure 1.2: Overlapping between Business functions (Source: Stevenson, 2016)](image-url)
Working together successfully means that all members of the organization understand not only their own role, but they also understand the roles of others. In practice, there is significant interfacing and collaboration among the various functional areas, involving exchange of information and cooperative decision making. For example, although the three primary functions in business organizations perform different activities, many of their decisions impact the other areas of the organization. Consequently, these functions have numerous interactions, as depicted by the overlapping circles shown in Figure 1.2.

Finance and operations management personnel cooperate by exchanging information and expertise in such activities as the following:

1. **Budgeting**: Budgets must be periodically prepared to plan financial requirements. Budgets must sometimes be adjusted, and performance relative to a budget must be evaluated.

2. **Economic analysis of investment proposals**: Evaluation of alternative investments in plant and equipment requires inputs from both operations and finance people.

3. ** Provision of funds**: The necessary funding of operations and the amount and timing of funding can be important and even critical when funds are tight. Careful planning can help avoid cash-flow problems.

**Design Decisions**

Design or strategic decision involves the following critical issues:

1. **What operational activities should be carried out by the nodal firm and what should be outsourced?**

2. **How to select entities/ partners to perform outsourced operational activities and what should be the nature of the relationship with those entities? Should the relationship be transactional in nature or should it be a long-term partnership?**

3. **Decisions pertaining to the capacity and location of the various Production/ Operational facilities/ Plant Locations.**
The decisions pertaining to location and capacity are for those facilities/ Plant Locations that are owned by the nodal firm. In addition to manufacturing locations and capacities, the firm has also to worry about locations and capabilities for warehouses (Depots). Supply Chain design decisions are made for the long term (usually a couple of years) and are very expensive to alter at short notice.

**Operations decisions**

Once supply chain design decisions are in place, the firm has to take decisions regarding the management of supply chain operations for shorter horizons. This involves tactical decisions, which have horizons of about three months to a year, and operations decisions, which usually have a horizon ranging from a day to a month. Both tactical and operations decisions involve the following areas:

1. Demand Forecasting
2. Procurement Planning and Control
3. Production Planning and Control
4. Distribution Planning and Control
5. Inventory Management
6. Transportation Management
7. Customer Order Processing
8. Relationship Management with Partners in the Chain

**Location Decisions**

As with capacity planning, Operation managers need to follow a three-step procedure when making facility location decisions. These steps are as follows:

**Step 1:** Identify Dominant Location Factors. Identify the location factors that are dominant for the business. This requires managerial judgment and knowledge.

**Step 2:** Develop Location Alternatives. Once identification of factors is done, operation manager can identify location alternatives that satisfy the selected factors.

**Step 3:** Evaluate Location Alternatives. After a set of location alternatives have been identified, managers evaluate them and make a final selection. This is not easy because one
location may be preferred based on one set of factors, whereas another may be better based on a second set of factors.

You Tube animation I: What is Operation Management

Following YouTube link explains the Nature and Scope of Decision Making in Operation Management
https://www.youtube.com/watch?v=leMOReAE2hk
The video highlights Scope of Decision making in Operation Management
(Source: study.com)

Decision Areas in Operation Management

The major decision areas in Operation management are (a). Location, (b). Production, (c) Distribution, (d). Inventory.

The location decision relates to the choice of locations for both production and distribution facilities. Production and transportation costs and delivery lead times are important. Production and distribution decisions focus on what customers want, when they want it, and how much is needed. Outsourcing can be a consideration. Distribution decisions are strongly influenced by transportation cost and delivery times, because transportation costs often represent a significant portion of total cost. Moreover, shipping alternatives are closely tied to production and inventory decisions. For example, using air transport means higher costs but faster deliveries and fewer inventories in transit than sea, rail, or trucking options. Distribution decisions must also take into account capacity and quality issues. Operational decisions focus on scheduling, maintaining equipment, and meeting customer demand. Quality control and workload balancing are also important considerations. Inventory decisions relate to determining inventory needs and coordinating production and stocking decisions throughout the supply chain. Logistics management plays the key role in inventory decisions. Enterprise Resource Planning (ERP) is being increasingly used to provide information sharing in real time among organizations and their major supply chain partners.

Definition
Operation Management - OM is the branch of management science concerned with the study of the factors involved in the successful management of an organization’s day-to-day operations. It seeks to develop and apply the methods and techniques needed to design and implement systems which will enable the efficiency and effectiveness of these operations to be improved. Operational problems can range from purchasing, through manufacturing to the final distribution of the products. The last 10 years has witnessed the re-emergence of Operations Management as a critical function in the growth and profitability of organizations. The ability to deliver products and services fast and right first time while cutting costs has become fundamental to not only the competitiveness of a business, but also its survival.

**Decision Process:** The thought process of selecting a logical choice from the available options.

When trying to make a good decision, a person must weigh the positives and negatives of each option, and consider all the alternatives. For effective decision making, a person must be able to forecast the outcome of each option as well, and based on all these items, determine which option is the best for that particular situation.

**Operational Decisions:** A type of short term decision by a company in lieu of long term strategies at the time of acquisition of company assets. These involve the day-to-day operations of the company, and therefore need to be addressed before any grand scheme issues.

**Models:** An abstraction of reality; a simplified representation of something.

**Technology:** refers to the application of scientific discoveries to the development and improvement of goods and services. It can involve knowledge, materials, methods, and equipment. The term high technology refers to the most advanced and developed machines and methods. Operations management is primarily concerned with three kinds of technology: product and service technology, process technology, and information technology (IT). All three can have a major impact on costs, productivity, and competitiveness.

**E-business:** Use of the Internet to transact business.

**E-commerce:** Consumer-to-business transactions.
Competitiveness: How effectively an organization meets the wants and needs of customers relative to others that offer similar goods or services.

Significance of Decision Making in Operation Management
The scope of operations management ranges across the organization. Operations management people are involved in product and service design, process selection, selection and management of technology, design of work systems, location planning, facilities planning, and quality improvement of the organization’s products or services. The operations function includes many interrelated activities, such as forecasting, capacity planning, scheduling, managing inventories, assuring quality, motivating employees, deciding where to locate facilities, and more.

Under Operation Management, Decision making is consider as the process of selection of best course of action among alternatives (Selection of Best Product/ Service, Plant Location, Selection of vendor/supplier etc.) and supports managerial functions (such as planning, organizing, directing an controlling) through “right” decision making.

Exhibit I: Operation Management in an Airline Company
We are taking one airline company to illustrate a service organization’s operations system. The Airline system consists of the airplanes, airport facilities, and maintenance facilities, sometimes spread out over a wide territory. The activities include:

Forecasting such things as weather and landing conditions, seat demand for flights, and the growth in air travel.

Capacity planning, Essential for the airline to maintain cash flow and make a reasonable profit. (Too few or too many planes, or even the right number of planes but in the wrong places, will hurt profits.) Locating facilities according to managers’ decisions on which cities to provide service for, where to locate maintenance facilities, and where to locate major and minor hubs.

Facilities and layout, Important in achieving effective use of workers and equipment.
The operations manager is part of the senior management team. A large-scale organization will most likely have many managers under the operations manager, such as the production manager, warehouse manager and quality manager.

The following set of activities are required to be examined while formulating the decision making for Operation Management.

1. **Pervasive Function**: Decision making is essential in each level of management. Top level management makes strategic decisions such as planning, organizing, directing and controlling. Middle level management makes tactical decisions such as division of works,
fixation of authority and responsibility, integration of efforts etc. Operating level management makes regular operating decisions such as preparation of schedule of daily works, divisions of works, delegation of authority etc. Thus, decision making function is performed in all the levels of management according to needs. This is necessary to bring uniformity and smoothness in the organizational performance.

2. Indispensable Component: Decision making is known as an inseparable part of management functions. It is one of the essential processes for successful operation of business. It determines all management functions and covers every part of the organizational structure. Every manager from top level to the first line is involved in the decision making process according to the nature of works.

Evaluation of Managerial Function
Decision making is a time consuming process and decision makers spend more time to select the alternative. The quality of decision serves as the yardstick for evaluating managerial performance. It provides a clear line of guidance to the management for the achievement of defined objectives. The achievement of managerial performance is evaluated and measured with planned performance.

Selection of Best Alternatives
Decision making is the process of selecting a best course of action from among many alternatives. A problem might be solved in different ways on the basis of time and situation. The decision maker evaluates all the possible alternatives on the basis of organizational process and suitability. The selection of the best course of action is significant to bring smoothness in operation and achieve organizational goals.

Establishment of Plans and Policies
The establishment of plans and policies is the initial part of decision making. Every organization is established for a definite objective and for this, formation of plans and policies are necessary. Thus, at the initial stage, the management decides the clear line of action and the procedures to gain defined objectives. The practical implementation of defined line of
actions and procedures is an efficient way in bringing smoothness and uniformity in organizational performance. Finally, it is helpful in achieving organizational goals.

**Successful Operation of Business**

Decision making is one of the important tools for the successful operation of the business. In course of operation, many problems may arise at different situations and times. The management solves those problems in time by using decision making tools.

**Exhibit II: Wegmans Food Markets**

Wegmans Food Markets, Inc., is one of the premier grocery chains in the United States. Headquartered in Rochester, New York, Wegmans operates over 70 stores, mainly in Rochester, Buffalo, and Syracuse. There are also a handful of stores elsewhere in New York State and in New Jersey, Pennsylvania, and Virginia. The company employs over 45,000 people, and has annual sales of over $3 billion. Wegmans has a strong reputation for offering its customers high product quality and excellent service. Through a combination of market research, trial and error, and listening to its customers, Wegmans has evolved into a very successful organization. Its sales per square foot are 50 percent higher than the industry average.

**Superstores** Many of the company’s stores are giant 100,000-square-foot superstores, double or triple the size of average supermarkets. You can get an idea about the size of these stores from this: they usually have between 25 and 35 checkout lanes, and during busy periods, all of the checkouts are in operation. A superstore typically employs from 500 to 600 people. Individual stores differ somewhat in terms of actual size and some special features. Aside from the features normally found in supermarkets, they generally have a full-service deli (typically a 40-foot display case), a 500-square-foot fisherman’s wharf that has perhaps 10 different fresh fish offerings most days, a large bakery section (each store bakes its own bread, rolls, cakes, pies, and pastries), and extra-large produce sections. They also offer film processing, a complete pharmacy, a card shop, video rentals, and an Olde World Cheese section. In-store floral shops range in size up to 800 square feet of floor space and offer a wide variety of fresh-cut flowers, flower arrangements, vases, and plants. In-store card shops cover over 1,000 square feet of floor space. The bulk foods department provides customers with the opportunity to select the quantities they desire from a vast array of foodstuffs and some nonfood items such as birdseed and pet food. Each store is a little different. Among the special features in some stores are a dry cleaning department, a wokery, and a salad bar. Some stores feature a Market Café that has different food stations, each devoted to preparing and serving a certain type of food. For example, one station will have pizza and other Italian specialties, and another oriental food, and still another chicken or fish. There also will be a sandwich bar, a salad bar, and a dessert
station. Customers often wander among stations as they decide what to order. In some Market Cafés, diners can have wine with their meals and have brunch on Sundays. In several affluent locations, customers can stop in on their way home from work and choose from a selection of freshly prepared dinner entrees such as medallions of beef with herb butter, chicken Marsala, stuffed flank steak with mushrooms, Cajun tuna, crab cakes, and accompaniments such as roasted red potatoes, grilled vegetables, and Caesar salad. Many Wegmans stores offer ready-made sandwiches as well as made-to-order sandwiches. Some stores have a coffee-shop section with tables and chairs where shoppers can enjoy regular or specialty coffees and a variety of tempting pastries.

**Produce Department** The company prides itself on fresh produce. Produce is replenished as often as 12 times a day. The larger stores have produce sections that are four to five times the size of a produce section in an average supermarket. Wegmans offers locally grown produce in season. Wegmans uses a “farm to market” system whereby some local growers deliver their produce directly to individual stores, bypassing the main warehouse. That reduces the company’s inventory holding costs and gets the produce into the stores as quickly as possible. Growers may use specially designed containers that go right onto the store floor instead of large bins. This avoids the bruising that often occurs when fruits and vegetables are transferred from bins to display shelves and the need to devote labor to transfer the produce to shelves.

**Meat Department** In addition to large display cases of both fresh and frozen meat products, many stores have a full-service butcher shop that offers a variety of fresh meat products and where butchers are available to provide customized cuts of meat for customers. Meat department employees attend Wegmans’ “Meat University,” where they learn about different cuts of meat and how to best prepare them. They also learn about other items to pair with various meats, and suggest side dishes, breads, and wine. This helps instill a “selling culture” among employees, who often spend 75 percent of their time talking with customers. Wegmans continually analyzes store operations to improve processes. In the meat department, a change from in-store cutting and traditional packaging to using a centralized meat processing facility and vacuum packaging extended the shelf life of meats and reduced staffing requirements in meat departments, reducing costs and providing customers with an improved product.

**Ordering** Each department handles its own ordering. Although sales records are available from records of items scanned at the checkouts, they are not used directly for replenishing stock. Other factors—such as pricing, special promotions, and local circumstances (e.g., festivals, weather conditions)—must all be taken into account. However, for seasonal periods, such as holidays, managers often check scanner records to learn what past demand was during a comparable period. The superstores typically receive one truckload
of goods per day from the main warehouse. During peak periods, a store may receive two truckloads from the main warehouse. The short lead time greatly reduces the length of time an item might be out of stock, unless the main warehouse is also out of stock. The company exercises strict control over suppliers, insisting on product quality and on-time deliveries.

**Inventory Management** Some stores carry as many as 70,000 individual units. Wegmans uses a companywide system to keep track of inventory. Departments take a monthly inventory count to verify the amount shown in the companywide system. Departments receive a periodic report indicating how many days of inventory the department has on hand. Having an appropriate amount on hand is important to department managers: If they have too much inventory on hand, that will add to their department’s costs, whereas having too little inventory will result in shortages and thus lost sales and dissatisfied customers.

**Employees** The company recognizes the value of good employees. It typically invests an average of $7,000 to train each new employee. In addition to learning about store operations, new employees learn the importance of good customer service and how to provide it. The employees are helpful, cheerfully answering customer questions or handling complaints. Employees are motivated through a combination of compensation, profit sharing, and benefits. Employee turnover for full-time workers is about 6 percent, compared to the industry average of about 20 percent.

**Quality** Quality and customer satisfaction are utmost in the minds of Wegmans’ management and its employees. Private-label food items as well as name brands are regularly evaluated in test kitchens, along with potential new products. Managers are responsible for checking and maintaining product and service quality in their departments. Moreover, employees are encouraged to report problems to their managers. If a customer is dissatisfied with an item, and returns it, or even a portion of the item, the customer is offered a choice of a replacement or a refund. If the item is a Wegmans brand food item, it is then sent to the test kitchen to determine the cause of the problem. If the cause can be determined, corrective action is taken.

**Technology** Wegmans continues to adopt new technologies to maintain its competitive edge, including new approaches to tracking inventory and managing its supply chain, and new ways to maintain freshness in the meat and produce departments.

**Sustainability** Wegmans began replacing incandescent light bulbs with compact fluorescent bulbs in 2007, generating 3,000 fewer tons of carbon dioxide each year. Also the company installed sensors in its dairy cases that reduced the time the cooling systems run by 50 percent.

**Questions:**

1. How do customers judge the quality of a supermarket?
2. Indicate how and why each of these factors is important to the successful operation of a supermarket:
Operations Management and its role in Decision Making

1. What are the purposes of operations management?
- a. Customer satisfaction
- b. Forecasting
- c. Capacity planning
- d. Location
- e. Inventory management
- f. Layout of the store
- g. Scheduling

2. What are the three components of operations management?
- Planning
- Organizing
- Controlling

3. What are some of the ways Wegmans uses technology to gain an edge over its competition?
(Source: Stevenson, 2016)

Cross disciplinary importance of Operations Management

Operations also interacts with other functional areas of the organization, including legal, management information systems (MIS), accounting, personnel/human resources, and public relations, as depicted in Figure 1.4.

**Legal department** must be consulted on contracts with employees, customers, suppliers, and transporters, as well as on liability and environmental issues.

**Accounting** supplies information to management on costs of labor, materials, and overhead, and may provide reports on items such as scrap, downtime, and inventories.

**Management information systems (MIS)** is concerned with providing management with the information it needs to effectively manage. This occurs mainly through designing systems to
capture relevant information and designing reports. MIS is also important for managing the control and decision-making tools used in operations management.

**Human Resources department** is concerned with recruitment and training of personnel, labor relations, contract negotiations, wage and salary administration, assisting in manpower projections, and ensuring the health and safety of employees.

**Public Relations** have responsibility for building and maintaining a positive public image of the organization. Good public relations provide many potential benefits. An obvious one is in the marketplace. Other potential benefits include public awareness of the organization as a good place to work (labor supply), improved chances of approval of zoning change requests, community acceptance of expansion plans, and instilling a positive attitude among employees.

**Operation managers and Decision making**
The main role of an operations manager is that of planner/decision maker. In this capacity, the operations manager exerts considerable influence over the degree to which the goals and objectives of the organization are realized. Most decisions involve many possible alternatives that can have quite different impacts on costs or profits. Consequently, it is important to make informed decisions. Operations management professionals make a number of key decisions that affect the entire organization. These include the following:

**What:** What resources will be needed, and in what amounts? When: When will each resource be needed?

**When:** Where should the work be scheduled? When should materials and other supplies be ordered? When is corrective action needed?

**Where:** Where will the work be done?
**How:** How will the product or service be designed? How will the work be done (organization, methods, equipment)? How will resources be allocated?

**Who:** Who will do the work? An operations manager’s daily concerns include costs (budget), quality, and schedules (time).

Various approaches to decision making, including the use of models, quantitative methods, analysis of trade-offs, establishing priorities, ethics, and the systems approach.

Strategic Operations Management Decision Areas Operations management people play a strategic role in many strategic decisions in a business organization.

**History of decision making in Operation Management**

The factory movement was accompanied by the development of several quantitative techniques. F. W. Harris developed one of the first models in 1915: a mathematical model for inventory order size. In the 1930s, three coworkers at Bell Telephone Labs, H. F. Dodge, H. G. Romig, and W. Shewhart, developed statistical procedures for sampling and quality control. In 1935, L.H.C. Tippett conducted studies that provided the groundwork for statistical sampling theory. At first, these quantitative models were not widely used in industry. However, the onset of World War II changed that. The war generated tremendous pressures on manufacturing output, and specialists from many disciplines combined efforts to achieve advancements in the military and in manufacturing. After the war, efforts to develop and refine quantitative tools for decision making continued, resulting in decision models for forecasting, inventory management, project management, and other areas of operations management. During the 1960s and 1970s, management science techniques were highly regarded; in the 1980s, they lost some favor. However, the widespread use of personal computers and user-friendly software in the workplace contributed to a resurgence in the popularity of these techniques.
Table 1-1: History of Decision Making in Operation Management

<table>
<thead>
<tr>
<th>Approximate Date</th>
<th>Contribution/ Concept</th>
<th>Originator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1776</td>
<td>Division of Labor</td>
<td>Adam Smith</td>
</tr>
<tr>
<td>1790</td>
<td>Interchangeable parts</td>
<td>Eli Whitney</td>
</tr>
<tr>
<td>1911</td>
<td>Principles of Scientific Management</td>
<td>Frederick W Taylor</td>
</tr>
<tr>
<td>1911</td>
<td>Motion Study, use of industrial psychology</td>
<td>Frank and Lillian Gilbreth</td>
</tr>
<tr>
<td>1912</td>
<td>Chart for Scheduling activities</td>
<td>Henry Gantt</td>
</tr>
<tr>
<td>1913</td>
<td>Moving assembly line</td>
<td>Henry Ford</td>
</tr>
<tr>
<td>1915</td>
<td>Mathematical Model for Inventory Ordering</td>
<td>F.W. Harris</td>
</tr>
<tr>
<td>1930</td>
<td>Hawthorne Studies on Worker Motivation</td>
<td>Elton Mayo</td>
</tr>
<tr>
<td>1949</td>
<td>Operations research applications in warfare</td>
<td>Operations research groups</td>
</tr>
<tr>
<td>1947</td>
<td>Linear programming</td>
<td>George Dantzig</td>
</tr>
<tr>
<td>1951</td>
<td>Commercial digital computers</td>
<td>Sperry Univac, IBM</td>
</tr>
<tr>
<td>1950s</td>
<td>Automation</td>
<td>Numerous</td>
</tr>
<tr>
<td>1960s</td>
<td>Extensive development of quantitative tools</td>
<td>Numerous</td>
</tr>
<tr>
<td>1960s</td>
<td>Industrial dynamics</td>
<td>Jay Forrester</td>
</tr>
<tr>
<td>1975</td>
<td>Emphasis an manufacturing strategy</td>
<td>W. Skinner</td>
</tr>
<tr>
<td>1980s</td>
<td>Emphasis on flexibility, time-based competition, lean production</td>
<td>T. Ohno, S. Shingo, Toyota</td>
</tr>
<tr>
<td>1980s</td>
<td>Emphasis on quality</td>
<td>W. Edwards Deming, J. Juran, K. Ishikawa</td>
</tr>
<tr>
<td>1990s</td>
<td>Internet, supply chain management</td>
<td>Numerous</td>
</tr>
<tr>
<td>2000s</td>
<td>Applications service providers and outsourcing</td>
<td>Numerous</td>
</tr>
<tr>
<td></td>
<td>Social media, YouTube, and others.</td>
<td>Numerous</td>
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</table>

(Source: Russell and Taylor, 2015)

Table 1-2 explain various strategic decision areas where decisions has to be made by the operation manager.
Table 1-2: Strategic operations management decisions

<table>
<thead>
<tr>
<th>Decision Area</th>
<th>What the Decisions Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Product and service design</td>
<td>Costs, quality, liability and environmental issues</td>
</tr>
<tr>
<td>2. Capacity</td>
<td>Cost structure, flexibility</td>
</tr>
<tr>
<td>3. Process selection and layout</td>
<td>Costs, flexibility, skill level needed, capacity</td>
</tr>
<tr>
<td>4. Work design</td>
<td>Quality of work life, employee safety, productivity</td>
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<tr>
<td>5. Location</td>
<td>Costs, visibility</td>
</tr>
<tr>
<td>6. Quality</td>
<td>Ability to meet or exceed customer expectations</td>
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<tr>
<td>7. Inventory</td>
<td>Costs, shortages</td>
</tr>
<tr>
<td>8. Maintenance</td>
<td>Costs, equipment reliability, productivity</td>
</tr>
<tr>
<td>9. Scheduling</td>
<td>Flexibility, efficiency</td>
</tr>
<tr>
<td>10. Supply chains</td>
<td>Costs, quality, agility, shortages, vendor relations</td>
</tr>
<tr>
<td>11. Projects</td>
<td>Costs, new products, services, or operating systems</td>
</tr>
</tbody>
</table>

Various Approaches towards decision making in Operation Management

**Model**: A model is an abstraction of reality, a simplified representation of something. For example, a child’s toy car is a model of a real automobile. It has many of the same visual features (shape, relative proportions, and wheels) that make it suitable for the child’s learning and playing. But the toy does not have a real engine, it cannot transport people, and it does not weigh 2,000 pounds.

**Types of Models**
Models are sometimes classified as physical, schematic, or mathematical:

(a). **Physical models** look like their real-life counterparts. Examples include miniature cars, trucks, airplanes, toy animals and trains, and scale-model buildings. The advantage of these models is their visual correspondence with reality.
(b). **Schematic models** are more abstract than their physical counterparts; that is, they have less resemblance to the physical reality. Examples include graphs and charts, blueprints, pictures, and drawings. The advantage of schematic models is that they are often relatively simple to construct and change. Moreover, they have some degree of visual correspondence.

(c). **Mathematical models** are the most abstract: They do not look at all like their real-life counterparts. Examples include numbers, formulas, and symbols. These models are usually the easiest to manipulate, and they are important forms of inputs for computers and calculators.

**Benefits of Using Models**
1. Are generally easy to use and less expensive than dealing directly with the actual situation.
2. Require users to organize and sometimes quantify information and, in the process, often indicate areas where additional information is needed.
3. Increase understanding of the problem.
4. Enable managers to analyze what-if questions.
5. Serve as a consistent tool for evaluation and provide a standardized format for analyzing a problem.
6. Enable users to bring the power of mathematics to bear on a problem.

**Quantitative Approaches**
Another approach for decision making could be Quantitative Approach for problem solving. Theoretically, Quantitative approach is an attempt to obtain mathematically optimal solutions to managerial problems.

Various Techniques comes under Quantitative approaches are:

**Linear programming**: Linear Programming and related mathematical techniques are widely used for optimum allocation of scarce resources.
**Queuing techniques:** Queuing Techniques are useful for analyzing situations in which waiting lines form. Inventory models are widely used to control inventories.

**Project models:** Project Models such as PERT (program evaluation and review technique) and CPM (critical path method) is useful for planning, coordinating, and controlling large-scale projects.

**Forecasting techniques:** Forecasting Techniques are widely used in planning and scheduling. Statistical models are currently used in many areas of decision making. In large measure, quantitative approaches to decision making in operations management (and in other functional business areas) have been accepted because of calculators and computers capable of handling the required calculations.

**Performance Matrix**

All managers use metrics to manage and control operations. There are many metrics in use, including those related to profits, costs, quality, productivity, flexibility, assets, inventories, schedules, and forecast accuracy.

A key aspect of operations management is process management. A process consists of one or more actions that transform inputs into outputs. In essence, the central role of all management is process management. Businesses are composed of many interrelated processes. Generally speaking, there are three categories of business processes: 1. Upper-management processes. These govern the operation of the entire organization. Examples include organizational governance and organizational strategy. 2. Operational processes. These are the core processes that make up the value stream. Examples include purchasing, production and/or service, marketing, and sales. 3. Supporting processes. These support the core processes. Examples include accounting, human resources, and IT (information technology).

![Figure 1.5: Business Processes (across Supply Chain) ([Source: Stevenson, 2016](#))](#)
Analysis of Trade-Offs

Operation Managers often encounter operational decisions that exhibit trade-off decisions.

For example, Inventory Turnover Decision (Amount of inventory to stock, the decision maker must take into account the trade-off between the increased level of customer service that the additional inventory would yield and the increased costs required to stock that inventory). Decision makers sometimes deal with these decisions by listing the advantages and disadvantages—the pros and cons—of a course of action to better understand the consequences of the decisions they must make. In some instances, decision makers add weights to the items on their list that reflect the relative importance of various factors. This can help them “net out” the potential impacts of the trade-offs on their decision.

Degree of Customization

In the era of consumerism, profitability of business firm is based on degree of customization of products/or services offered to its customers. Decision related to customization requires understanding new market trends, customer outlook, flexible production techniques, high skilled process developers. The degree of customization has important implications for process selection and job requirements. The impact goes beyond operations and supply chains. It affects marketing, sales, accounting, finance, and information systems.

For successful operation activities, it is important to note that managers typically use a combination of qualitative and quantitative approaches, and many important decisions are based on qualitative approaches.
Analytics uses descriptive and predictive models to obtain insight from data and then uses that insight to recommend action or to guide decision making. Commercial analytics software is available for the challenges of analyzing very large, dynamic data sets, referred to as big data. Analyzing big data presents opportunities for businesses such as those that operate transactional online systems that generate massive volumes of data. For example, the McKinsey Global Institute estimates that the U.S. health care system could save $300 billion from analyzing big data. (Source: The Economist, May 26, 2011).

Changing Paradigm in Operation Decision making

Advances in information technology and global competition have had a major influence on operations management. While the Internet offers great potential for business organizations, the potential as well as the risks must be clearly understood in order to determine if and how to exploit this potential. In many cases, the Internet has altered the way companies compete in the marketplace. Electronic business, or e-business, involves the use of the Internet to transact business. E-business is changing the way business organizations interact with their customers and their suppliers. Most familiar to the general public is e-commerce, consumer–business transactions such as buying online or requesting information. However, business-to-business transactions such as e-procurement represent an increasing share of e-business. E-business is receiving increased attention from business owners and managers in developing strategies, planning, and decision making.

Summary

The operations function in business organizations is responsible for producing goods and providing services. It is a core function of every business. Supply chains are the sequential system of suppliers and customers that begins with basic sources of inputs and ends with final customers of the system. Operations and supply chains are
interdependent—one couldn’t exist without the other, and no business organization could exist without both. Operations management involves system design and operating decisions related to product and service design, capacity planning, process selection, location selection, work management, inventory and supply management, production planning, quality assurance, scheduling, and project management. The historical evolution of operations management provides interesting background information on the continuing evolution of this core business function. The Operations Tours and Readings included in this and subsequent chapters provide insights into actual business operations.

**Key Points**

1. The operations function is that part of every business organization that produces products and/or delivers services.
2. Operations consists of processes that convert inputs into outputs. Failure to manage those processes effectively will have a negative impact on the organization.
3. A key goal of business organizations is to achieve an economic matching of supply and demand. The operations function is responsible for providing the supply or service capacity for expected demand.
4. All processes exhibit variation that must be managed.
5. Although there are some basic differences between services and products that must be taken into account from a managerial standpoint, there are also many similarities between the two.
6. Environmental issues will increasingly impact operations decision making.
7. Ethical behavior is an integral part of good management practice.
8. All business organizations have, and are part of, a supply chain that must be managed.