CHAPTER ONE

INTRODUCTION TO PRODUCTION AND OPERATIONS MANAGEMENT

Chapter Objectives:

After reading this unit, you will be able to:

- define operations management
- describe the operations system
- outline the difference between manufacturing and service operations
- calculate productivity ratios (partial, multifactor and total)
- Explain operations strategy.

1.1. INTRODUCTION

Efficient and effective management of production resources (human resource, raw materials, etc) is a critical success factor in this global economy. It is a source of strategic growth and competitiveness in the market. One of the responsible functions to this end is Operation and production management which involves the design and control of a system responsible for the productive use of resources in the development of products or services. Operations management is the managing of these reproductive resources. It entails the design and control of systems responsible for the productive use of human resource, raw materials, equipment and facilities in the development of a product or service. The way how we manage productive resources is critical to strategic growth and competitiveness.

To many people, the term production creates an image of factories, machines and assembly lines. Because the field of production management in the past focused almost exclusively on manufacturing sector, Heavy emphasis was placed on methods and techniques that dealt with operating a factory .In recent years, the scope of production management has broadened considerably. Currently production concepts and techniques are being applied to a wide range of activities and situations outside of manufacturing, that is, in services as well as in manufacturing.

In other words, production management is applicable in all types of organization be it public or private, manufactory or services. Among the service organizations that apply production management are health care, food service recreation, banking, hotel management, retail sales, education, transportation and government. Because of this broadened scope, the field has taken on the name production /operations management (POM) or more simply Operations Management (OM), a term that more closely reflects the diverse nature of activities to which its concepts and techniques are applied.

In this unit, you will learn the meaning of operations management, operations system, the environment of OM, operations decision making and productivity measurement.

1.2. Production /operations Management

There is no one single definition given to the term operations and production management. The following are few of the definitions given by different writers.

- Operation management deals with the production of goods and services that people buy and use every day. It is a function that enables organization to achieve their goals through efficient acquisitions and utilization of resources.
- OM refers to the interaction and control of the process that transform input into finished goods and services.
- OM may be defined as the design, operation and improvement of the production systems that create the firm's primary products or services.
- OM may be defined as the management of the direct resources required to produce the goods and services provided by an organization. It is the derivative of the organization strategy and mission. The following model summarize the field of OM in a broad business context.

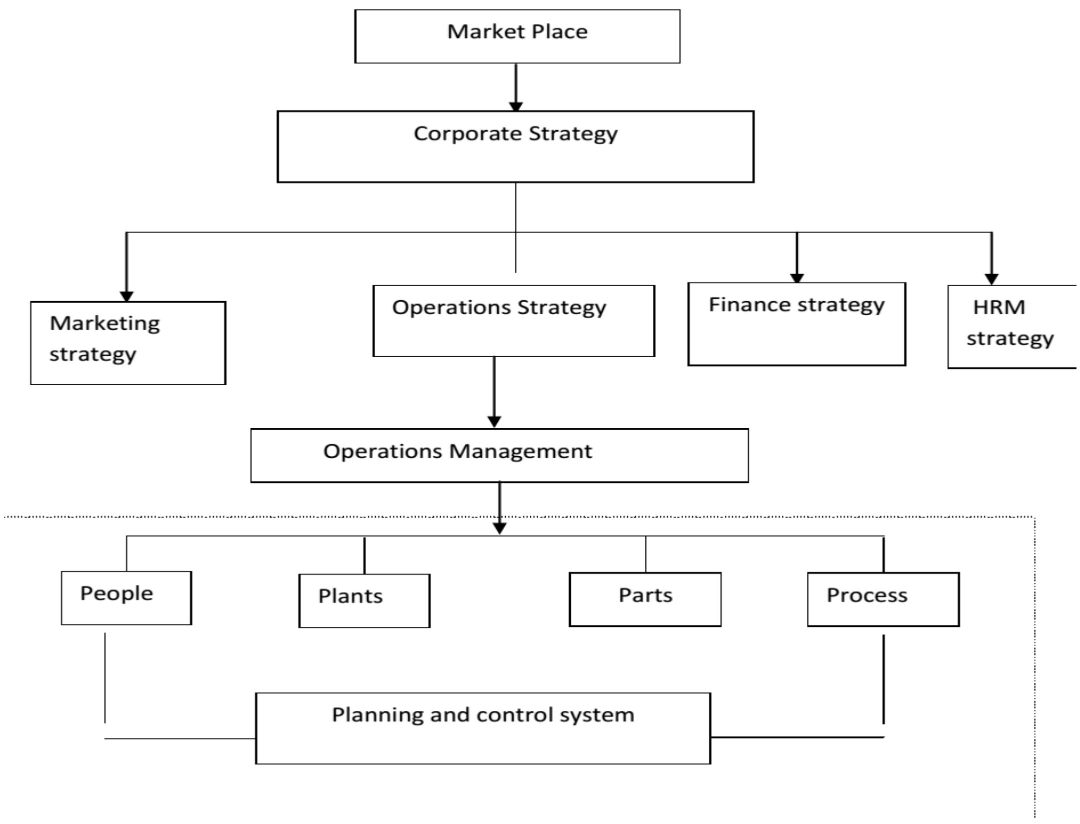


Fig.1.1 production system

As you can understand from the definitions, the operations system of an organization is the part that produces the organizations products. Thus, operations managers have the prime responsibility for processing inputs into outputs. They must bring the inputs together under a production plan that effectively uses the capacity and knowledge available in the production facility. In general, OM (operations management) deals with the effective and efficient management of the transformation process.

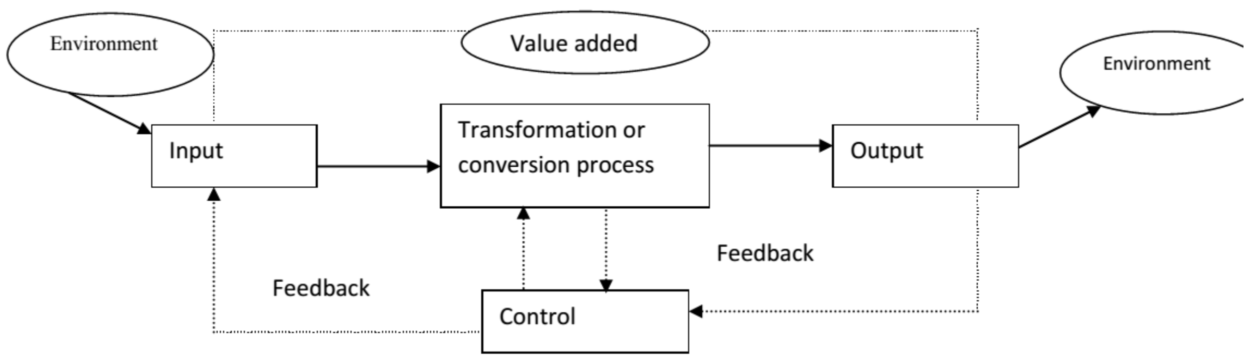
Effectiveness focuses on the extent to which the outputs of the transformation process to satisfy the needs and expectations of customers in a way that contributes to the overall objectives and goals of the company. To evaluate effectiveness, managers ask “did we build something that the customer really wanted and deliver that product in a way that helped the firm to compete in the market place”?

Efficiency depends on costs incurred to deliver outputs; managers ask “how does the value of the inputs consumed, to produce the output compared with the value or cost of the output”? Effectiveness deals with issues of customer satisfaction and strategic positioning; efficiency concerns matter such as productivity, cost control, and variance analysis.

1.3. Operation system

Operation management is the core of most business organization. It is responsible for the creation of an organization is goods or services. Inputs are used to obtain finished goods or services using one or more transformation process. To ensure that the desired outputs are obtained , measurements /assessment/evaluation/are taken at various points in the transformation process (feedback) and then compared to previously established standards to determine if corrective action is needed (control). Figure 1.2 given on page 4, shows the input-output relationship clearly.

Fig. 1.2 The conversation process



The essence of the operations function is to add value during the transformation process. Value added is the term used to describe the difference between the costs of inputs and the value or price of out puts. Typical examples are given in the table 1 below.

Table 1. Input transformation output relationship for typical systems

System	Primary input	Resources	Primary transformation	Desired output
Hospital	Patient	MDS, nurses medical supplies, equipment, food, bed etc	Health care (physiological)	Healthy individuals
Restaurant	Hungry customer	Food, chief waiters	Well prepared well served food	Satisfied customers
Automobile factory	Sheet steel engine parts	Tools, equipment, workers	Fabrication and assembly of car	High quality cars
College University	High school graduate	Teachers, books, class rooms	Imparting knowledge and skills, information	Educated individuals
Department Store	Shoppers	Displays, stocks of goods, sales, clerks	Attract shoppers promote products	Sales to satisfied customers

1.4. OPERATION FUNCTIONS AND ITS ENVIRONMENT

In every business organization there are three basic functions, that is, finance, marketing production/operation and others such as information system. However, production and operations function is the foundation of any business. Today's competitive and economic realities demand companies upgrade their skill in production. Because, no matter how other functions are effective, if it is difficult to think of success without having a product that can fit the requirements of customers. Doing so requires knowledge and application of operations management techniques.

In most organizations, operations is an internal function that is buffered form the external environment by other organizational functions such as marketing, finance, human resource management, purchasing, R&D departments etc. The following figure depicts this relationship

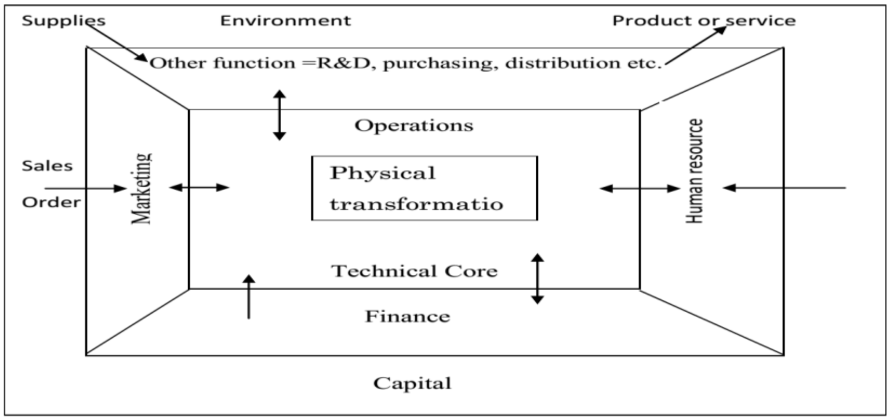


Fig. 1.3 The environment of operation management

As you shown in figure 1.3 operations function interact/interface and exchange information from the environment indirectly through other functions of the business.

These interfaces with other functions buffer the production function (technical core) from the direct environmental influence. This situation has been traditionally seen as desirable for the following reasons:

1. Interaction with the environment could have a distributing manner on the operation or production process.
2. In certain situations, maximum efficiency can be achieved by making production continuous.
3. The management skill that could be required to carry out successful operation of the production processes are often different from those required for successful operation of the boundary system of marketing, personnel and other functions.

1.5. Operations Decision making

Hundreds of decisions are made every day in the operation activity. Even minor decisions determine the company's success or failure. It ranges from simple judgmental to complex analysis which can also involve judgment (past experience & common sense). They involve a way of blending objective and subjective data to arrive at a choice. The use of quantitative methods of analysis adds to the objectivity of such decisions.

The major areas in which operations managers make decisions are:

1. Strategic decision

- Product and service plan
- Competitive priorities (TQM, statistical process,
- Location, capacity and layout decision

2. Design decisions

- Deals with actual production system

- Process design technology
- Job design

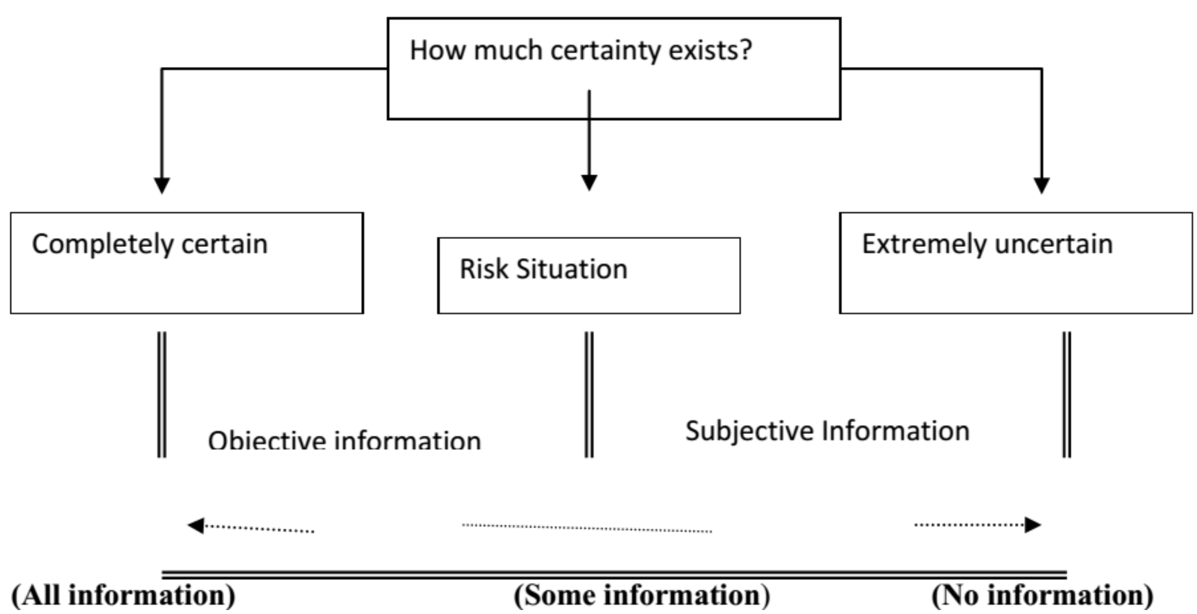
3. Operating Decision–deals with operating the factory the system once it is in place. It includes forecasting, materials management, inventory management, aggregate planning, scheduling.

1.5.1. Quantitative Approaches

Quantitative approaches to problem solving often embody an attempt to obtain mathematically optimum solutions to managerial problems. The functions are commonly used quantitative approaches like, linear programming, Queuing techniques, Inventory models, Forecasting techniques, Statistical models.

Operation decision become more complex when: it involves many variables, the variables are highly interdependent or related, and the data describing the variables are incomplete or uncertain. The necessity of working with incomplete and uncertain data has always been a problem for decision maker. The following figure depicts the information environment decisions.

Fig. 1.4 Quantitative methods available to operations managers



The following are quantitative tools used under the three situations.

Certainty	**Risk**	**uncertainty**
Algebra, Breakeven analysis,	Statistical analysis	- Game theory
Cost benefit analysis,	Queuing theory	- Decision theory
Calculus, mathematical	Simulation	
Programming, linear and	Net Work analysis;	
Non linear, integer, dynamic	PERT/CPM	

Programming etc. Decision tree, Utility theory etc

Framework for Decisions (process)

An analytical and scientific framework for decisions implies several systematic steps for decision makers. They are:

Step 1. Define the problem and its parameters

Step 2. Establish the decision criteria and set the objective

Step 3. Formulating a relationship (model) between the parameters and the criteria

Step 4. Generate alternatives by varying the values of the parameters

Step 5. Choose the course of action, which most closely satisfies the organization.

Step 6. Implement the decision and monitor the result

In the following section of this unit you will learn how to apply the quantitative tools in solving operations related problems. Since it is difficult to illustrate the entire models only one model, which can be used under the three situations of decision-making are discussed.

A. Decision Making under Certainty

As it is shown in the figure 1.4 above different approaches to decision making are available to decision makers. The most widely used decision rule under the certainty situation is break-even analysis (cost-profit-volume analysis), cost-benefit analysis and mathematical programming. In the next section break-even analysis is illustrated.

1. Breakeven Analysis (BEA)

BEA is a widely used decision making tool. It helps to make a decision whether to produce or not a certain level of output. Breakeven point is a level of output at which, profit is zero or no loss or no gain. Production or operation level below this point results in a loss, whereas level of output above this point helps the company to enjoy some level of profit. Therefore, knowing this point helps the company to take appropriate action.

Example 1. The cost and revenue information of ABC Company are as follows:

Fixed Cost = Br 120,000

Unit Price = Br. 50

Variable Cost/unit (Vc/unit) = Br. 30

Find the break-even point in terms of unit and sales in Birr.

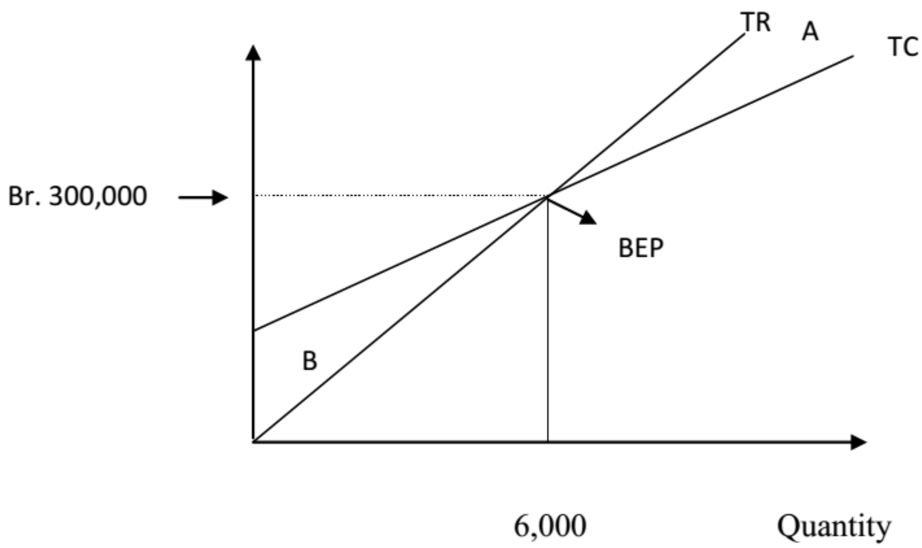
Solution:

$$\text{Break Even Point-BEP (quantity)} = \frac{\text{Fixed Cost}}{\text{Price/unit - VC/unit}}$$

$$BEP = \frac{120{,}000}{50 - 30} = \frac{120{,}000}{20} = \underline{\underline{6{,}000}} \text{ units}$$

$$BEP \text{ (In Birr)} = 6{,}000 \text{ X Br. } 50 = \underline{\text{Br. } 300{,}000.}$$

This can be depicted graphically as follows:



Where:	TR= total revenue	A= represents the profit region
	TC= total cost	B= represents the loss region
	BEP= breakeven point	Vc/unit = Variable cost per unit

Interpretation

The company, if it wants to be profitable, should produce and sale more than 6, 000 units of output. For example, if the external and internal environment forces it to produce only 3,000 units of the product the company will incur a loss. So, it has to take some short-term as well as long term measures to correct the situation.

B. Decision making under Risk

Decision Tree

Decision tree is a schematic diagram used to determine expected value. It shows the alternative outcomes and independence of choice. It is used in risk situation where there is only probabilistic information stated in probabilistic value.

Example. ABC manufacturing firms wants to meet the excess demand to its products. The firm's management is concerning three alternative courses of action.

A. Arrange for subcontracting
B. Begin overtime production
C. Construct new facilities

The correct choice depends largely on future demand, which may be low, medium or high. Management ranks the respective probabilities as 10%, 50% and 40% to low, medium and high product demand in the future respectively. A cost analysis reveals the effect on profit of each alternative under a given state. This is given in the payoff table below.

Pay off table

Alternatives	**Profit if Demand is (Birr)**		
	Low (0.1)	**Medium (0.5)**	**High (0.4)**
Arrange for sub contract (A_1)	10,000	50,000	50,000
Over time (A_2)	-20,000	60,000	100,000
New facilities (A_3)	-150,000	20,000	20,000

Required: Which alternative is the viable choice?

We can use expected monetary value approach and decision tree to answer this question.

1. Expected monetary value (EMV) – Determine the expected payoff of each alternative and choose the alternative that has the best expected payoff.

EMV (A1) =10,000X0.1+0.5X 50,000+0.4X50, 000

=1000+25,000+20,000

=46,000

EMV (A2) = -20,000X0.1+60,000X0.5+100,000X0.4

= -2,000+30,000+40,000

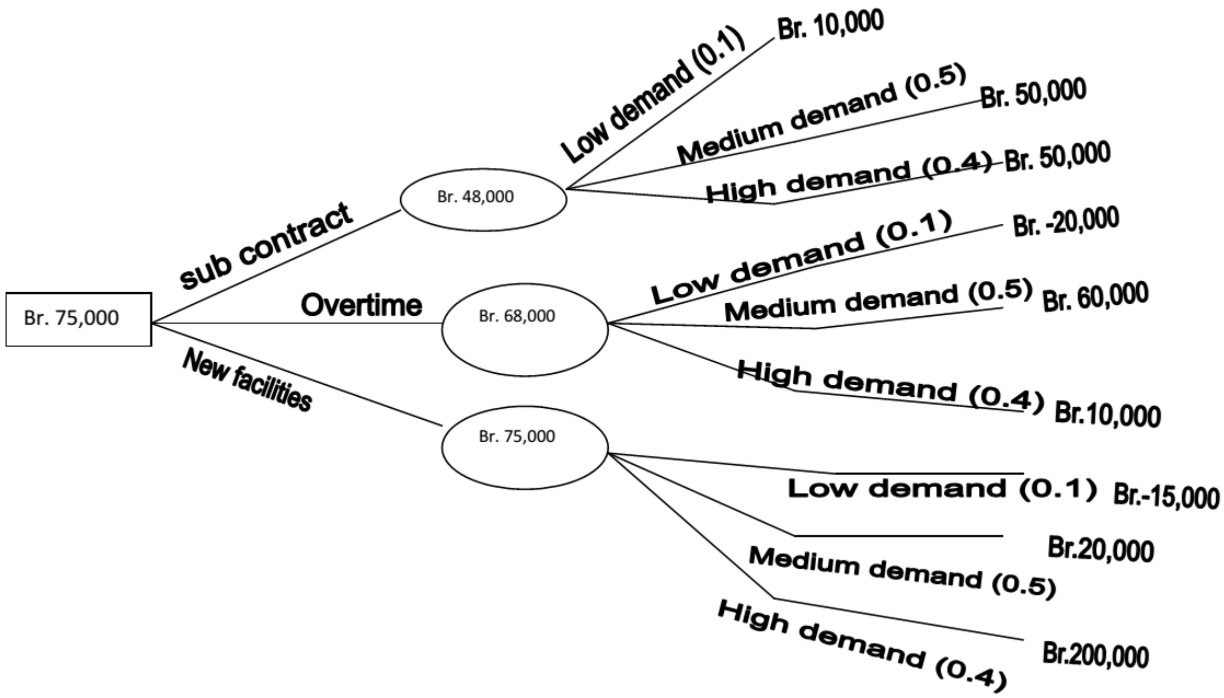
= Br. 68,000

EMV (A3) = 150,000X0.1+20,000X0.5+200,000X0.4

= -15,000+10,000+80,000

= Br.75, 000 (highest expected value)

Decision: The best alternative is to construct new facilities because it has the highest expected value. You can also use decision tree two depict this information to make a decision as shown below.



Decision: Construct new facility because it have a better return than other two alternatives

C. Decision making under uncertainty

At the opposite extreme is complete uncertainty, no information is available on how likely the various states of nature are under these condition, four possible decision criteria are:

A. **Minimax regret** – determine the worst regret for each alternative, and choose the alternative with " best worst"
B. **Maximax** – determine the best possible payoff and choose the alternative with that payoff.
C. **Laplace** – determine the average payoff, and choose the alternative with the best average.
D. **Maximin-** determine the worst possible pay off for each alternative, and then choose the alternative that has the "best worst"

Example: Based on the above pay off table and assuming that there is not probability value of occurrence of each outcome, determine which alternative would be chosen under each of these strategies.

- Maximin
- Maximax

- Laplace

Solution:

a) Maximin criteria

The worst pay off for the alternatives are Br. 10,000 for subcontracting, Br. -20,000 for overtime and Br. -150,000 for new facilities and 10,000 is the best out of the worst, hence, the decision is to choose subcontracting as an alternative using the maximin criteria.

b) Maximax criteria

The best pay off for each alternative, that is, for Sub contracting is 50,000, over time Br. 100,000, and New facilities is Br. 2000,000. The decision is to construct new facility which is an alternative with the best payoff value i.e., Br. 200,000

c) Laplace criteria

The average payoff of each alternative is;

A1 = 10,000+50,000+50,000/3 = 36,667

A2 = -20,000 + 60,000 + 100000 /3 = 46,667

A3 == -150,000 + 20,000 + 200000 / 3 = 23,333

Decision: use overtime to absorb the excess demand.

1.5.2. Difference between Manufacturing and service operations

Operations management may be defined as the design, operations and improvement of the production systems that creates the firm‟s primary products or services. The essential difference between the two is that service is an intangible process, while a good is the physical output of a process. To put it another way a service is something that “ If you drop it on your food it won‟t hurt you” Other differences are that in service, location of the service facility and direct customer involvement in creating the output are often essential factors; in goods production, they usually are not.

Manufacturing and service are often similar in terms of what is done but differ in terms of how it is done. For example, both involve design and operating decision. Most of the difference between manufacturing and service operations is that manufacturing is product-oriented and service is act oriented. The difference involves following.

1. Customer Contact

By its very nature, service involves a much higher degree of customer contact than manufacturing does. The performance of service typically occurs at the point of consumption; that is the two often occur simultaneously. For example, surgery requires the presence of the surgeon and the patient. Repairing a leaky roof must take place where the roof is on the other hand manufacturing, allows a separation between production and consumption so that manufacturing often occurs in an isolated environment away from the customer.

2. Uniformity of inputs

Service operations are subject to more variability of inputs than manufacturing operations are. Each patient, each TV repair presents a specific problem that often must be diagnosed before it can be remedied. Low variability of inputs requirements for manufacturing are generally more uniform than for service.

3. Labor content of Jobs. Service by its nature is labor intensive whereas manufacturing is capital intensive

4. Uniformity of output. Service is variable but manufacturing is low variable or highly (uniform).

5. Measurement of productivity. Productivity measurement in manufacturing is straightforward and easy but Service productivity measurement is more difficult because, there are certain intangible variables in service that are difficult to measure objectively.

Table 1.2 Difference between manufacturing and service operations (Summary)

Characteristic	Manufacturing	Service
Out put	Tangible	Intangible
Contact with customer	Low	High
Uniformity of input	High	Low
Labor content	Low	High
Uniformity of output	High	Low
Measurement of productivity	Easy	Difficult
Storage	Output can be inventoried	Not
Delivery time	Long lead times	Short lead time
Quality	Objectively determined	Subjectively determined

In reality most, firms are not selling purely services or goods rather manufacturers provide many services as part of their product and many services often manufacture the physical product that they deliver to their customers or consume goods is creating the services. In essence goods are considered as vehicles for services. To put in another way:

- In services outputs cannot be inventoried while for goods products can be invigorated
- There is extensive customer contact for service white for goods production customer contact is little

- The lead-time is short for services (delivered immediately on spot e.g. doctor) while for goods it is long.
- Service quality determined with difficulty (customer service and customer satisfaction are difficult to measure.) while product quality can easily be determined.

1.6. HISTORICAL EVOLUTION OF PRODUCTION AND OPERATION MANAGEMENT

Operation management has existed since people start to produce. The concern for efficiency and the essence of productivity can be traced back through history to long before. Aside from individual and family concern for personal or small group productivity, large organizations such as governmental units, armies, and organized religious institutions were concerned with productivity and employed managerial techniques that would increase worker output. For over two century's operations and production management has been recognized as an important factor in a country's economic growth. The traditional view of manufacturing management began in eighteenth century when Adam Smith recognized the economic benefits of specialization of labor. He recommended breaking of jobs down into subtasks and recognizes workers to specialized tasks in which they would become highly skilled and efficient. In the early twentieth century, F.W. Taylor implemented Smith's theories and developed scientific management. From then till 1930, many techniques were developed prevailing the traditional view.

Production Management becomes the acceptable term from 1930s to 1950s. As F.W. Taylor‟s works become more widely known, managers developed techniques that focused on economic efficiency in manufacturing. Workers were studied in great detail to eliminate wasteful efforts and achieve greater efficiency. At the same time, psychologists, socialists and other social scientists began to study people and human behavior in the working environment. In addition, economists, mathematicians, and computer socialists contributed newer, more sophisticated analytical approaches. With the 1970s emerge two distinct changes in our views. The most obvious of these, reflected in the new name Operations Management was a shift in the service and manufacturing sectors of the economy. As service sector became more prominent, the change from „production‟ to „operations‟ emphasized the broadening of our field to service organizations. The second, more suitable change was the beginning of an emphasis on synthesis, rather than just analysis, in management practices. Previously preoccupied with intensive analytical orientation and an emphasis on marketing and finance, managers failed to integrate operations activities coherently into the highest levels of strategy and policy. Today, the operations function is experiencing a renewed role as a vital strategic element. Consequently, organizational goals are better focused to meet consumers‟ needs throughout the world.

Operations management will continue to progress with contributions from other disciplines, including industrial engineering and management science. These disciplines along with statistics, management, and economics, have contributed substantially to greater productivity. Innovations from physical sciences (biology, anatomy, chemistry, and physics) have also contributed to advances in OM. This is because of the fact that the design of products and processes often depend on the biological and physical sciences.

Especially important contribution to OM has come from the information sciences, which we define as the systematic processing of data to yield information. The information sciences are contributing in a major way toward improved productivity while at the same time providing society with a greater diversity of goods and services.

In sum, decisions in operations management require individuals who are well versed in management science, in information science, and often in one of the biological or physical science.

TABLE 2.2 Historical summary of operations management

Date	Contribution	Contributor
1776	Specialization of labour in manufacturing	Adam Smith
1799	Interchangeable parts, cost accounting	Eli Whitney & others
1832	Division of labour by skill; assignment of jobs by Skill; basics of time study	Charles Babbage
1900	Scientific management time study and work study Developed; dividing planning and doing of work	Frederick W.Taylor
1900	Motion of study of jobs	Frank B. Gilbreth
1901	Scheduling techniques for employees, machines Jobs in manufacturing	Henry L. Gantt
1915	Economic lot sizes for inventory control	F.W. Harris
1927	Human relations; the Hawthorne studies	Elton Mayo
1931	Statistical inference applied to product quality: quality control charts	W.A. Shewart
1935	Statistical Sampling applied to quality control: inspection sampling plans	H.F.Dodge & H.G.Roming
1940	Operations research applications in world war II	P.M.Blacker & others
1946	Digital Computer	John Mauchlly and J.P.Eckert
1947	Linear Programming	G.B.Dantzig, Williams &
1950	Mathematical programming, on-linear and stochastic processes	A.Charnes, W.W.Cooper &
1951	Commercial digital computer: large-scale computations available	Sperry Univac
1960	Organisational behaviour: continued study of people at work	L.Cummings, L.Porter
1970	Integrating operations into overall strategy and policy Computer applications to manufacturing, scheduling, and control, Material Requirement Planning (MRP)	W.Skinner J.Orlicky & G.
1980	Quality and productivity applications from Japan: robotics, CAD-CAM	W.E. Deming & J.Juran

1.7. Productivity measurement

Productivity is a common measure of how well a country, industry or business unit is using its resources (or factors of production). In its broadest sense, productivity is defined as:

Productivity = Input

Outputs

To increase productivity, we want to make this ratio of output to inputs as large as practical. Productivity is what we call a relative measure. In other words, to be meaningful, it needs to be compared with something else. Comparison can be made with similar operations within its industry, or it can measure productivity over time within the same operation.

Productivity may be expressed as partial measures, multifactor measures, or total measures. If we are concerned with the ratio of output to a single input; we have a partial productivity measure. If we want to look at the ratio of output to a group of inputs (but not all inputs), we have a manufacture productivity measure. If we want to express the ratio of all outputs to all inputs, we have a total factory measure of productivity that might be used to describe the productivity that might be used to describe the productivity of an entire organization or even a nation.

$$\text{Partial Measure} = \frac{\text{Output}}{\text{Labor}} \quad \text{or} \quad \frac{\text{Output}}{\text{Capital}} \quad \text{or} \quad \frac{\text{Output}}{\text{Material}} \quad \text{or} \quad \frac{\text{Output}}{\text{energy}}$$

$$\text{Multifactor Measure} = \frac{\text{Output}}{L + K + E} \quad \text{or} \quad \frac{\text{Output}}{L + K + Rm}$$

$$\text{Total Measure} = \frac{\text{Output}}{\text{Inputs}} \quad \text{or} \quad \frac{\text{Goods and service produced}}{\text{All resourceused}}$$

Where: L = Labor

K = Capital

E = Energy

Rm = Raw materials

Example 1 ABC Co. produces apple pies sold to supermarkets has been able to work with his current equipment, to produce 24 pies per bushel of apples. He currently purchases 100 bushel per day and each gallon requires 3 labor –hours to process. He believes that he can hire a professional food broker, who can buy better – quality apple at the same cost. If this is the case he can increase his production to 26 pies per bushel. This labor hour will have the impact on productivity (pies labor hours) if the food broker is hired. The professional food broker works hours per day. Calculate:

1. The current labor productivity
2. Labor productivity with food broker

Solution: Current Labor productivity $= \frac{24\,\text{pies} \times 100\,\text{bushel}}{100\,\text{bushel} \times 3\,\text{hour}}$

$= \underline{8 \text{ pies /labor hour}}$

$$\text{Labor productivity with food broker} = \frac{26\,\text{pies} \times 100\,\text{bushel}}{(100\,\text{bushel} \times 3\,\text{hrs}) + 8\,\text{hours}}$$

$$= \frac{2600}{308}$$

= $\underline{\textbf{8.44 pies /labor hours}}$

Using last year (i.e. 8 as a base, the increase is 5.5%= 8.44/8 =1.055 or 5.5% increase over last year.

Example 2 A) Determine the productivity of four workers who installed 640 square yards of carpeting in 8 hours per day.

B) Calculate the productivity of a machine that produces 60 units in two hours

Solution:

$$\text{Productivity} = \frac{\text{Yards of carpet installed}}{\text{Labor hours worked}}$$

$$= \frac{640\,\text{yards}}{4\,\text{workers} \times 8\,\text{hours}} = \frac{640}{32}$$

$= \underline{20 \text{ yards/hour}}$

$$\text{Productivity} = \frac{\text{Outputs (in units)}}{\text{Production time}} = \frac{60\,\text{units}}{2\,\text{hours}}$$

$= \underline{30 \text{ pieces /hour}}$

Example 3: A company that produces fruits and vegetable is able to produce 400 cases of canned peaches in one half hour with two workers. What is labor productivity?

Solution:

$$\text{Labor productivity} = \frac{\text{Quantity produced}}{\text{Labor hours}}$$

$$= \frac{400 \text{ cases}}{2\text{workers X}1/2 \text{ hour /workers}}$$

$= \underline{400 \text{ cases per hour}}$

Examples 4 A wrapping paper Company produced 2000 rolls of paper one day at a standard price of Br. 1 per roll. Labor cost was Br. 160, material cost was Br. 50, and overhead was Br. 320. Determine the (multifactor and total) productivity.

Solution:

$$\text{Multifactor productivity} = \frac{\text{quantity produced @standard price}}{\text{Labor cost + material cost + overheads}}$$

$$= \frac{2{,}000 \text{ rolls X Br. } 1\text{ /roll}}{\text{Br. } 160 + \text{Br } 50 + 320}$$

$$= \frac{2000}{530}$$

$$= \underline{\underline{3.77}}$$

Productivity Variables

The three factors critical to productivity improvements are labor, capital and the art and science of management. These three factors are to improved productivity. They represent the broad areas in which managers can take action to improve productivity.

Labor: improvement in the contribution of labor to productivity is the result of a healthier, better-educated, and better-nourished labor force. Some increase may also be attributed to a shorter workweek. Historically, about 10% of the annual improvement in productivity is attributed to improvement in the quality of labor. Three key variables for improved labor productivity are: 1. Basic education appropriate for effective labor force 2. Diet of the labor force 3. Social overhead that makes labor available, such as transportation and sanitation

Capital: human beings are tools using animals. Capital investment provides those tools. Capital investment has increases in any country every year except during a few very severe recession periods. Inflation and tax increase the cost of capital, capital investment increasingly expensive. When the capital invested per employee drops, we can expect a drop in productivity. Using labor rather than capital may reduce unemployment in the short run, but it also makes economies less productive and therefore lowers wages in the long run. Capital investment is often a necessary, but seldom a sufficient ingredient in the battle for increasing productivity.

Management: management is a factor of production an economic resource. Management is responsible for ensuring that labor and capital are efficiently used to increase productivity. Management accounts for over half (52%) of the annual increase in productivity. This increase includes improvements made through the use of knowledge and the application of technology. Using knowledge and technology is critical in postindustrial societies. Consequently, postindustrial are also known as knowledge societies. Knowledge societies are those in which much of the labor force has migrated from manual work to technical and information processing tasks requiring ongoing education. The required education and training are important high-cost items that are the responsibility of operation managers as they build organizations and workforces. The expanding knowledge base of a contemporary society requires that managers use technology and knowledge effectively. More effectively use of capital also contributes to productivity. It falls to the operations managers, as a productivity catalyst, to select the best new capital investments as well as to improve the productivity of existing investments. The productivity challenge is difficult. A country cannot be a world class competitor with second class inputs. Poorly educated labor,

inadequate capital and outdated technology are second class inputs. High productivity and quality outputs requires high quality inputs, including good operations managers.

Productivity and the Service Sector

The service sector a special challenge to the accurate measurement of productivity and productivity improvement. Productivity of the service sector has proven difficult to improve because service- sector work is: 1. Typically labor-intensive (for example, counseling, teaching). 2. Frequently focused on unique individual attributes or desires (for example, investment advice). 3. Often an intellectual task performed by professionals (for example, medical diagnosis) 4. Often difficult to mechanize and automate (for example, a haircut) 5. Often difficult to evaluate for quality (for example, performance of a law firm) The more intellectually and personal the task, the more difficult it is to achieve increase in productivity. Low productivity improvement in the service sector is also attributable to the growth of low productivity activities in the service sector. These includes activities not previously a part of the measured economy, such as child care, food preparation, house cleaning, and laundry service.

Improving Productivity

Factors Affecting Productivity and Improving

- Numerous factors affect productivity. Among them are methods, capital, quality, technology, and management.

There are a number of key steps that a company or a department can take toward improving productivity:

1. Develop productivity measures for all operations
2. Look at the system as a whole in deciding which operations 40 concentrate on; it is overall productivity that is important.
3. Develop methods for achieving productivity improvements
4. Establish reasonable goals for improvement.
5. Make it clear that management supports and encourage productivity improvement.
6. Measure improvements, and publicize then

Ethics and Social Responsibility

Operations managers are subjected to constantly changes and challenges. The systems they build to convert resources into goods and services are complex. The physical and social environment changes, as do laws and values. These changes present a variety of challenges that come from the conflicting perspective of stakeholders such as customers, distributers, suppliers, owners, lenders, and employees. These stakeholders, as well as government agencies at various levels, require constant monitoring and thoughtful responses. Identifying ethical and social responsible responses while building productive systems is not always-clear cut. Among the many ethical challenges facing operations managers are:

- Efficiently develop and producing safe, quality products.
- Maintaining a clean environment.
- Providing a safe workplace.
- Honoring community commitments.

Managers must do all of this in an ethical and social responsible way while meeting the demands of the marketplace. If operations managers have a moral awareness and focus on increasing productivity in a system where all stakeholders have a vice, then many of the ethical challenges will be committed, the market will be satisfied, and the ethical climate will be enhanced.

SUMMARY

This unit has provided you an overview of operations management. The main points covered in this unit are as below.

- Operations management refers to the direction and control of the process that transform inputs into finished goods and services. This function is essential to systems producing goods and services in both profits and non for profit organizations.
- Types of decisions with which operations managers are involved include design and operating decisions. Design decisions relate to capacity planning, product design, process design, layout of facilities, and selecting locations for facilities. Operating decisions relate to quality assurance, scheduling, inventory management, and project management.
- This unit also provides a brief discussion of the historical evolution of production or operations management and recent trends in the field.
- Operations require utilization of a variety of skills and technologies. They play a key, role in determining productivity, which is a prime determinant of productivity. Productivity is a ratio of output to input or it is given by the formula productivity = output/Input.