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V-Skills

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1. OPERATIONS AND PRODUCTIVITY

1.1. Introduction

Hospitality goes beyond the service guests expect of servers. Hospitality means creating a pleasant dining experience for your guests with small gestures like giving a friendly greeting, smiling even w hen very tired, remembering names, hanging up coats, pulling out chairs, remembering a returning guest's favorite drink, knowing exactly w hat is ordered, and anticipating w hat the guest needs next.

An organization consists mainly of four functional subsystems, viz. marketing, production, finance and human resource management. The marketing function of an organization aims to promote its products among customers which help it to obtain sales orders. This, in turn, is communicated to the production subsystem which is concerned with the management of physical resources for production of an item or provision of services. This means that the available facilities also need to be managed to meet the current market requirements. To manufacture the product as per the specifications, the production function needs to organize its resources (raw material, equipments labor and working capacity) according to predetermined production plans. The finance function provides authorization and to control to all other subsystems to utilize money more effectively through a well defined finance plan. The human resource management function plans and provides manpower to all other subsystems of the organization by proper recruitment and training programs. It also monitors the performance of the employees by proper motivation for targeted results.

Thus we can see that all the subsystems of an organization are mutually interlinked. They cannot work in isolation. A complete integration of all the functions /subsystems of an organization are absolutely essential for the effective functioning and achievement of desired results.

The concern of any organization today is the pursuit of creating more value for the customer. This value end focus provides the competitive advantage that has become of necessity today. 09 Production and operation management provides the means to explore and implement initiatives on how to avoid waste, how to create value and how the organization can differentiate itself from its competitors. This differentiation has become the means to survive in this brutal world of competition. In fact "Operations" greatly influences, directly or indirectly, the value creation logic of the organization. Production and operation management is the science-combination of techniques and systems – that guarantee production of goods and services of the right quality, in the right quantities and at right time with the minimum cost within shortest possible time. The essential features of a production and operation function is to bring together people, machines and materials to provide goods and services for satisfying customer needs. In our next paragraph we shall describe what is meant by 'operation function' in an organization

Definition of production management

One cannot demarcate the beginning and end point of Production and Operation Management in an establishment. The reason is that it is interrelated with many other functional areas of business viz. marketing, finance, industrial relations policies etc Alternately, Production and Operation Management is not independent of marketing, financial, and personnel management due to which it is difficult to formulate some single appropriate definition of Production and Operation

Management. The following definitions try to explain main characteristics of Production and Operation Management

- ✓ In the words of Mr. E.L. Brech: "Production and Operation Management is the process of effective planning and regulating the operations of that section of an enterprise which is responsible for the actual transformation of materials into finished products". This definition limits the scope of operation and production management to those activities of an enterprise which is associated with the transformation process of inputs into outputs. The definition does not include the human factors involved in production process. It lays stress on materialistic features only.
- ✓ Production and Operation Management deals with decision making related to production processes, so that the resulting goods and services are produced in accordance with the quantitative specifications and demand schedule with minimum cost. According to this definition design and control of the production system are two main functions of production and operation management.
- ✓ Production and Operation Management is a set of general principles for production economies, facility design, job design, schedule design, quality control, inventory control work study and cost band budgeting control. This definition explains the main areas of an enterprise where the principles of production and operation management can be applied. This definition clearly points out that the production and operation management is not a set of techniques,

It is evident from the above definitions that production planning and its control are the main characteristics of production and operation management. In the case of poor planning and control of production activities the organization may not be not be able to attain its objectives and may result in loss of customer's' confidence and retardation in the progress of the establishment.

In short, the main activities of operation and production management can be listed as;

- ✓ Specialization and procurement of input resources namely management, material and labor, equipment and capital.
- ✓ Product design and development to determine the production process for transforming the input factors into output goods and services.
- ✓ Specialization and control of transformation process for efficient production of goods and services.

1.2. Operation Function

The operation function of an organization is the part that produces the organization's products. The product may be physical goods or services. This function performs several activities to 'transform' a set of inputs into a useful output using a conversion process. The conversion process is the process of changing inputs of labor, materials, capital and management into outputs of goods and services. The basic elements of a conversion process are shown in the Figure 1.1

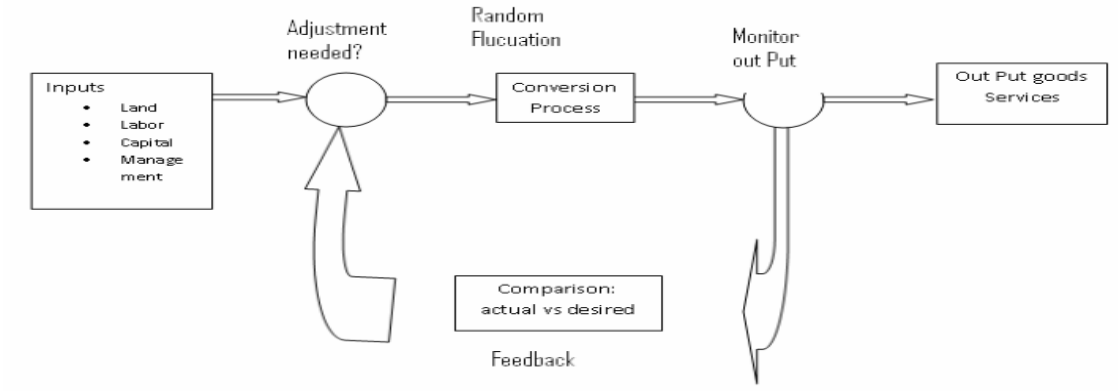

Figure 1.1 Basic Elements of Conversion Process

The production process consists of number of activities and operations. These operations and activities can be applied in different combinations and order to achieve the desired objective. The operations can be purchase of raw materials, maintenance of inventories, transportation of goods etc. The combination of two or more constitutes a system. In any production process two or more systems can be combined in series or parallel e.g. number of factories producing produce similar products to supply several markets areas then they constitute a parallel system. According to Webster "System is a regularly interacting or interdependent group of items forming a unified whole." Any systems may have many components and variation in one component is likely to effect the other components of a system e.g. change in rate of production will affect inventory, overtime hours etc.

Broadly speaking an 'operation function' or operations management is a systematic approach to address all the issues pertaining to the transformation process that converts some inputs into outputs that are useful and could fetch revenue to the organization. Four aspects of this definition merit closer attention.

A systematic approach involves understanding, nature of issues and problems to be studied, establishing measures of performance, collecting relevant data, using scientific tools and techniques to analyze and effective and efficient solutions to the problem. Therefore, for successful operation management, the focus should be on developing a set of tools and techniques to analyze problems within operation systems.

The second aspect of operation management pertains to addressing several issues that an organization faces. These issues vary markedly in terms of the time horizon, the nature of the problem to be solved and commitment of the required resources, the problems may include deciding how to re-route jobs when a machine breaks down on a shop floor or how to handle a surge in demand in a service systems. On the other hand, decisions such as where to locate the plant, what capacity to build in the system and what type of products and services need to be offered to the customers is to be done? Operation management provides alternative methodologies to address such wide-ranging issues to an organization.

Transformation processes are central to operation systems. The transformation process ensures that inputs are converted into useful outputs. Therefore, the focus of the operation management is

to address the various aspects of design in the transformation process as well as planning and operational control.

Finally, the goal of operation management is to ensure that through careful planning and control of operations the organization is able to keep the costs. In order to ensure this an appropriate performance evaluation system is required. Therefore the operation management discipline also involves the development of such a system of performance evaluation and methods by which the operating system could make improvements to meet targeted performance measures.

Importance of Productivity

Effectiveness of production and operation system may be viewed as the efficiency with which inputs are converted into outputs. The conversion efficiency can be gauged by ratio of the output to the inputs and is commonly known as productivity of the system. Productivity is the ratio of input facilities to the output of goods and services.

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

$$= \frac{\text{Goods or services}}{\text{Capital, manpower, materials, machines and land and building}}$$

The higher the productivity of the operating system, more efficient the operation function said to be. Management of operation system thus is essentially concerned with the management of productivity. Another way of looking at the concept of productivity is to look at the amount of waste generated in the system. If waste is unnecessary output and/or defective output from the system, then the productivity of the system can be improved by eliminating / minimizing the waste occurring in the system.

Policy formation in modern times has become a very complicated and time consuming phenomenon. Business enterprises now days want to plan their future strategies from the past performance. There are number of measures viz. Productivity, Profitability, rate of return etc. to illustrate the past performance. All these indicators are some sort of direct or indirect relationship between inputs and outputs factors. But none of the measures is able to determine or evaluate the overall performance of an enterprise. We shall be discussing measures of productivity in a little more detail in the following paragraphs.

The only way of raising the living standards of people is to increase productivity. Productivity can be increased by increasing output from each unit of input.

Concept of Productivity: In general sense, productivity is some relationship between inputs and outputs of an enterprise. It is quantitative relationship between what we produce and the resources used. The concept of productivity measurement is many sided. It can relate to every item/activity on which money is spent to get the final product some of the definitions given below explain the concept of productivity

Definition of Productivity:

- ✓ Productivity is a measure of how much input is produced to a given output i.e. it is ratio of output to input
- ✓ Productivity is the ratio between the amount produced and the amount of resources used in the course of production. The resources may be any combination of materials, machines, men and space.
- ✓ European productivity council defines "productivity is an attitude of mind. It is mentality of progress, of the constant improvement of that which exists. It is the certainty of progress, of the constant improvement of that which exists. It is the certainty of being able to do better than yesterday and continuously. It is the continual effort to apply new techniques and methods. It is the faith in human progress."
- ✓ According to Peter Drucker, "productivity means a balance between all factors of production that will give the maximum output with the smallest efforts."
- ✓ I.L.O generally takes productivity to mean. "The ratio between the volumes of output as measured by production indices the corresponding volume of labor input as measured by employment indices."
- ✓ Organization of European Economic Community (OEEC) defines productivity as the ratio between the production of given commodity measured by volume and one or more of the corresponding input factors also measured by volume.

Thus there can be a number of measures indicating the level of performance corresponding to each input. In general sense, productivity is measure of how much input is required to produce a given output.

Importance of Productivity

The concept of productivity is of great significance for undeveloped and developing countries. In both the cases there are limited resources which should be used to get the maximum output i.e. there should be tendency to perform a job cheaper, safer, and in quicker ways. The aim should be optimum use of resources so as to provide maximum satisfaction with minimum efforts and expenditure. Productivity analyses and measures indicate the stages and situations where improvement in the working of inputs is possible to increase the output.

The productivity indicators can be used for different purposes viz. comparison of performance for various organizations, contribution of different input factors, bargaining with trade unions etc.

Factors affecting Productivity

All the factors which are related to input and output components of a production process are likely to affect productivity. These factors can be divided into 2 main categories, namely:

Category 1

Primary factors are effort and working capacity of an individual.

- ✓ Organization factors are related to the design and transformation process required to produce some item, the nature of training and other skill imported to workers to perform certain operations in a production process, control and various other incentives.
- ✓ Conventions and traditions of the organization e.g. activities of labor unions, medical facilities, worker and executive understanding etc.

Category II

- ✓ Factors related to output: research and development techniques, improvement in technology and efficient sales strategy of the organization will lead to improvement in output.
- ✓ Efficient use of input resources , better stores control , production control policy , maintenance of machines etc will minimize the cost of production

The factors listed in category I and II can be further divided into 4 major classes viz.

- ✓ Technological
- ✓ Managerial
- ✓ Labor, and
- ✓ External factors

The technological factors can increase the output per unit of input substantially. They can be defined in terms of technology employed, tools and raw material used.

The labor factors are characterized by the degree of skills of the works force, health, and attitude towards management, training and discipline

Managerial factors can be located in organizational structure, scheduling of work, financial management, layout innovation, personnel policies and practice work environment, material management etc.

External factors or innumerable and identifiable in the environment which an organization has to interact e.g., the power and transport facilities, tariffs and taxes etc have important bearing on the levels of productivity. Some of these factors are controllable and some are uncontrollable and demarcation should be made between the two.

Ways of increasing productivity

Productivity can be increased in a number of ways. It can be increased either by reducing the input for the same level of output or by increasing the output with the level of input or by combination of both. This can be achieved by elimination of waste , by using improved technology , better production design and management efforts there can be increase in productivity by reducing down time of maintenance , reduction in material inputs , better quality of goods , improved utilization of resources , reduction in working capital requirements , reduction in inventory size , improvement in man power skills through training etc . Output can be increased by better leadership management. When employees are better motivated output can be increased.

Decision making is a key factor which effects productivity. Better decisions obtained through educate and timely information system will improve effectiveness and efficiencies of the organization

Techniques to Improve Productivity

Productivity can be considerably improved by improving the performance of various factors affecting productivity. The measures to improve productivity can be:

Better planning and training of employees, improved jobs and communication and effective management through CPM/PERT methods.

- ✓ Use of time and motion studies to study and improve work performance. It enables to assess the quantum of work which can be used for planning and control.
- ✓ Better transportation and material handling systems.
- ✓ By providing work incentives and other benefits to workers.
- ✓ Workers involvement in decision making and working of organizations.
- ✓ Improvement in technology of production process and nature of raw material and the quality.
- ✓ Simplification, standardization and specialization techniques.
- ✓ Better and efficient utilization of resources at the disposal of the enterprise.
- ✓ Use of linear programming and other quantitative techniques for better decision making.
- ✓ ABC analysis to identify more important items and then apply inventory control to reduce capital investment.
- ✓ Value engineering to reduce material content by good design.

Measurement of Productivity

There are a number of ways to measure productivity. The main criterion of measuring productivity is:

- ✓ In term of input performance by calculating changes in output per unit of input
- ✓ On the basis of output performance by calculating changes in input per unit in output

Following are some of the measures in common use

$$\text{Labor Productivity} = \frac{\text{Amount of output}}{\text{Amount of Labor}}$$

Where output can be measured in total quantity produced and labor can be measured in total manpower required to produce that output. Output and labor can also be measured in terms of their value in money units.

$$\text{Capital Productivity} = \frac{\text{Turn}}{\text{Capital employed}}$$

$$\text{Profit Productivity} = \frac{\text{Profit}}{\text{Investment}}$$

$$\text{Energy Productivity} = \frac{\text{Output}}{\text{Quantity of energy used}}$$

A general measure of productivity can be defined as;

$$\text{Productivity} = \frac{\text{Output}}{\text{Labor + Capital +Other inputs}}$$

Each kind of measure needs some specific kind of information. The appropriate measure can be selected on the basis of information available and the objective of investigation. In fact the measure of productivity indicates the performance of inputs namely labor and capital in an enterprise.

Increase in output is not an indication of increase in productivity. Production is an absolute measure and productivity is a relative measure.

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X= (1-A)

Where I is the identity matrix and X is the matrix of estimated output (1-A) is known as Technology matrix. Input-Output analysis can be used to study the productivity of an enterprise. The index of productivity can be defined as:

Qi (1-Ai) Po

Qo (1-Ao) Po

Where Po Qo is the value of output in the base year and QiPo value in the current year based on base year, (1-Ai) is technology matrix in current year and (1-Ao) is technology matrix in base year.

1.3. Evolution of Production and Operation Management

Operation Management has been variously known as Industrial Management, Management Science, Operation Research, Production management and Production and Operation Management. The concepts associated with Operation Management, perhaps, have their roots embedded in the development of early organizations. The class of problems represented by Operation Management came in the era after Industrial Revolution. This was a period of radical changes. People got replaced by machines and water and mule power replaced human muscular efforts. These developments changed the nature of production. As production moved from the cottage to factory, the seeds of operation management sprouted on fertile ground.

Time and Motion studies—Scientific Management

It has passed through various stages to reach the present stage. Its roots go back to the concept of "division of labor" advocated by Adam Smith in his book "The Wealth of Nations" in 1776. He recognized the economic benefits of specialization of lab our, He recommended breaking the job down into subtasks and reassigning workers to specialized tasks in which they would become highly skilled and efficient. In the early twentieth century, Frederick W. Taylor implemented Smith's theories and enunciated his theory of "scientific management". The basis of scientific management was a focus on machines and system of their utilization. This concept led to "time and motion study "Early in the 20th.century , Frank and Lillian Gilbreth developed a more systematic and sophisticated method of time and motion study taking into account the limits to physical and mental capacity and importance of good physical environment. The Hawthorne Studies by Elton Mayo, in 1927, resulted in the Human Resource Movement. These developments changed the way operations were managed in many businesses during that period

World War II – Operation Research

1940–1980: Before World War II the focus of 'scientific management' was based on the micro-environment in the manufacturing sector. During the war, the focus moved from micro-environment to macro-environment. There was rapid development in the concepts 'theory and techniques of production and operation management after World War II. The operation Research techniques evolved during defense operations in the World War II found useful operations e.g. linear programming and network analysis.

A new multi-disciplinary approach to problem solving called 'Operation Research' was developed. This was quantitative approach basically concerned with the efficient allocation and control of resources. Operation Research is the application of scientific methods to study and devise solutions to managerial problems in decision making using mathematical models and system approach. Operation Research has helped solve resource allocation, scheduling, processing, inventory, location layout and control problems replacement methods, and advent of computers introduced the field of automation. The demand of manpower in defense operations in Second World War necessitated evolving production systems requiring lesser labor force. This resulted in detailed time and motion studies and standard machine tool designs to improve the efficiency of reduced work force.

Where We Stand Today?

If we assess the past, covering a period of 200 years after Adam Smith, it can be observed that total production capacity as well as productivity has expanded considerably. Production and Operation Management has become an empirical science. Undoubtedly, during this period, we have responded to the expansion of markets and large scale business units by using concepts of division of labor and progressive mechanization in order to achieve economies of large scale production. There has been continuous improvement in design, layout and equipment of production processes by:

- ✓ With efficient use of labor, material and equipment economies in production,
- ✓ Using sophisticated production control techniques to produce goods and services of desired specialization at the desired time and with minimum cost,
- ✓ Improvement in production line e.g. automation in industries.

1.4. Frame Work for Managing Operations

An operation manager whose job is to manage the process of converting inputs (land, labor, capital and management) uses the following three approaches:

- ✓ Classical
- ✓ Behavioral
- ✓ Modeling

Classical Management has contributed to scientific management and process orientation theories. The basis of scientific management is a focus on economic efficiency at the production core of the organization. Economic efficiency refers the ratio of outputs to inputs. Management is concerned with labor efficiency. The school of process management views management as a continuous process of planning, Organizing and controlling.

- ✓ Planning includes all activities that establish a course of action. These activities guide future decision making,
- ✓ Organizing includes all activities that establish a structure of tasks and authority,
- ✓ Controlling includes all activities that ensure that actual performance is in accordance with planned performance.

Behavioral Management is one of the primary theories of management emphasizing human relations and behavioral sciences. Human relations phenomenon recognized by behavioral scientists that people are complex and have needs and that the subordinate-supervisor relationship directly affect productivity. Behavioral science explores how human behavior is affected by leadership, motivation, Communication, interpersonal relationships and attitude change.

Modeling Management is concerned with decision making and systems theory and mathematical modeling of these theories. The decision making orientation considers making decisions to be the central purpose of management. System theory stresses the importance of studying organizations from a "total system" point of view. According to this, identifying subsystem relationships, predicting effects of changes in the system, properly implementing system change are all part of managing the total organization. With its foundations in operations research and management science, mathematical modeling focuses on creating mathematical representation of management problems and organizations. For a particular problem, the variables are expressed mathematically, and the model is used to demonstrate different outcomes that would result from the various possible managerial choices.

To study the Operation Management the following three approaches are created for the frame work for managing operations:

- ✓ **Planning:** The operation manager defines the objectives for the operations subsystem of the organization and the policies, programs and procedures for achieving the objectives. This stage includes clarifying the role and focus of operations in the organizational overall strategy. It also involves planning, facilities designing and using the conversion process.
- ✓ **Organizing:** Operation managers establish a structure of roles and flow of information within the operation subsystem. They determine the activities required to achieve the operation's subsystem's goals and assign responsibility authority for carrying them out.
- ✓ **Controlling:** To ensure that the plans for the operations subsystem are accomplished, the operation manager must also exercise control by measuring actual output and comparing them to planned output. Controlling costs, quality and schedules is at the very heart of operations management.

Beside planning, organizing and controlling the various activities of the operation subsystem, the Operation manager is also concerned with the following two approaches;

- ✓ **Behavior:** Operation managers are concerned with how their efforts to plan organize and control effect human behavior. They also want to know how the behavior of subordinates can affect management's planning, organizing and controlling actions. In operations we are interested in the behavior of managers as well especially their decision making behavior

- ✓ **Models:** As operation manager plans, organizes and controls the conversion process, he encounters many Problems and must make many decisions. They can frequently simplify these difficulties by using models.

1.5. Operation Strategy

The environment of organizations is becoming more and more complex because of increased rate of environmental, social and technological change, the increased internalization of business organizations and increased scarcity and cost of natural recourses. An analysis of the competitive scenario in our country in the last ten years reveals that it is inevitable for organizations to have a good operation strategy. Due to the liberalization and globalization policies of the Union Government, Indian manufacturing and service firms have faced competition from other parts of the world. They are new and required to have a global outlook as opposed to the traditional domestic outlook.

It also signaled the end of an era when customer orientation and the need for cost cutting were not all that important. Today the primary goals are related to market opportunities and customer satisfaction. The general thrust of the operation management is guided by competitive and market condition of the industry, which provides the basis for determining the organization's strategy. Where is the industry now, and where will it be in future? What are existing and potential markets? What market gap exists and what competencies do we have for filling them? A careful analysis of market segments and the ability of our competitors and ourselves to meet the needs of these segments will determine the best direction for focusing an organization' efforts After assessing the potential within the industry, an overall organizational strategy must be developed, including some basic choices of the primary basis for competing. In doing so, priorities are established among the following four characteristics;

- ✓ Quality (Product performance)
- ✓ Cost efficiency (Low product price)
- ✓ Dependability (Reliable; timely delivery of orders to customers)
- ✓ Flexibity (Responding rapidly with new products or changes in output volumes)

The manufacturers need to devise methods to remain competitive in the market following the four characteristics. Better cost management practices are often required in the manufacturing and service organizations to handle the threat of competition. Time is emerging as a critical dimension of competition in both manufacturing and service industries. In any industry the firm with the fastest response to customer demands has the potential to achieve an overwhelming market advantage. Developing superior capabilities to cut down lead time is an important requirement today. Another area of operation strategy is the proliferation of variety. Some of the key inferences from the changes in the last ten years can be summarized as follows:

- ✓ Due to several factors, the competitive dynamics will change and the expectation of the customers will also change on account of this.
- ✓ Organizations need a structured approach to scan the market and distill the changing needs at the market place. Moreover they also need a mechanism to chalk out a plan for responding to these changes in the most effective way.

- ✓ With the changes in the market place, the competitive priorities for an organization must also change. Organizations need to tune their operations to match the competitive priorities?
- ✓ The above processes are expected to repeat several times in the future and the organization must be in a position to respond to the changes every time it is called for.

These basic strategic choices, then, set the tone for the shape and content of the operation function and what it accomplishes. Therefore it is important for organizations to develop the capabilities to devise strategies for operations. This strategic planning exercise enables an organization to respond to the market needs in the most effective manner by aligning the resources and various activities in the organization to deliver products and services that are likely to succeed in the market place.

The process of formulating operation strategy in any organization involves a sequential and structured set of activities. There are three steps in the process. The first step is to identify the strategic options for sustaining the competitive advantage. Once the options are known, based on the firm's strengths and weaknesses, the overall corporate strategy could be devised. In the last step, the corporate strategy provides the basis for arriving at the appropriate operation strategy for the organization.

Any strategy making exercise begins with scanning the marketplace and understanding the dynamics of the marketplace. The market dynamics informs an organization of the relevant issues to be considered for the strategy formulation process. It provides useful information about competitors, the nature of offerings that they make to the current customers, the customer's expectations, any missing links between expectations and the current offerings and intensity of competition. The expectations of the customers can be manifold. It can include price, performance, quality, ease of use, delivery commitments, technological superiority of products, critical post sales service and so on.

Customer expectation changes with time on account of several reasons. Technological improvements, evolution of market and infrastructure may cause a shift in customer expectations about a product or service. The demographic profile of the customer base may also shift over the years. Moreover customers are exposed to newer choices either by a smart competitor or due to entry of the foreign firms into the market therefore, it is important for the organization to prioritize the alternatives and understand what is likely to make greater impact on the market. Customer's expectations and the competitive priorities that an organization needs to pursue could be better understood using order winning attitudes.

Decision Making in Production Management: The production strategy can be planned in a number of ways and the organization wants to select the best course of action. The decision making process involves proper analysis of these alternatives and then to select the most suitable alternative .The decision making is an art of taking rational decisions using various scientific and analytical techniques. Here a rational decision for any organization is one with which the management can achieve its goals with minimum efforts of time and money. The management should be able to evaluate the risks associated with each alternative and the one with minimum risk should be preferred. In the opinion of Herbert Simon decision making and management appears to synonymous terms. Decision making approach in production management mainly consists of following steps:

- ✓ **Comprehension:** A step unified awareness is derived from sensory processes about the phenomenon under consideration
- ✓ **Conception:** It is the scheme of design of formulating ideas or concepts about the phenomenon generated from comprehension.
- ✓ **Investigation:** The idea or concepts from conception provides many alternative choices. The procedure of collected information about the possible outcomes from these alternatives and then to compare their merits and demerits is known as investigation
- ✓ **Deliberation:** This implies the mental weighing and assessment of merits and consequences of various schemes.
- ✓ **Selection:** Investigation and deliberation provides the guidelines to select the best alternative for the given situation keeping in view the overall interest of the organization.
- ✓ **Implementation:** This is the final stage of decision making process. The information about the alternative selected is communicated to the concerned people for using it to get the desired solution.

In recent years a production manager is generally involved in making decisions under unpredictable and uncertain situation. There are many considerations or factors associated with the final choice and the decision maker must be fully acquainted with these factors. The decision making process can be divided into two categories:

- ✓ Based on judgment and intuition
- ✓ Based on some quantitative methods

1.6. Trends in Operation Management

Recently several developments that affect operations management practices have taken place in the market place. These changes have been due to economic policies at the national and international levels, advent of new sectors of industry and new technologies. The following represent a brief projected perspective on what operation managers should look at when they think of future. These are the emerging trends and future challenges which will have a profound impact for operation strategy.

- ✓ **Dismantling of Trade Barriers:** One of the recent developments which could potentially affect the operation management practices in the country is the opening up the Indian market to foreign competition Beginning 1991, the Union Government brought new reforms for easy import of foreign goods in India. In addition to cost pressures from overseas players Indian manufacturing firms had to face large scale dumping of goods. Therefore the new market scenario sets new priorities for operation management and manufacturing firms need to face up to the new challenge. Besides this new challenge, Indian manufacturing firms have greater chances for market expansion, on account of liberalized economy, for two important reasons. The first is the overall attractiveness of Indian firms due to factor cost advantage, because of relatively low cost of labor. The second advantage for India is the large installed base of technical manpower, manufacturing know-how and experience in manufacturing and operation management .These developments are likely to affect operation management practices in the country.

- ✓ **Shift in Economic Activity:** In the beginning of the 21'st century the global economy shows significant structural changes with a swing of service sector. Reserve Bank of India Annual Report for the year 1998-99 notes that the services have emerged as the fastest growing sector. From 41.3%share in 1990-91 of services the real gross domestic product has increased to 51.2% in 1998-99. Increasing economic activity in service sector that employment pattern will shift from manufacturing sector to service sector.

- ✓ **Out sourcing as a major wave:** India is the direct beneficiary of the phenomenon of dismantling of trade barriers. Based on the successful experience of outsourcing software jobs in India, firms in developed countries are increasing variety of other jobs, thus creating an 'outsourcing wave' .Business process outsourcing (BPO) is an arrangement by which some of the business processes are done by a third party on behalf of the organization. The key motivation for a firm to outsource some of its processes stems from three factors: (i) Cost (ii) - Capacity (iii) Competency. Excellence in operations is a prerequisite for being successful in the BPO sector. Since the primary consideration for a BPO is cost operation strategy thus a BPO firm must emphasize cost leadership, otherwise the BPO activities may be shifted to competitor. Another critical performance measure is quality. Since an organization often outsourcers the entire operations pertaining to business process to third party, quality considerations are followed as per stringent norms. Therefore, developing strategic planning for high level of quality is another important implication for BPO organizations. In several other cases, in addition to cost and quality requirements, stringent delivery requirements may also have to be met as the processes may be in the intermediate stages of value creating process.

- ✓ **Collaborative Commerce through the Internet:** One of the most recent developments is the advent of Internet in commerce and trade. Using the huge IT infrastructure, consisting of network connectivity, client-service architecture and several computers, it is possible to connect remote trading partners. Collaborative commerce opens up new areas for consideration in the operations management. Many of traditional methods of operation management can either be replaced or supplemented by new procedures using the electronic methods. Two important areas of significant interest are (i) procurement and supply management practices using electronic means (ii) design and new product development by means of CAD.

- ✓ **Technological Change:** There is a tremendous growth in the use of robots in automatic machine loading. The robot is used to load position and then unload and transfer work pieces. Welding processes use robots extensively. Project management techniques of PERT/CPM are very effective tools of planning and control of various projects. Computer simulation, computer-aided design and manufacturing (CAD/CAM), group technology (GT) and cellular manufacturing systems (CMS) are being introduced in future. Lean Manufacturing concept conceived by Toyota Corporation in Japan is widely adopted. Lean redefines the organization's means, methods and mission. In lean philosophy non-value added activities (NVA's) are excluded.

- ✓ **The Environment:** Technologies, to make products more earth friendly will be developed. Stringent legislations and their compliance will be mandatory. Recycling and reuse of waste will be adopted in many industries. New technologies will be developed to provide benefits to the organizations.

In an organization production manager has to administer a great variety of activities. He assembles appropriate resources and direct the use of resources, be they people, machines, processing etc. in transforming material and time of people into products and services. Managers also have to respond to others forces from the external environment such as government regulation, labor organization as well as local, regional, national and international economic conditions Thus managers have to pay more attention to not only what their customers might buy but also to increasing government regulations and behavior of consumers and environment protection groups.

- ✓ **Production manager should concern himself with production planning:** In every enterprise the Production Manager is responsible for producing the required quantity of produces in time to meet the stipulated delivery date. The quantity to be produced depends upon the magnitude of the demand whereas the time by which the production should be completed is determined by the delivery date. Besides, the production department has to make arrangements for input factors and. Also has to produce in economic lot quantity. To achieve all these objectives proper production planning is necessary. Production planning involves the generation and identification of alternative courses of action and to select the optimum alternative. This can be done by; (i) Assessing the requirements of various factors of productions on the basis of demand forecast. (ii)Formulating demand schedule for factors of production to permit purchase of raw material and production of products in economic lot sizes.

- ✓ **Production Control:** It is the duty of the production manager to use the resources at its disposal in the best possible manner as well as to regulate the operations in such a way that the desired delivery schedule is maintained. This is done by routing, scheduling and inspection during the production process.

- ✓ **Production manager should concern himself with Quality Control:** It is the responsibility of the production manager to manufacture the goods and services of the desired specifications. Though the quality of the finished goods can be ensured by inspection of the finished goods, but it is better to employ measure which minimizes the likelihood of producing defective items.

- ✓ **Method of Analysis:** There can be a number of ways in which some operations can be executed. Production manager should select the most efficient and economical method to perform the operation.

- ✓ **Plant layout and material handling:** The physical management of manufacturing components and the equipment for handling the material during production process has considerable effect on cost of production. The material handling system and the plant layout should be most efficient for the given situation.

- ✓ **Proper Inventory Control:** Inventory implies all the materials, parts, supplies, tools and in-process or finished product kept in stock for some time. The procurement policy of these items requires a careful consideration and analysis. The purchases should be planned in economic lot sizes and the time of purchase should be so scheduled that the investment in inventory is at the lowest possible level. This implies determination of economic lot size and re-orders level.

- ✓ **Work Study:** Method study and work measurement techniques are applied to find the relationship between output of goods and services and inputs of human and material resources.

The production manager should try to find the most appropriate method of performing various operations involved in the production process so as to obtain the optimum use of the resources as well as increasing the productivity. Production manager should be able to generate the interest of the workers to increase their efforts by providing them wage incentives. This will result in an increase in labor productivity.

- ✓ **The cost of production varies with different methods of production:** The production manager is responsible to follow a systematic approach to control capital and expenditure designed in a way that the desired profit is ensured. The nature of problems associated in the production management is such that the production manager should have the capacity as well as the aptitude to use qualitative and quantitative methods of analysis to get the desired solution. ''