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PRODUCTION AND OPERATIONS MANAGEMENT

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INTRODUCTION

The Subject of Production Management is studied under different Headings-such as Production Planning and control, Production and Inventory control, production and operations control and many more. What ever may be the title of the subject, the contents of the subject are more or less one and the same. Before we discuss about production management, let us discuss about product, production and management. This will give us a rough idea about production Management and with what a production manager has to deal with.

1.1. PRODUCT

Though many authors define the product with Consumer orientation, it is better for us to deal with different angles, because it will be helpful for us to understand the subject of production and Operation Management.

(i) For a Consumer: The product is a combination of or optimal mix of potential utilities. This is because every consumer expects some use or uses from the product. Hence he/she always identifies the product in terms of the uses. Say for example-Soap can be identified by complexion, cleanliness of body, freshness, fragrance or health.... etc. Because of this, many producers advertise that they are selling health, or they are selling Cine star Complexion or they are selling freshness and so on.

(ii) For a Production Manager: Product is the combination of various surfaces and processes (or operations). This is because the production Manager is solely responsible for producing the product. He has to think of the various surfaces by which the product is made of, so that he can plan for processes by which a particular surface can be made and plan for required capacity of the facility

by which the surface is produced. While planning he has to see that the required surface is produced by the best and cheapest method (optimally), so as to make the product to face competition in the market.

(iii) For a Financial Manager: For him the product is a mix of various cost elements as he is responsible for the profitability of the product.

(iv) For a Personnel Manager: For him the product is a mix of various skills, as he is the person who selects and trains the personnel to meet the demand of the skill to produce the product.

In general we can define the product as a bundle of tangible and intangible attributes, which along with the service is meant to satisfy the customer wants.

1.2. PRODUCTION

Production means application of processes. (Technology) to the raw material to add the use and economic values to arrive at desired product by the best method, with out sacrificing the desired quality. We have three ways of Production, they are:

(i) Production by Disintegration: By separating the contents of Crude oil or a mixture the desired products are produced. For example the crude oil is disintegrated into various fuel oils. Similarly salt production is also an example for product produced by disintegrated. We can use Mechanical or Chemical or both technologies to get the desired product, so that it will have desired use value.

(ii) Production by Integration: In this type of Production various Components of the products are assembled together to get the desired product. In this process, Physical and Chemical Properties of the materials used may change. The examples are: Assembly of Two wheelers, Four wheelers and so on.

(iii) Production by Service: Here the Chemical and Mechanical Properties of materials are improved without any physical change. The example for this is Heat Treatment of metals. In real world, a combination of above methods is used.

In general production is the use of any process or procedure designed to transform a set of input elements into a set of output elements, which have use value and economic value.

1.3. MANAGEMENT

Management can be explained as an art or science, (in fact it is a combination of art and science) of getting things done by the people, by planning, coordinating, organizing, directing and controlling the activities to meet specified goals, with in the frame work of agreed policies. The above explanation put emphasis on getting things done, Planning, Organizing, Coordinating, and controlling and specific objectives and agreed policies. Today's manager needs scientific base as well as personal tactics to manage the people under him to achieve the desired goals. Above discussion about product, production and management will help us to understand what exactly the Production Management or Production, and Operations Management is.

1.4. OPERATIONS MANAGEMENT – AN OVERVIEW

Operations Management is the conversion of *inputs* into *outputs*, using physical resources, so as to provide the desired utility/utilities of form, place, possession or state or a combination there-of to the customer while meeting the other organizational objectives of effectiveness, efficiency and adaptability. It distinguishes itself from other functions such as personnel, marketing, etc. By its primary concern

for 'conversion by using physical resources'. There should be a number of situations in either marketing or personal or other functions, which can be classified or sub-classified under **Production and Operations Management**. For example, (a) The physical distribution of items to the users or customers, (b) The arrangement of collection of marketing information, (c) The actual selection and recruitment process, (d) The paper flow and conversion of data into information usable by the judge in a court of law, etc. Can all be put under the banner of production and operations management? 'The conversion' here is subtle, unlike manufacturing which is obvious. While in case (a) and (b) it is the conversion of 'place' and 'possession' characteristic of product, In (c) and (d) it is the conversion of the 'state' and characteristics. And using physical resources effects this 'conversion'. The input and / or output could also be non-physical such as 'information', but the conversion process uses physical resources in addition to other non-physical resources. The management of the use of physical resources in addition to other non-physical resources for the conversion process is what distinguishes production and operations management from other functional disciplines.

Production and Operations Management systems are also described as providing physical goods or services. When we say that the Central Government provides *service* and the Indian Airlines provide *service* these are two entirely two different classes of utilities and consequently the objective and criteria for reference will have to be entirely different for these two cases.

We may say that the actual production and operations management systems are quite Operations Management complex involving multiple utilities to be provided to the customer, with a mix of physical and non-physical inputs and outputs and perhaps with a multiplicity of customers.

1.5. CRITERIA OF PERFORMANCE:

Three aims of performance of the Production and Operations Management system may be identified. They are,

(a) Effectiveness, (b) Customer satisfaction, (c) Efficiency.

The case of *Efficiency* is *productive* utilization of resources is clear. Whether the organization is in 'private sector' or in the 'public sector', is a 'manufacturing or 'non-manufacturing' organization or a 'profit' or a 'non-profit' organization, the optimal utilization of resource inputs is always a desired objective. The effectiveness has more dimensions to it. It involves optimality in the fulfillment of multiple objectives with a possible prioritization within the objectives. Modern production and operations management has to serve the target customers, the people working within, as also the region, country or society at large. Thus Production / Operations Management system, has not only to be *profitable* and / or *efficient*, but must necessarily satisfy many more *customers*. This effectiveness has to be again viewed in terms of the short and long-term horizons depending upon the operations system.

Optimum, Good, Better operations management can improve:

(i) Efficiency of operation system to *do things right and broader concept*.

(ii) Effectiveness of operation system refers to doing right things that is seven rights, they are:
Right operation, Right Quantity, Right Quality, Right Supplier or Right Vendor, Right Time, Right Place and Right Price.

Basically, *efficiency and effectiveness of the operations system* can be measured by four dimensions, they are: (i) Cost, (ii) Quality, (iii) Dependability and (iv) Reliability. In fact these directly relate to the *competitiveness* of the organization, both nationally and internationally. Modern developments in better tools and techniques, methods and systems like Automation, Flexible manufacturing, CAD,

CAM, CIM at management, CADD, CIMS, Use of Robotics, TQM, OR Techniques etc, are taking place to achieve improvements in Cost, Quality, Dependability, Reliability and Flexibility and thus to help for *better management*.

1.6. DEFINITION OF PRODUCTION MANAGEMENT

It may be defined as:

- (i) The performance of the management activities with regards to selecting, designing, operating, Controlling and updating production system.
- (ii) It is the processes of effectively planning, coordinating and controlling the production, that is the operations of that part of an enterprise, it means to say that production and operations Management is responsible for the actual transformation of raw materials into finished products.
- (iii) Production management is a function of Management, related to planning, coordinating and controlling the resources required for production to produce specified product by specified methods, by optimal utilization of resources.
- (iv) Production management is defined as management function which plans, organizes, coordinates, directs and controls the material supply and Processing activities of an enterprise, so that specified products are produced by specified methods to meet an approved sales programme. These activities are being carried out in such a manner that Labour, Plant and Capital available are used to the best advantage of the organization.

1.7. OBJECTIVE OF PRODUCTION MANAGEMENT

The objective of Production Management is to produce the desired product or specified product by specified methods so that the optimal utilization of available resources is met with. Hence the production management is responsible to produce the desired product, which has marketability at the cheapest price by proper planning, the manpower, material and processes. Production management must see that it will deliver right goods of right quantity at right place and at right price. When the above objective is achieved, we say that we have effective Production Management system.

1.8. SCOPE OF PRODUCTION MANAGEMENT:

In fact, we apply Principles of Management; and functions of Management in our day-to-day life. We all know, from morning till night, we plan our activities; we coordinate available resources and control our activities to achieve certain goals. So also any organization must follow the Principles of Management for its survival and growth. The same is applicable to production Management also. Reading and learning Production Management will enable one to be capable of solving the problems of the organization, may be an Educational Institution, Production Shop, Hospital, Departmental shop or even a barber shop. The problems a manager face in various organizations are more or less similar to that of Production department but smaller in magnitude. Hence the knowledge of Production Management will help any professional Manager to tackle the problems of his business easily. For example: The Production Management consists of Planning, selection of materials, planning of processes, Routing, Scheduling and controlling the activities etc., Take the example of an Educational Institution/University. Here also selection of raw students, Planning of the Course Work, Educating the students and conducting the examination. Therefore this knowledge will enable one to apply the

principles of Production Management to any field of life without restriction. Here, We have to remember that the above is also applicable to the management of a service organization and the management of a Project. Here it is better to distinguish between product, Service and Project, so as to help the reader to know on which particular aspect of Production Management to put much emphasis, in managing a service organization or a project.

(i) Product: Manufacturing system often produces standardized products in large volumes. The plant and machinery have a finite capacity. The facilities constitute fixed costs, which are allocated to the products produced. Variable costs, such as, labour cost and materials costs. While manufacturing the product use value and economic values are added to the product. Hence the product is a store of values added during manufacture. Because the input costs and output costs are measurable, the productivity can be measured with certain degree of accuracy. Product can be transported to the markets and stored physically until it is sold.

(ii) Service: Service system present more uncertainty with respect to capacity and costs. Services are produced and consumed in the presence of the customer. We cannot store the service physically. Because of this the service organizations, such as Hotels, Hospitals, Transport Organizations and many other service organizations the capacity must be sufficiently or consciously managed to accommodate a highly variable demand. Sometimes services like legal practice and medical practice involve Professional or intellectual judgments, which cannot be easily standardized. Because of this the calculation of cost and productivity is difficult.

(iii) Project: Project system does not produce standardized products. The Plant, Machinery, Men and Materials are often brought to project site and the project is completed. The project is of big size and remains in the site itself after completion. As the costs can be calculated and allocated to the project with considerable accuracy, Productivity can be measured. Once the project is completed, all the resources are removed from site.

1.9. BENEFITS DERIVED FROM EFFICIENT PRODUCTION MANAGEMENT

The efficient Production Management will give benefits to the various sections of the society. They are:

- (i) Consumer** benefits from improved industrial Productivity, increased use value in the product. Products are available to him at right place, at right price, at right time, in desired quantity and of desired quality.
- (ii) Investors:** They get increased security for their investments, adequate market returns, and creditability and good image in the society.
- (iii) Employee** gets adequate Wages, Job security, improved working conditions and increased Personal and Job satisfaction.
- (iv) Suppliers:** Will get confidence in management and their bills can be realized with out any delay.
- (v) Community:** community enjoys Benefits from economic and social stability.
- (vi) The Nation** will achieve prospects and security because of increased Productivity and healthy industrial atmosphere.

1.10. FUNCTIONS OF PRODUCTION MANAGEMENT DEPARTMENT

The functions of Production Management depend upon the size of the firm. In small firms the production Manager may have to look after production planning and control along with Personnel,

Marketing, Finance and Purchase functions. In medium sized firms, there may be separate managers for Personnel, marketing and Finance functions. But the production planning and control and Purchase and stores may be under the control of Production management department. In large sized firms the activities of Production Management is confined to the management of production activities only. As such, there are no hard and fast rule or guidelines to specify the function of Production Management, but in the academic interest we can mention some of the functions, which are looked after by the Production Management department. They are:

(i) Materials: The selection of materials for the product. Production manager must have sound Knowledge of materials and their properties, so that he can select appropriate materials for his product. Research on materials is necessary to find alternatives to satisfy the changing needs of the design in the product and availability of material resumes.

(ii) Methods: Finding the best method for the process, to search for the methods to suit the available resources, identifying the sequence of process are some of the activities of Production Management.

(iii) Machines and Equipment: Selection of suitable machinery for the process desired, designing the maintenance policy and design of layout of machines are taken care of by the Production Management department.

(iv) Estimating: To fix up the Production targets and delivery dates and to keep the production costs at minimum, production management department does a thorough estimation of Production times and production costs. In competitive situation this will help the management to decide what should be done in arresting the costs at desired level.

(v) Loading and Scheduling: The Production Management department has to draw the time table for various production activities, specifying when to start and when to finish the process required. It also has to draw the timings of materials movement and plan the activities of manpower. The scheduling is to be done keeping in mind the loads on hand and capacities of facilities available.

(vi) Routing: This is the most important function of Production Management department. The Routing consists of fixing the flow lines for various raw materials, components etc., from the stores to the packing of finished product, so that all concerned knows what exactly is happening on the shop floor.

(vii) Dispatching: The Production Management department has to prepare various documents such as Job Cards, Route sheets, Move Cards, Inspection Cards for each and every component of the product. These are prepared in a set of five copies. These documents are to be released from Production Management department to give green signal for starting the production. The activities of the shop floor will follow the instructions given in these documents. Activity of releasing the document is known as dispatching.

(viii) Expediting or Follow up: Once the documents are dispatched, the management wants to know whether the activities are being carried out as per the plans or not. Expediting engineers go round the production floor along with the plans, compare the actual with the plan and feed back the progress of the work to the management. This will help the management to evaluate the plans.

(ix) Inspection: Here inspection is generally concerned with the inspection activities during production, but a separate quality control department does the quality inspection, which is not under the control of Production Management. This is true because, if the quality inspection is given to production Management, then there is a chance of qualifying the defective products also. For example Teaching and examining of students is given to the same person, then there is a possibility of passing

all the students in the first grade. To avoid this situation an external person does correction of answer scripts, so that the quality of answers are correctly judged.

(x) Evaluation: The Production department must evaluate itself and its contribution in fulfilling the corporate objectives and the departmental objectives. This is necessary for setting up the standards for future. What ever may be the size of the firm; Production management department alone must do Routing, Scheduling, Loading, Dispatching and expediting. This is because this department knows very well regarding materials, Methods, and available resources etc. If the firms are small, all the above-mentioned functions (*i* to *x*) are to be carried out by Production Management Department. In medium sized firms in addition to Routing, Scheduling and Loading, Dispatching and expediting, some more functions like Methods, Machines may be under the control of Production Management Department. In large firms, there will be Separate departments for Methods, Machines, Materials and others but routing, loading and scheduling are the sole functions of Production Management. All the above ten functions are categorized in three stage, that is Preplanning, Planning and control stages as shown in figure.1.1.

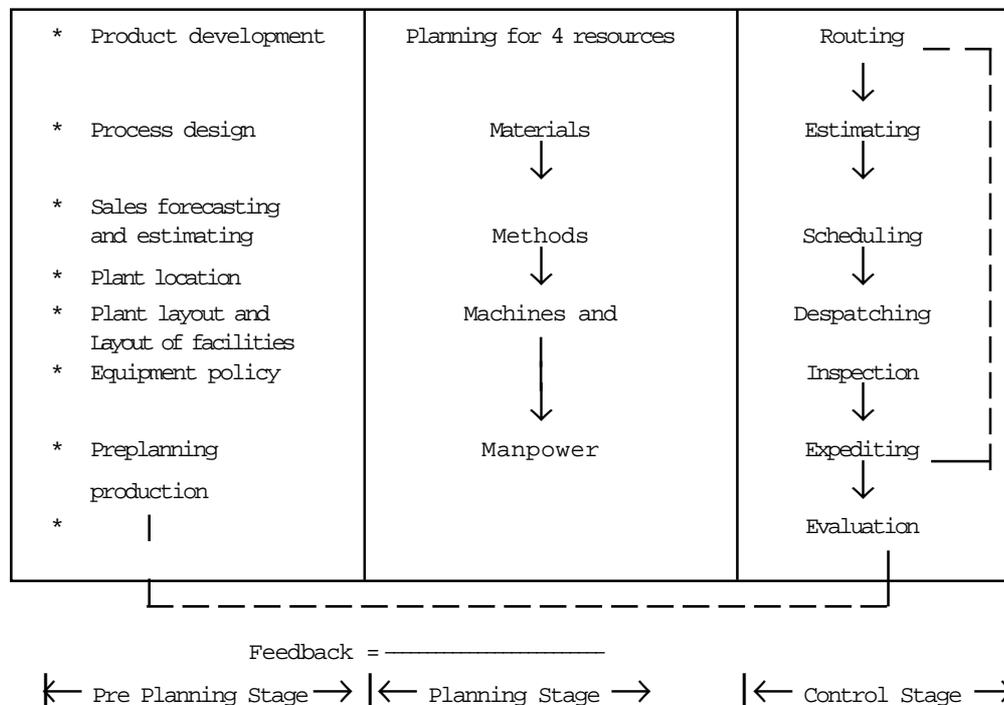


Fig. 1.1 : Production function.

1.11. PLACE OF PRODUCTION MANAGEMENT DEPARTMENT IN THE ORGANISATION

Production is the center of all activities of an organization. This is to say all the activities of an organization, such as: Finance, Personnel, Marketing...etc., are exists in an organization because of production activity. Hence the position of Production Management in an organization is very important. Whether it should be a line function or Staff function, more or less depends upon the corporate management policy. In small organization, Production Management is whole and sole of it. In large

industries, generally it is advisable to have Production as line function, because, the decision taken by the line manager and the advices given by the Staff personnel will be based on the Production activities. The Production Manager, directly report to General Manager, who in turn report to the Board. The figure 1.2 shows a typical organization structure showing the position of Production Management. Figure 1.3 shows an organization chart for Production and Operations Management department.

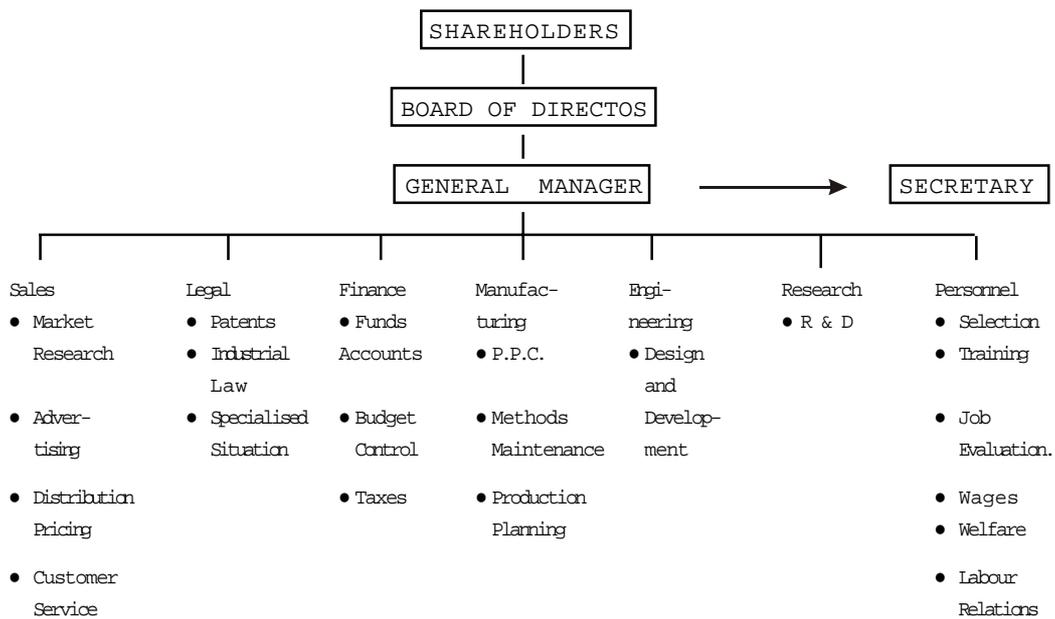


Fig. 1.2 : Typical Organisation chart for an organisation

ORGANISATION CHART FOR P.P.C. DEPARTMENT

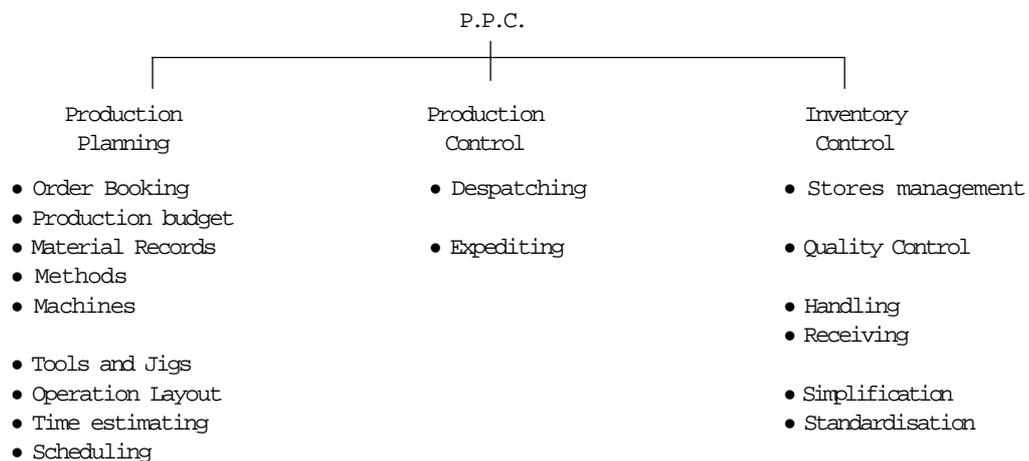


Figure 1.3 : An organization chart for production management department.

1.12. TYPES OF PRODUCTION SYSTEMS

The organization of manufacturing systems, also planning and control of production greatly depends on type of product type of the product line. Basic principles that guide the formation of planning policy and its execution may be the same for all the manufacturing concerns. But emphasis on a particular aspect of production management in fulfilling of specific requirement of the plant and the management approach to the problems of inventory, machine selection, machine setting, tooling, routing, scheduling, loading, follow up and general control will differ depending on the type of production system. Three main factors generally determine this aspect are :

- (i) **Type of production** i.e., quantities of finished products and regularity of manufacture. For example whether Job production or Batch Production or Continuous Production.
- (ii) **Size of the Plant** i.e., Small Industry, Medium sized Industry or Large Industry.
- (iii) **Type of Production:** In general there are three classifications in types of Production system. They are discussed below.

(a) **Job Production:** In this system Products are manufactured to meet the requirements of a specific order. The quality involved is small and the manufacturing of the product will take place as per the specifications given by the customer. This system may be further classified as.

- (i) **The Job produced only once:** Here the customer visit the firm and book his order. After the completion of the product, he takes delivery of the product and leaves the firm. He may not visit the firm to book the order for the same product. The firm has to plan for material, process and manpower only after receiving the order from the customer. The firms have no scope for pre-planning the production of the product.
- (ii) **The job produced at irregular intervals:** Here the customer visits the firm to place orders for the same type of the product at irregular intervals. The firm will not have any idea of customer's visit. Here also planning for materials, process and manpower will start only after taking the order from the customer. In case the firm maintains the record of the Jobs Produced by it, it can refer to the previous plans, when the customer arrives at the firm to book the order.
- (iii) **The Jobs Produced periodically at regular intervals:** In this system, the customer arrives at the firm to place orders for the same type of product at regular intervals. Here firm knows very well that the customer visits at regular intervals, it can plan for materials, and process and manpower and have them in a master file. As soon as the customer visits and books the order, the firm can start production. If the volume of the order is considerably large and the number of regularly visiting customers are large in number, the Job Production system slowly transform into Batch Production system.

(b) **Batch Production:** Batch Production is the manufacture of number of identical products either to meet the specific order or to satisfy the demand. When the Production of plant and equipment is terminated, the plant and equipment can be used for producing similar products. This system also can be classified under three categories.

- (i) **A batch produced only once:** Here customer places order with the firm for the product of his specification. The size of the order is greater than that of job production order. The firm has to plan for the resources after taking the order from the customer.
- (ii) **A Batch produced at irregular intervals as per Customer order or when the need arises:** As the frequency is irregular, the firm can maintain a file of its detailed plans and it can refer to its previous files and start production.

(iii) **A Batch Produced periodically at known Intervals:** Here the firm either receives order from the customer at regular intervals or it may produce the product to satisfy the demand. It can have well designed file of its plans, material requirement and instructions for the ready reference. It can also purchase materials required in bulk in advance. As the frequency of regular orders goes on increasing the Batch Production system becomes Mass Production System. Here also, incase the demand for a particular product ceases, the plant and machinery can be used for producing other products with slight modification in layout or in machinery and equipment.

(c) **Continuous Production:** Continuous Production system is the specialized manufacture of identical products on which the machinery and equipment is fully engaged. The continuous production is normally associated with large quantities and with high rate of demand. Hence the advantage of automatic production is taken. This system is classified as

(i) **Mass Production:** Here same type of product is produced to meet the demand of an assembly line or the market. This system needs good planning for material, process, maintenance of machines and instruction to operators. Purchases of materials in bulk quantities is advisable.

(ii) **Flow Production:** The difference between Mass and Flow Production is the type of product and its relation to the plant. In Mass Production identical products are produced in large numbers. If the demand falls or ceases, the machinery and equipment, after slight modification be used for manufacturing products of similar nature. In flow production, the plant and equipment is designed for a specified product. Hence if the demand falls for the product or ceases, the plant cannot be used for manufacturing other products. It is to be scrapped. The examples for the above discussed production system are

(i) *Job Production Shop:* Tailors shop; cycle and vehicles repair shops, Job typing shops, small Workshops.

(ii) *Batch Production Shop:* Tyre Production Shops, Readymade dress companies, Cosmetic manufacturing companies...etc.

(iii) *Mass Production Shops:* Components of industrial products,

(iv) *Flow Production:* Cement Factory, Sugar factory, Oil refineries...etc.,

The Table 1.1 given below and figure 1.4 will give the Characteristics of Intermittent (Job and Batch production) and continuous (Mass and flow production) Production system.

Table 1.1 : Characteristics of intermittent and continuous manufacturing system

S. No.	Particulars	Intermittent production system (job and batch production)	Continuous production system. (mass and flow production)
1.	Type of plant layout.	Process layout is most suitable.	Product layout designed according to a process separate line for each product is considered.
2.	Type of machine	As it necessitate frequent changes in the machine set-up required by the specification of each order, general purpose machines are more suitable. Also they have good flexibility. In batch production special purpose machines Automatic and Semi-automatic machines are used.	As production flow is permanently in the form of product line, Automatic or special purpose machines are used. In flow production specialised machines are used.

S. No.	Particulars	Intermittent production system (job and batch production)	Continuous production system. (mass and flow production)
3.	Type of labour	The type of production pre-supposes frequent changes in product design and machine setups; which requires highly skilled labour. Repair and maintenance of machines are to be done by these labours.	The manufacturing activity becomes a routine function and as the machines are designed to suit the process required for product and automatic in nature unskillful or semi-skilled labour is required. A specialised team of plant maintenance staff will look after the repair and maintenance of machines.
4.	Number of products and product design.	Wide range of products are manufactured in small quantities. The product design changes from lot to lot as per the product specification. Each lot produced in small size.	Few/one standard products/product is manufactured in large quantities. Usually the product line is designed to one or two products of standard specification.
5.	Changes in machine set-up.	As specification of each order changes, the machines are to set according to the requirements of each order, frequent changes in machine setup is a common phenomenon.	In this type of manufacturing, the set-up of machines remains unchanged for a longer period. The standard products are manufactured in a continuous flow.
6.	Nature and size of orders.	Generally the size of orders is small and they are not repeated. The orders are for non-standardised products. The order may involve the production of single product or products in limited lot. Usually the production is done according to first-in-first-out principle. First orders are received and then they are translated into production.	Generally the production is carried on for stock. The production of standardised products is the nature of this type of production. Products are produced in anticipation of demand. The size of the order is large. Same type of product is produced in every cycle to satisfy the demand.
7.	Investment on machines and equipment.	As the machines are arranged in process layout and general purpose machines are required for Job production, the investment comparatively less. For batch production as automatic and semi-automatic machines are involved the investment will be higher than job production.	The machines are arranged according to process layout and because of this duplication of machines is fairly high. The machines are fully automatic, the cost is higher than intermittent production.
8.	Investment on inventories	Here the operating cycle takes more time and it is necessary to have standard materials for long period hence inventory cost per product is considerably large.	Bulk purchase of materials is done at periodic intervals. Due to continuous process, less in process inventory exists hence material cost per product is less.
9.	Material handling equipments	Because of varieties of products, different routes are followed by materials also volume of order is small, mechanisation of material handling is not possible.	Mechanisation of material handling is possible. Generally, conveyors, pipe-lines, automatic material handling equipment is used.
10.	Material handling cost	Material handling per product is costlier because of long distance handling (manual) and backtracking.	Due to mechanised material handling, material handling cost per product is less.

S. No.	Particulars	Intermittent production system (job and batch production)	Continuous production system. (mass and flow production)
11.	Plant maintenance and service	It is desirable to have a maintenance department to avoid losses due to brake down of machinery.	It is essential to have a good plant maintenance department to avoid stoppage of production due to break down of machines.
12.	Balancing of production capacity	Due to different products and different types of machines with different capacity blocks, possibility of imbalance in plant capacity occurs.	The chances of imbalance in plant capacity is very much less.
13.	Production planning and control	The functions of routing, scheduling and loading becomes relatively complicated due to odd size of order, non-repetitive nature of the order, different delivery dates, etc., production planning and control is complicated.	The function of routing, scheduling and loading are carried on smoothly due to standardised products, rated capacity. Here production planning and control is simpler.

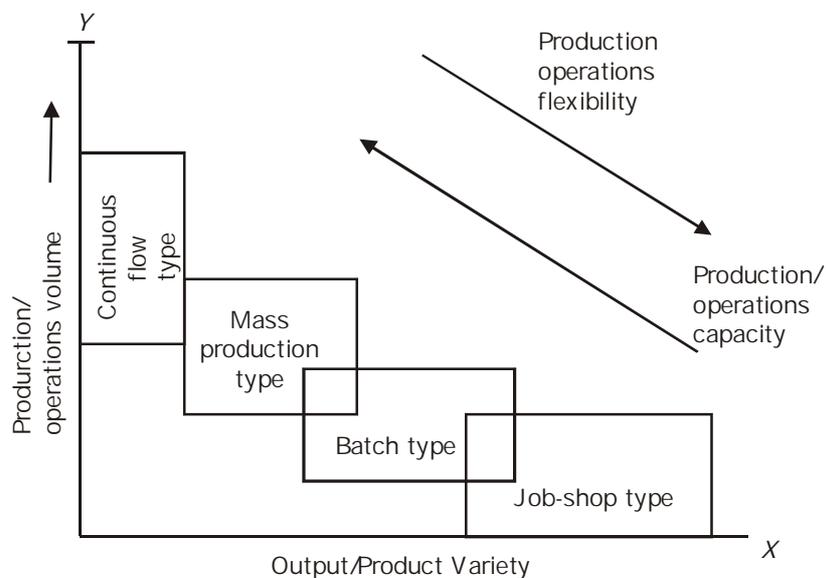


Fig. 1.4 : Production and operations system.

1.13. THE PRODUCTION CYCLE

The production cycle starts from Market Research. Market research reveals consumer preferences and needs. The marketing department will transfer this information to the design department. The design department basing on the information received from marketing department designs the product to fulfill consumer needs and supplies design specifications and drawings to production department. The production department verifies whether the product can be manufactured with the technology and skill available in the firm. If yes it will give the acceptance. Otherwise the Production Manager, Design engineer and Marketing Manager, discuss together and make alterations in the product,

without sacrificing the customer needs. Once this is done the design department conduct the market survey and analyze the demand and submits its sales programme to the top management. The top management after going through the proposals sanctions the budget and gives green signal for production. Production department produces a trial run and sales department release the product in the test markets to get consumer acceptance sells the products. Meanwhile, the production department prepares the detailed production plans and production scheduling. After getting the acceptance from the marketing department, actual production of product starts to meet the marketing programme. All this is shown in figure number 1.5

QUESTIONS

1. Distinguish between Product, Service and Project.
2. Define Production Planning and Control and state the objective of production Planning and control department.
3. What advantages are desired from efficient Production? Operations Management.
4. Briefly discuss the functions of Production Management.
5. Describe with the use of organization structure the importance of Production Management function and its relationship with other departments in the organization.
6. Explain the steps in Planning Production in the case of Line Production and Job Production. What are the specific problems in each one of the above and how can there be tackled.
7. Recommend a suitable Production Planning and control system by a unit undertaking design and fabrication of steel transmission towers. Each order is tailor made to Customers requirements. Your proposal, among other things, should cover
 - (a) Production of the nature of work from the print of view of production Planning and control.
 - (b) Pre Production Planning
 - (c) Work order and feed back system
 - (d) Cost estimation and Control
 - (e) Planning and Control techniques particularly of importance for this type of work.
8. Distinguish in clean terms between mass, batch and unit production. In what ways Production Planning and control system differ between the three types?
9. In a restaurant wide variety foods are offered to the customers, to suit the needs the locality the restaurant work from 9-00am to 1-00pm and 4.p.m to 8-00pm. The restaurant is famous for its food stuffs. The items that are served can be categorized as
 - (a) Those involving preparation time of 1/2 an hour or more.
 - (b) Those require about 5 to 10 minutes for preparation.
 - (c) Those are from packed/canned, which does not require any preparation time. Stuff that has not been consumed in any one day are scrap and cannot be stored for use on the next day. Materials required for (a) and (b) we have to be ordered a day in advance; if delivery is required in the morning, while delivery of packed/canned food is usually made in the afternoon. A certain amount of cold storage at the restaurant is available, and the management is prepared to expand the facility, if necessary. How would you use Production Planning and control procedure to:
 - (i) Study Customers preferences and demand patterns?
 - (ii) Determine the number of foodstuff the restaurant should plan under each Category to ensure of maximum Customer satisfaction and minimum scrap.
 - (iii) Exercise a control function to provide effective waitresses service?
10. The term "Operations Management" implies the applicability of production concept to a much wider variety of human endeavours. Explain?
11. Dr.Chowdary has been in the field of hospital administration for last 18 years. Recently he has been posted as chief of a district Head Quarters Hospital. After assuming the position, Dr.Chowdary came to know that everything is not good at the hospital and came across certain critical problems. Some of them are.
 - (a) Storage of medical and non-medical items
 - (b) Poor patient feeding-patients have complained about the quality of food.

(c) Non availability of Ambulance, when needed.

(d) Break down of X-ray facility since long time.

Dr.Chowdary decided to take assistance of a management hand to solve the above problems and many more small problems that bother him in every day business. Dr.Chowdary gave an advertisement. Called candidates for interview and could not satisfy from the answers given by the candidates.

One fine morning a neatly dressed young man came to Dr.Chowdary and told him that he is useful to Dr.Chowdary in solving the problems in the Hospital. He told Dr.Chowdary that he is working as a production manager in local medium sized factory. Dr.Chowdary laughed at him and said, " You see young man in spite of my 18 years of experience in the hospital, I am not in a position to understand their administrative problems. You being a production manager of a manufacturing concern, how do you help me? Think that you are the young man who has approached Dr.Chowdary and explain how do you answer Dr.Chowdary.

