PRODUCTION SYSTEM

The production system of an organization is that part, which produces products of an organization.

It is that activity whereby resources, flowing within a defined system, are combined and transformedin a controlled manner to add value in accordance with the policies communicated by management.

A simplified production system is shown above

The production system has the following **characteristics:**

1. Production is an organized activity, so every production system has an objective.

2. The system transforms the various inputs to useful outputs.

3. It does not operate in isolation from the other organization system.

4. There exists a feedback about the activities, which is essential to control and improve system performance.

Definition of Production Management:

The following definitions try to explain main characteristics of production management:

(i) In the words of Mr, E.L. Brech:

"Production 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."

The main activities of production management can be listed as:

(i) Specification and procurement of input resources namely management, material, and land, labour, equipment and capital.

(ii) Product design and development to determine the production process for transforming the input factors into output of goods and services.

(iii) Supervision and control of transformation process for efficient production of goods and services.

Functions of Production Management:

In modern times production management has to perform a variety of functions, namely:

(i) Design and development of production process.

(ii) Production planning and control.

(iii) Implementation of the plan and related activities to produce the desired output.

(iv)Administration and co-ordination of the activities of various components and departments responsible for producing the necessary goods and services.

Objectives of Production Management

The objective of the production management is 'to produce goods services of right quality and

quantity at the right time and right manufacturing cost'.

1. **Right Product**

2. RIGHT QUALITY

The quality of product is established based upon the customers needs. The right quality is not necessarily best quality. It is determined by the cost of the product and the technical characteristics as suited to the specific requirements.

3. RIGHT QUANTITY

The manufacturing organization should produce the products in right number. If they are produced in excess of demand the capital will block up in the form of inventory and if the quantity is produced in short of demand, leads to shortage of products.

4. RIGHT TIME

Timeliness of delivery is one of the important parameter to judge the effectiveness of production department. So, the production department has to make the optimal utilization of input resources to achieve its objective.

5. **RIGHT MANUFACTURING COST**

Manufacturing costs are established before the product is actually manufactured. Hence, all attempts should be made to produce the products at pre-established cost, so as to reduce the variation between actual and the standard (pre-established) cost.

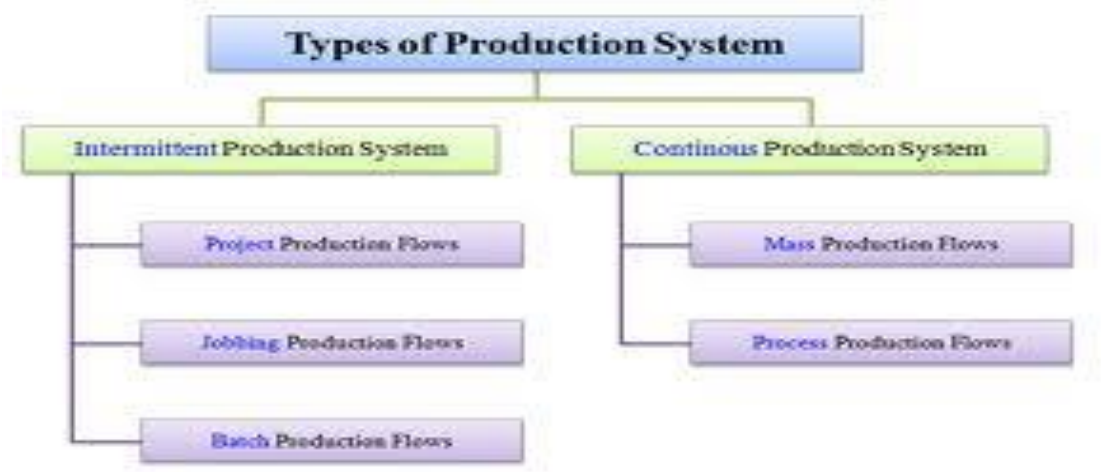
Scope of Production Management:

The scope of production management is indeed vast. Commencing with the selection of location, production management covers such activities as acquisition of land, constructing building, procuring and installing machinery, purchasing and storing raw materials and converting them into saleable products. Added to the above are other related topics such as quality management, maintenance management, production planning and control, methods improvement and work simplification and other related areas.

Classification of Production System

Production systems can be classified as Job Shop, Batch, Mass and Continuous Production

systems.



JOB SHOP PRODUCTION

Job shop production are characterised by manufacturing of one or few quantity of products designed and produced as per the specification of customers within prefixed time and cost. The distinguishing feature of this is low volume and high variety of products. A job shop comprises of general purpose machines arranged into different departments. Each job demands unique technological requirements, demands processing on machines in a certain sequence.

Characteristics

The Job-shop production system is followed when there is:

1. High variety of products and low volume.

2. Use of general purpose machines and facilities.

3. Highly skilled operators who can take up each job as a challenge because of uniqueness.

4. Large inventory of materials, tools, parts.

5. Detailed planning is essential for sequencing the requirements of each product, capacities for each work centre and order priorities.

Advantages

Following are the advantages of job shop production:

1. Because of general purpose machines and facilities variety of products can be produced.

2. Operators will become more skilled and competent, as each job gives them learning opportunities.

3. Full potential of operators can be utilised.

4. Opportunity exists for creative methods and innovative ideas.

Limitations

Following are the limitations of job shop production:

1. Higher cost due to frequent set up changes.

2. Higher level of inventory at all levels and hence higher inventory cost.

3. Production planning is complicated.

4. Larger space requirements.

BATCH PRODUCTION

Batch production is defined by American Production and Inventory Control Society (APICS) "as a form of manufacturing in which the job passes through the functional departments in lots or batches and each lot may have a different routing." It is characterised by the manufacture of limited number of products produced at regular intervals and stocked awaiting sales.

Characteristics

Batch production system is used under the following circumstances:

1. When there is shorter production runs.

2. When plant and machinery are flexible.

3. When plant and machinery set up is used for the production of item in a batch and change of set up is required for processing the next batch.

4. When manufacturing lead time and cost are lower as compared to job order production.

Advantages

Following are the advantages of batch production:

1. Better utilisation of plant and machinery.

2. Promotes functional specialisation.

3. Cost per unit is lower as compared to job order production.

4. Lower investment in plant and machinery.

5. Flexibility to accommodate and process number of products.

6. Job satisfaction exists for operators.

Limitations

Following are the limitations of batch production:

1. Material handling is complex because of irregular and longer flows.

2. Production planning and control is complex.

MASS PRODUCTION

Manufacture of discrete parts or assemblies using a continuous process are called mass production.

This production system is justified by very large volume of production. The machines are arranged in a line or product layout. Product and process standardisation exists and all outputs follow the same path.

Characteristics

Mass production is used under the following circumstances:

1. Standardisation of product and process sequence.

2. Dedicated special purpose machines having higher production capacities and output rates.

3. Large volume of products.

4. Shorter cycle time of production.

5. Lower in process inventory.

6. Perfectly balanced production lines.

7. Flow of materials, components and parts is continuous and without any back tracking.

8. Production planning and control is easy.

9. Material handling can be completely automatic.

Advantages

Following are the advantages of mass production:

1. Higher rate of production with reduced cycle time.

2. Higher capacity utilisation due to line balancing.

3. Less skilled operators are required.

4. Low process inventory.

5. Manufacturing cost per unit is low.

Limitations

Following are the limitations of mass production:

1. Breakdown of one machine will stop an entire production line.

2. Line layout needs major change with the changes in the product design.

3. High investment in production facilities.

4. The cycle time is determined by the slowest operation.

CONTINUOUS PRODUCTION

Production facilities are arranged as per the sequence of production operations from the first

operations to the finished product. The items are made to flow through the sequence of operations

through material handling devices such as conveyors, transfer devices, etc.

Characteristics

Continuous production is used under the following circumstances:

1. Dedicated plant and equipment with zero flexibility.

2. Material handling is fully automated.

3. Process follows a predetermined sequence of operations.

4. Component materials cannot be readily identified with final product.

5. Planning and scheduling is a routine action.

Advantages

Following are the advantages of continuous production:

1. Standardisation of product and process sequence.

2. Higher rate of production with reduced cycle time.

3. Higher capacity utilisation due to line balancing.

4. Manpower is not required for material handling as it is completely automatic.

5. Person with limited skills can be used on the production line.

6. Unit cost is lower due to high volume of production.

Limitations

Following are the limitations of continuous production:

1. Flexibility to accommodate and process number of products does not exist.

2. Very high investment for setting flow lines.

3. Product differentiation is limited.

FUNCTIONS AND RESPONSIBILITIES OF A PRODUCTION MANAGER

Cut-throat competition is the way of life at every stage of the industrial activities in the modern business world. The main aim of an industrial unit is not only to produce the goods but also to ensure that commodities produced by it possess the required quality so that the customers derive maximum satisfaction at minimum possible cost. To achieve this, aproduction manager plays an important role in designing, planning and controlling the production and production systems. He is responsible for the application of right methodology to harmoniously administer, these functions within the total organizational framework and the society. A production manager is responsible for the following functions:

1. *PRODUCT SELECTION AND DESIGN:*

The right kind of a product and a Good design of the same are crucial for the success of an organization. A wrong selection of a product or a poor design of a product can render the company's operations ineffective and non-competitive. Therefore, a product/service must be chosen afterdetailed evaluation of their alterna tives in conformity with theorganisation's objectives. Techniques like value analysis may be employed in creating alternative designs which are free fromunnecessary features and which can meet the intended functions at the lowest cost.

2. *PROCESS SELECTION AND PLANNING:*

Selection of the optimal conversion system is as important as choice of products/services and their design. Process selection decisions includedecisions concerning choice of technology, equipment, machines, machinery handling systems, mechanisation and automation. Process planning involves detailing of processes of resource conversion required and their sequences.

3. *FACILITIES LOCATION:*

A poor location of a plant can be a constant source of higher cost, create difficulty in marketing and transportation, and cause dissatisfaction among employees and customers. Resulting in frequent disturbances in production, sub-standard quality and competitive disadvantage.

4. *CAPACITY PLANNING:*

 Capacity planning concerns determination and acquisition of productive resources to ensure that their availability matches the demand. Capacity decisions have a direct influence on performance of the production system in respect of both resource productivity and customer service (i.e. delivery performance). Excess capacity results in low resourceproductivity while inadequate capacity leads to poor service. Capacityplanning decisions concern expansion/ contraction of major facilitiesrequire d in the conversion process, economies of multiple shiftoperations, development of vendors for major components, etc.

Short term capacity planning decisions concern issues like working of over-time, sub-contracting, shift adjustment, etc. Break-even analysis is a valuable tool for capacity planning.

5 .*PRODUCTION PLANNING:*

 Production planning is the main concern of the production manager. It facilitates the supply of goods at the appropriate time to execute orders received by the company. It also helps control over the productionprocess. The function of production planning involves the decision when, what, how and why to produce goods. To overcome such problems, guiding plans are prepared before production is commenced and these guiding plans are called production planning. Production managerforecasts the sales or d emand for the products of the company andmakes necessary arrangements to meet that demand at the appropriate time. Thus, he tries to maintain a balance between demand and supply.

6. *PRODUCTION CONTROL:*

 After planning, the next responsibility of the production manager is to control the production by taking kin steps to utilise the various factors of production in an efficient manner so that the goods are produced at the lowest cost and according to the requirements and satisfaction of the customers and are supplied to them on the scheduled date of delivery in the ordered quantity. This function calls for scheduling of the requiredwork, providing necessary instructions to manufacturing departments and checking the production progress, etc.

7. *QUALITY CONTROL:*

The production manager is also responsible for maintaining a specificquality of the pr oducts.

Steps should be taken to produce as per specifications and to minimize the amount of defective work.

8. *METHOD ANALYSIS:*

There may be several alternatives for manufacturing a product. As all alternatives do not work equally, some may be more economical than the others. The production manager must study the various alternatives and analyse them in right perspective in order t o choose the best one. This activity of choosing the best alternative is called method analysis. Method analysis improves the productivity of the concern and minimises the cost of production.

9. *INVENTORY CONTROL:*

Production manager is supposed to have control over the cost of production by reducing the wastage of raw material. Hence, he/she has to make best use of the raw material. For this purpose, he/she has to determine the economic lot size, economic lot quantity, reorder levels(minimum, maximum and danger levels of stock of raw materials) so that the problems of over or under stock of materials may not arise. This involves the physical and financial control of materials. Thus, he/she has to arrange for the procurement of raw materials.

10. *PLANT LAYOUT AND MATERIAL HANDLING:*

Plant layout pertains to the arrangement of machines and equipment in such a manner so as to maintain the smooth flow of production without any interruption. An efficient plant layout aims at efficient material handling which in turn reduces wastage of men and materials and helps in reducing the cost of production. The production manager must ensurethat efficient material handling system and plant layout handling are designed and developed.

11. *WORKMEASUREMENT:*

One of the main responsibilities of the production manager is to control and reduce the labour cost per unit. At different levels of production, the labour cost per unit differs. Here, application of work measurement is necessary. By applying work-measurement techniques, the performance of workmen must be improved through positive or negative incentives. Time and motion studies are work-measurement techniques.

12. *MAINTENANCE AND REPLACEMENT:*

Maintenance and replacement involve selection of optimal maintenance (preventive and/or breakdown) policy to ensure higher equipmentavailability at minimum mainte nance and repair cost. Preventivemaintenance which includes preventive inspection, planned lubrication, periodic cleaning and upkeep, replacement of parts, condition-monitoring of the equipment, etc., for maintaining critical machines.Replacement decisions concerning machines are basically financialinvestment decisions but have a major effect on the e fficiency of production system.

Other types of replacement decisions concern parts of machines and the most common problem will be to decide between individual replacement and group replacement.

13. *COST REDUCTION AND COST CONTROL:*

Effective production management must ensure minimum cost of production and in this context cost reduction control acquires significant importance.

14. *OTHER FUNCTIONS:*

Apart from the above, the production manager has to perform certain other functions pertaining to engineering economics, stores and warehousing management, maximizing the labour efficiency,standardization and storage, price analysis, wage incentives to workers, etc.