

**DEPARTMENT OF BUSINESS ADMINISTRATION**  
**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE-18**

**PRODUCTION MANAGEMENT**

**UNIT-I**

Production Management- Functions-Scope-Production system-plant location-Factors influencing Plant Location-Plant layout-principles-Plant Layout and its kinds-Principles.

**UNIT -II**

Materials handling-Importance-Principles-Work Study,Time Study and Motion Study-Work Measurement- Maintenance of Plant- Types.

**UNIT – III**

Production Planning and Control- Meaning- Objectives and Importance- Principles-Routing-Scheduling- Despatching-Control-Purchasing-Principles-Purchasing Procedure-Objectives – Functions.

**UNIT-IV**

Materials Management – Meaning- Objectives and Significance-Functions of inventory-Importance-Tools – ABC , VED,FSN Analysis- EOQ-Store keeping- Objectives- duties-responsibilities.

**UNIT V**

Quality control- inspection-Types – objectives – TQM: Meaning- objectives-elements-benefits- Bench Marking: Meaning – Objectives -Advantages. AGMARK,ISO : Features- Advantages- Procedure for obtaining ISO.

**Text Books**

O.P.Khanna : Industrial Engineering and Management

**Reference Books**

Gopalakrishnan : Materials Management

Banga and Sharma : Production Management

V.V.Varma : Materials Management

## Unit I

Subject Name	Sub Code	Semester	Prepared by
<b>PRODUCTION MANAGEMENT</b>	18BBA32C	III	Dr.S.Akilandeswari, Assistant professor

**Production Management** refers to the application of **management** principles to the **production** function in a factory. In other words, **production management** involves application of planning, organizing, directing and controlling the **production** process.

### Function

The components or functions of production management are as follows:

1. Selection of **Product and Design**,
2. Selection of Production **Process**,
3. Selecting Right Production Capacity,
4. Production **Planning**,
5. Production Control,
6. Quality and Cost Control,
7. Inventory Control, and.
8. Maintenance and Replacement of Machines.

### Scope of Production Management.

Production Management is a vast concept it involves a huge chain. Production starts with input and ends with output i.e finished product. Following are the scope of production management.

**1.Location of Facilities:** The selection of location is a key decision as large investment made in building, land, and machinery.

**2.Plant Layout and material Handling:** Plant layout refers to the physical arrangement of facilities. Material handling refers to the moving of material from the storeroom to the machine & from machine to the next during the process of manufacturing.

### 3.Product Design

Product design deals with the conversion of the ideas about the product into the reality

#### **4.Process Design**

It is the decision making on overall process route for converting the raw material into the finished goods

#### **5.Production Planning & Controlling ( P.P.C)**

- (d) flexibility to meet technological changes and increase in production requirements
- (e) easy control of production
- (f) effective supervision
- (g) low cost of manufacturing

#### **6.Quality control**

Quality control may be defined as a system that is used to maintain a desired level of quality in a product and service.

#### **7. Material Handling**

Material Management is that aspect of management function which is primarily concerned with acquisition control and use of needed material.

#### **8.Maintenance Management**

Maintenance deal with taking care of factory layout, types of machinery. This is essential for equipment & machinery which are a very important part of the total production process.

#### **Production System**

Production system consists of three main components viz., Inputs, Conversion Process and Output.

**1.Inputs** include raw-materials, machines, man-hours, components or parts, drawing, instructions and other paper works.

**2.Conversion process** includes operations (actual production process). Operations may be either manual or mechanical or chemical. Operations convert inputs into output. Conversion process also includes supporting activities, which help the process of conversion. The supporting activities include; production planning and control, purchase of raw-materials, receipt, storage and issue of materials, inspection of parts and work-in-progress, testing of products, quality control, warehousing of finished products, etc.

**3. Output** includes finished products, finished goods (parts), and services.

#### **Examples**

The examples of a production system are as follows:

**1.Tangible goods** : Consider an example of a manufacturing industry like a Sugar Industry. Here, sugarcane is first used as an input, then the juice of sugarcane is processed through a conversion process, finally to get an output known as a refined sugar (used for mass consumption).

2. **Intangible goods** : Consider an example from a service industry that of a software-development firm or company. Here, initially, written program codes are used as an inputs. These codes are then integrated in some database and are provided with a user-friendly interface through a conversion process. Finally, an output is made available in form of an executable application program.

Production system is a result of arranging inputs, their conversion process and output based on some logic and functions. Production system fails if any such arrangement made don't give a desired level of outcome.

### **Plant Location**

Plant location refers to the choice of region and the selection of a particular site for setting up a business or factory. But the choice is made only after considering cost and benefits of different alternative sites. It is a strategic decision that cannot be changed once taken. If at all changed only at considerable loss, the location should be selected as per its own requirements and circumstances. Each individual plant is a case in itself. Businessman should try to make an attempt for optimum or ideal location.

### **Factors affecting plant location**

The important considerations for selecting a suitable location are given as follows:

- a) Natural or climatic conditions.
- b) Availability and nearness to the sources of raw material.
- c) Transport costs-in obtaining raw material and also distribution or marketing finished products to the ultimate users.
- d) Access to market: small businesses in retail or wholesale or services should be located within the vicinity of densely populated areas.
- e) Availability of Infrastructural facilities such as developed industrial sheds or sites, link roads, nearness to railway stations, airports or sea ports, availability of electricity, water, public utilities, civil amenities and means of communication are important, especially for small scale businesses.
- f) Availability of skilled and non-skilled labour and technically qualified and trained managers.
- g) Banking and financial institutions are located nearby.
- h) Locations with links: to develop industrial areas or business centers result in savings and cost reductions in transport overheads, miscellaneous expenses.
- i) Strategic considerations of safety and security should be given due importance.
- j) Government influences: Both positive and negative incentives to motivate an entrepreneur to choose a particular location are made available. Positive includes cheap overhead facilities like electricity, banking transport, tax relief, subsidies and liberalization. Negative incentives are in form of restrictions

for setting up industries in urban areas for reasons of pollution control and decentralization of industries.

k) Residence of small business entrepreneurs want to set up nearby their homelands .

## **PLANT LAYOUT**

The efficiency of production depends on how well the various machines; production facilities and employee's amenities are located in a plant. Only the properly laid out plant can ensure the smooth and rapid movement of material, from the raw material stage to the end product stage. Plant layout encompasses new layout as well as improvement in the existing layout. It may be defined as a technique of locating machines, processes and plant services within the factory so as to achieve the right quantity and quality of output at the lowest possible cost of manufacturing. It involves a judicious arrangement of production facilities so that workflow is direct.

## **DEFINITION**

A plant layout can be defined as follows: Plant layout refers to the arrangement of physical facilities such as machinery, equipment, furniture etc. with in the factory building in such a manner so as to have quickest flow of material at the lowest cost and with the least amount of handling in processing the product from the receipt of material to the shipment of the finished product.

## **IMPORTANCE**

Plant layout is an important decision as it represents long-term commitment. An ideal plant layout should provide the optimum relationship among output, floor area and manufacturing process. It facilitates the production process, minimizes material handling, time and cost, and allows flexibility of operations, easy production flow, makes economic use of the building, promotes effective utilization of manpower, and provides for employee's convenience, safety, comfort at work, maximum exposure to natural light and ventilation. It is also important because it affects the flow of material and processes, labour efficiency, supervision and control, use of space and expansion possibilities etc.

## **OBJECTIVES**

An efficient plant layout is one that can be instrumental in achieving the following objectives:

- a) Proper and efficient utilization of available floor space
- b) To ensure that work proceeds from one point to another point without any delay
- c) Provide enough production capacity.
- d) Reduce material handling costs
- e) Reduce hazards to personnel
- f) Utilise labour efficiently
- g) Increase employee morale

- h) Reduce accidents
- i) Provide for volume and product flexibility
- j) Provide ease of supervision and control
- k) Provide for employee safety and health
- l) Allow ease of maintenance
- m) Allow high machine or equipment utilization
- n) Improve productivity

### **TYPES OF PLANT LAYOUT**

In case of manufacturing unit, plant layout may be of four types:

- (a) Product or line layout
- (b) Process or functional layout
- (c) Fixed position or location layout
- (d) Combined or group layout

(a) **Product or line layout:** Under this, machines and equipments are arranged in one line depending upon the sequence of operations required for the product. The materials move from one workstation to another sequentially without any backtracking or deviation. Under this, machines are grouped in one sequence. Therefore materials are fed into the first machine and finished goods travel automatically from machine to machine, the output of one machine becoming input of the next, e.g. in a paper mill, bamboos are fed into the machine at one end and paper comes out at the other end. The raw material moves very fast from one workstation to other stations with a minimum work in progress storage and material handling.

The grouping of machines should be done keeping in mind the following general principles.

- a) All the machine tools or other items of equipments must be placed at the point demanded by the sequence of operations
- b) There should no points where one line crossed another line
- c) Materials may be fed where they are required for assembly but not necessarily at one point
- d) All the operations including assembly, testing packing must be included in the line.

### **Advantages:**

Product layout provides the following benefits:

- a) Low cost of material handling, due to straight and short route
- b) Smooth and uninterrupted operations
- c) Continuous flow of work

- d) Lesser investment in inventory and work in progress
- e) Optimum use of floor space
- f) Shorter processing time or quicker output
- g) Less congestion of work in the process
- h) Simple and effective inspection of work and simplified production control
- i) Lower cost of manufacturing per unit .

**Disadvantages:**

Product layout suffers from following drawbacks:

- a. High initial capital investment in special purpose machine
- b. Heavy overhead charges
- c. Breakdown of one machine will hamper the whole production process
- d. Lesser flexibility as specially laid out for particular product.

**Suitability:**

Product layout is useful under following conditions:

- 1) Mass production of standardized products
- 2) Simple and repetitive manufacturing process
- 3) Operation time for different process is more or less equal
- 4) Reasonably stable demand for the product
- 5) Continuous supply of materials

Therefore, the manufacturing units involving continuous manufacturing process, producing few standardized products continuously on the firm's own specifications and in anticipation of sales would prefer product layout e.g. chemicals, sugar, paper, rubber, refineries, cement, automobiles, food processing and electronics etc.

**Process layout:**

In this type of layout machines of a similar type are arranged together at one place. E.g. Machines performing drilling operations are arranged in the drilling department, machines performing casting operations be grouped in the casting department. Therefore the machines are installed in the plants, which follow the process layout. Hence, such layouts typically have drilling department, milling department, welding department, heating department and painting department etc. The process or functional layout is followed from historical period. It evolved from the handicraft method of production. The work has to be allocated to each department in such a way that no machines are chosen to do as many different job as possible i.e. the emphasis is on general purpose machine.

**Advantages:**

Process layout provides the following benefits

- a) Lower initial capital investment in machines and equipments. There is high degree of machine utilization, as a machine is not blocked for a single product
- b) The overhead costs are relatively low
- c) Change in output design and volume can be more easily adapted to the output of variety of products
- d) Breakdown of one machine does not result in complete work stoppage
- e) Supervision can be more effective and specialized
- f) There is a greater flexibility of scope for expansion.

**Disadvantages:**

Process layout suffers from following drawbacks

- a. Material handling costs are high due to backtracking
- b. More skilled labour is required resulting in higher cost.
- c. Time gap or lag in production is higher
- d. Work in progress inventory is high needing greater storage space
- e. More frequent inspection is needed which results in costly supervision

**(c) Fixed Position or Location Layout**

In this type of layout, the major product being produced is fixed at one location. Equipment labour and components are moved to that location. All facilities are brought and arranged around one work center. This type of layout is not relevant for small scale entrepreneur. The following figure shows a fixed position layout like ship building.

**Advantages:**

Fixed position layout provides the following benefits

- a) It saves time and cost involved on the movement of work from one workstation to another.
- b) The layout is flexible as change in job design and operation sequence can be easily incorporated.
- c) It is more economical when several orders in different stages of progress are being executed simultaneously.
- d) Adjustments can be made to meet shortage of materials or absence of workers by changing the sequence of operations.

**Disadvantages:**

Fixed position layout has the following drawbacks

- a. Production period being very long, capital investment is very heavy
- b. Very large space is required for storage of material and equipment near the product.



c. As several operations are often carried out simultaneously, there is possibility of confusion and conflicts among different workgroups.

**Suitability:**

The fixed position layout is followed in following conditions

1. Manufacture of bulky and heavy products such as locomotives, ships, boilers, generators, wagon building, aircraft manufacturing, etc.
2. Construction of building, flyovers, dams.
3. Hospital, the medicines, doctors and nurses are taken to the patient (product).

**Combined layout:** Certain manufacturing units may require all three processes namely intermittent process (job shops), the continuous process (mass production shops) and the representative process combined process [i.e. miscellaneous shops]. In most of industries, only a product layout or process layout or fixed location layout does not exist. Thus, in manufacturing concerns where several products are produced in repeated numbers with no likelihood of continuous production, combined layout is followed. Generally, a combination of the product and process layout or other combination are found, in practice, e.g. for industries involving the fabrication of parts and assembly, fabrication tends to employ the process layout, while the assembly areas often employ the product layout. . In soap, manufacturing plant, the machinery manufacturing soap is arranged on the product line principle, but ancillary services such as heating, the manufacturing of glycerin, the power house, the water treatment plant etc. are arranged.

**Principles of Plant Layout**

Layout of a plant is an expensive affair. Due care is required in the installation of plant and equipment. Management must remember that plant layout is not an end in itself but is a means to achieve a smooth flow of materials. A sound layout must ensure-

- (a) steady and uninterrupted flow of work
- (b) absence of congested traffic
- (c) full utilization of capacity
- (d) flexibility to meet technological changes and increase in production requirements
- (e) easy control of production
- (f) effective supervision
- (g) low cost of manufacturing

In addition to the location of production equipment and work centers, the location of plant services (receiving, shipping, warehousing, maintenance, tool, cribs) and employee services (parking, cafeteria, locker rooms, toilets, medical, recreation facilities, etc.). The main consideration in locating plant

services is the overall material flow patterns. In locating employee facilities the guiding factor is convenience and accessibility to employees.

While designing the layout of a plant, the following principles should be kept in mind:

**(i) Principle of minimum movement.** As far as possible materials and labor should be moved over minimum distances.

**(ii) Principle of flow.** The work areas should be arranged according to the sequence of operations so that there is a continuous flow of materials without backtracking or congestion. The layout should allow for easy movement of materials without interruptions or delays. As far as possible movement of materials should be continuous.

**(iii) Principle of space.** All available cubic space should be effectively used both horizontally and vertically.

**(iv) Principle of safety.** Due consideration should be given to the safety and convenience of workers. There should be built-in provision for the safety and comfort of employees.

**(v) Principle of flexibility.** Layout should be so designed that production facilities can easily be rearranged when it becomes necessary in future on account of expansion or technological changes.

**(vi) Principle of interdependence.** Interdependent operations and processes should be located in close proximity to each other. For example, materials should be stored near the area of requirement, transport, etc. This will minimize product travel.

**(vii) Principle of overall integration.** All the plant facilities and services should be fully integrated into a single operating unit so as to maximize efficiency and minimize costs of production.

**(viii) Principle of minimum investment.** The layout should yield savings in fixed capital investment through optimum utilization of available facilities.

**The Contents in this E-Material has been taken from the text and reference book as given in the syllabus.**

