

Biyani's Think Tank

**Concept based notes**

# **Production and Material Management**

(BBA)

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## Preface

I am glad to present this book, especially designed to serve the needs of the students.

The book has been written keeping in mind the general weakness in understanding the fundamental concepts of the topics. The book is self-explanatory and adopts the “Teach Yourself” style. It is based on question-answer pattern. The language of book is quite easy and understandable based on scientific approach.

Any further improvement in the contents of the book by making corrections, omission and inclusion is keen to be achieved based on suggestions from the readers for which the author shall be obliged.

I acknowledge special thanks to Mr. Rajeev Biyani, *Chairman* & Dr. Sanjay Biyani, *Director (Acad.)* Biyani Group of Colleges, who are the backbones and main concept provider and also have been constant source of motivation throughout this Endeavour. They played an active role in coordinating the various stages of this Endeavour and spearheaded the publishing work.

I look forward to receiving valuable suggestions from professors of various educational institutions, other faculty members and students for improvement of the quality of the book. The reader may feel free to send in their comments and suggestions to the under mentioned address.

**Author**

## PRODUCTION AND MATERIAL MANAGEMENT

# Syllabus

### UNIT I

Meaning and function of production management, role and responsibility of production function in org type of production system continuous, intermittent, job lots etc., plant layout objective type material flow pattern safety consideration and environment aspects.

### UNIT II

Production design- definition, importance, factor affecting product design product policy-standardization, simplification, production developments, meaning importance, factor responsible development techniques of product development.

### UNIT III

Production planning and control-meaning objective, scope, importance and procedure of production planning, routing, schedule, master production schedule, production schedule, dispatch, follow up, production control-meaning, objectives, factor affecting production control.

### UNIT IV

Concept and importance of material management 0corporate policy, organization, research, planning, source selection, inventory management and its prime importance in our country today. Inventory control techniqe -abc, make or buy decision. Problem on abs analysis

### UNIT V

Warehousing and store management centralized and decentralized store. Brief introduction to various methods of store accounting. Need for stock verification

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# Unit I

## Meaning and Function of Production Management

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### Multiple Choice Questions

1. The layout strategy that deals with low-volume, high-variety production is
  - a. fixed-position layout
  - b. retail layout
  - c. warehouse layout
  - d. office layout
  - e. none of the above
  
2. A good layout requires determining
  - a. material handling requirements
  - b. capacity and space requirements
  - c. environment and aesthetics
  - d. cost of moving between various work areas
  - e. all of the above
  
3. One of the major advantages of process-oriented layouts is
  - a. high equipment utilization
  - b. large work-in-process inventories
  - c. flexibility in equipment and labor assignment
  - d. smooth and continuous flow of work
  
4. The main issue in designing process-oriented layout concerns the relative positioning of \_\_\_\_\_ to minimize cost of material handling.
  - a. work stations
  - b. departments
  - c. raw materials
  - d. entrances, loading docks, etc.
  
5. A process-oriented layout is best suited for



- a. the assembly of products like automobiles and appliances
  - b. the mass production of uniform products
  - c. high-volume, low-variety production
  - d. low-volume, high-variety production
6. Which of the following is true for process layouts, but false for product layouts?
- a. low in-process inventories
  - b. flexibility in equipment and labor assignments
  - c. low variety of products
  - d. high volume of output
7. Which type of layout is used to achieve a smooth and rapid flow of large volumes of output?
- a. process-oriented
  - b. batch-oriented
  - c. product-oriented
  - d. unit production
  - e. fixed-position
8. A product layout would be most appropriate in which of the following cases?
- a. a grocery store
  - b. a doctor's office
  - c. a gourmet restaurant
  - d. a fast food restaurant

1. e 2. e 3. c 4. b 5. D 6. C 7. D 8. b

**Q1 Define production and operation management?**

**Ans**

Production/operations management is the process, which combines and transforms various resources used in the production/operations subsystem of the organization into value added product/services in a controlled manner as per the policies of the organization. Therefore, it is that part of an organization, which is concerned with the transformation of a range of inputs into the required (products/services) having the requisite quality level.

The set of interrelated management activities, which are involved in manufacturing certain products, is called as production management.

Production function is that part of an organization, which is concerned with the transformation of a range of inputs into the required outputs (products) having the requisite quality level.

Production is defined as *“the step-by-step conversion of one form of material into another form through chemical or mechanical process to create or enhance the utility of the product to the user.”* Thus production is a value addition process.

Some examples of production are: manufacturing custom-made products like, boilers with a specific capacity, constructing flats, some structural fabrication works for selected customers, etc., and manufacturing standardized products like, car, bus, motor cycle, radio, television, etc.

The term production is used to indicate a process through which raw materials are converted into finished product. In other words, it transforms the various inputs, such as raw materials, labour, money, management, etc. into output, i.e., goods and services. The place where such transformation takes place is known as factory. Production process can be undertaken either manually or mechanically.

**Q 2 What are the features of production function?**

**Ans** The following are the features of the production function:

1. It involves transformation of raw materials into finished product.
2. The place where production takes place is known as a factory.
3. Production is undertaken in various departments, such as production and service department of a factory.
4. Production may involve more than one process or operation.
5. It can be undertaken either manually or mechanically.
6. It is based on technology which may be either indigenous or imported.
7. Production is undertaken on large scale basis in recent times.
8. Production process involves combination of resources, such as materials, men, money, machinery, management.
9. Production process leads to uniformity of finished goods.
10. In modern times, production process is highly specialised.

**Q 3 How production function is important in organization?**

**Ans** Production function is a basic function of an industrial organisation around which all other functions of the organisation, such as purchasing, financing, marketing, storing, personnel, research and development, revolve. It is, therefore, very essential that the production function is managed effectively and efficiently so as to achieve the organisation's goals. The main aim of every production system is to produce the goods and services economically to the full satisfaction of the customer for which they are meant. In order to achieve this aim, it is essential to plan, organise, direct and control the



production system. In fact, these functions of planning, organising, directing and controlling comprise the production management.

**Q.4 Write the Scope of production management?**

**Ans** The scope of any subject refers to the areas of study. The production management has a wide scope. The following aspects are said fall under the purview of production management.

**1. Planning physical facilities**

Whenever an idea of starting production in a factory is conceived by an industrialist, he has to plan its formative aspects. This involves determining the place of incorporation and selection of a suitable site to construct a factory building. Next follows the plan relating to the layout of the factory and design of the factory building. The factory building must be constructed so as to provide better working conditions to the employees. So, this involves provision of adequate physical facilities with the factory for lighting, ventilation, air-conditioning, sanitation and noise control. Planning must also be done for the proper maintenance of plant, machineries and other equipments.

**2. Organisation of production**

The term production organisation is used both in a broad and narrow sense. In its broad sense, it implies the arrangement of all the factors of production, such as raw materials, labourers, machines, money and management required for production. Having procured these factors, necessary efforts are made to utilise them to the fullest extent possible so as to maximise production. In its narrow sense, the term organisation is concerned with setting up the internal organisation structure of the factory.

**3. Materials management**

'Materials Management' is concerned with controlling the kind, amount, location, movement, and timing of the various commodities used and produced by the factory. Materials use up substantial portion of the capital invested in the factories and thus demand continuing and considerable attention from the management. Many factories failures of the direct result outgrowth of excessive inventories.

**Q.4 What are the different types of production system?**

**Ans** The types of production system are grouped under two categories viz.,  
Intermittent production system, and  
Continuous production system

Intermittent production system

Intermittent means something that starts (initiates) and stops (halts) at irregular (unfixed) intervals (time gaps). In the intermittent production system, goods are produced based on customer's orders. These goods are produced on a small

scale. The flow of production is intermittent (irregular). In other words, the flow of production is not continuous. In this system, large varieties of products are produced. These products are of different sizes. The design of these products goes on changing. It keeps changing according to the design and size of the product. Therefore, this system is very flexible.

Following are examples on the intermittent production system.

The work of a goldsmith is purely based on the frequency of his customer's orders. The goldsmith makes goods (ornaments) on a small-scale basis as per his customer's requirements. Here, ornaments are not done on a continuous basis.

The characteristics of an intermittent production system are listed as follows:

The flow of production is not continuous. It is intermittent.

Wide varieties of products are produced.

The volume of production is small.

General purpose machines are used. These machines can be used to produce different types of products.

The sequence of operation goes on changing as per the design of the product.

The quantity, size, shape, design, etc. of the product depends on the customer's orders.

The types of intermittent production system include:

Project production flows,

Jobbing production flows, and

Batch production flows.

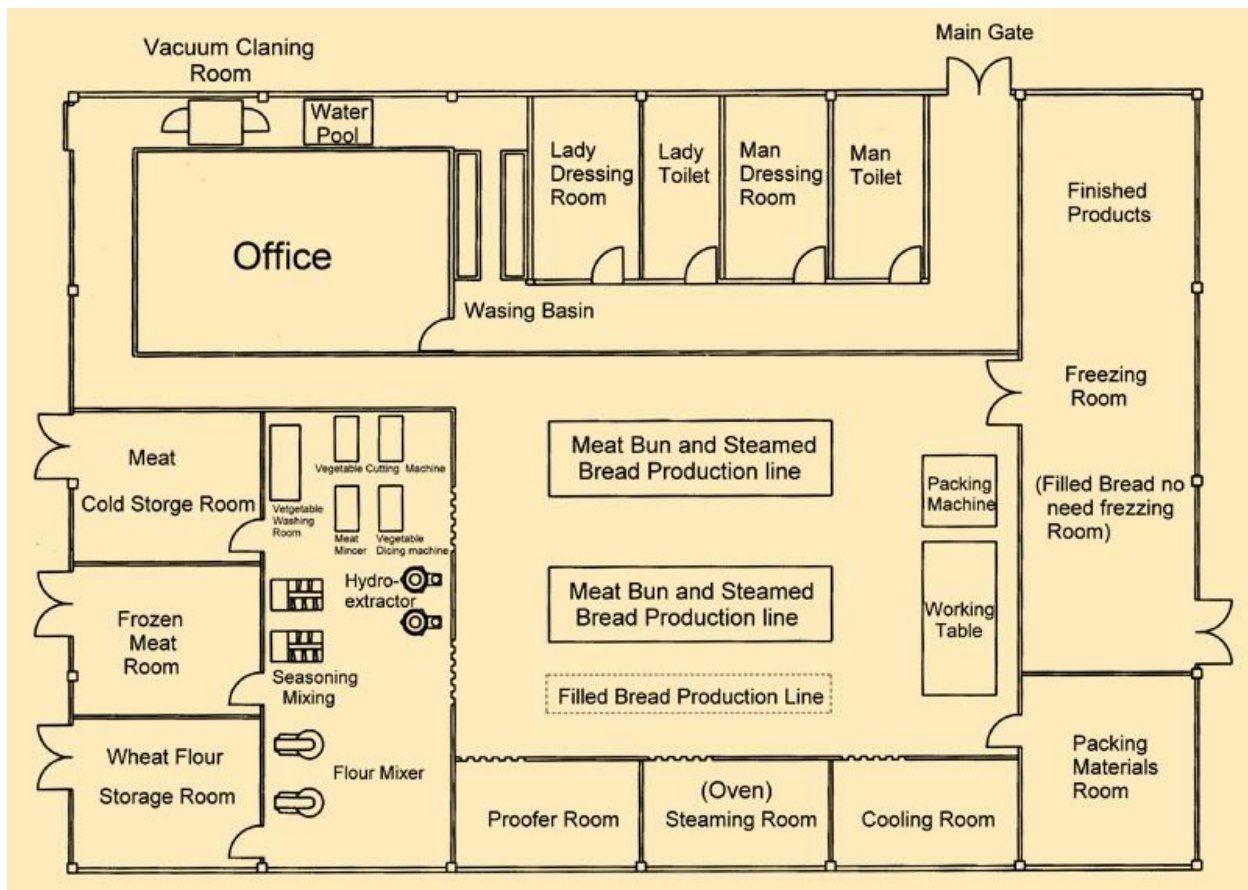
Continuous production system

Continuous means something that operates constantly without any irregularities or frequent halts.

In the continuous production system, goods are produced constantly as per demand forecast. Goods are produced on a large scale for stocking and selling. They are not produced on customer's orders. Here, the inputs and outputs are standardized along with the production process and sequence.

Following are examples on the continuous production system

The production system of a food industry is purely based on the demand forecast. Here, a large-scale production of food takes place. It is also a continuous production.



The characteristics of a continuous production system are listed as follows:

The flow of production is continuous. It is not intermittent.

The products are standardized.

The products are produced on predetermined quality standards.

The products are produced in anticipation of demand.

Standardized routing sheets and schedules are prepared.

The types of continuous production system include:

Mass production flows, and

Process production flows.

**Q.5 Define plant layout?**

**Ans** 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.

**Q.6 What is plant location?**

**Ans** 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 plant location may be understood as function of determining where plant should be located for maximum operating economy and effectiveness.

EX-M/S samrat thermo plastic industries ,are manufacturers of mixer and grinders ,located in Raipur district in M.P .seventy five %of raw material required by them had to de bought from Mumbai and 75%of finised goods had to be marketed in pune and Mumbai. to overcome this difficulty ,it was decided to shift entire plant to pune.

**Q.7 What is an ideal location?**

**Ans** An ideal location is one where the cost of the product is kept to minimum, with a large market share, the least risk and the maximum social gain. It is the place of maximum net advantage or which gives lowest unit cost of production and distribution. For achieving this objective, small-scale entrepreneur can make use of locational analysis for this purpose.

**Q.8 What are the objectives and factors of efficient plant layout?**

**Ans** Following are the objectives of efficient plant layout:

- 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

**Factors effecting plant layout:**

- i) Material-type and size of material influence facility layout.EX.67 km slurry pipelines carries iron ore from kudremukh iron ore project to manglore port..

- ii) product-type of product whether it is heavy ,light,small big ,liquid,or solid influence facility layout.
- iii) worker
- iv) machinery
- iv) type of industry
- v) location
- vi) managerial policies.

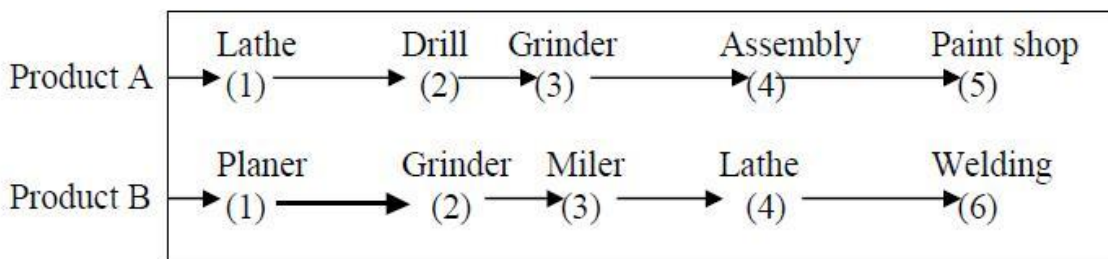
**Q.9 What are the types of plant layout?**

**Ans Types of plant layout: -**

**1. Process layout** - These layouts are also called the functional layouts and are very suitable in the conditions, when the products being prepared are non - standard or involve wide variations in times of processing of the individual operations. Such layouts are able to make better utilization of the equipment that is available, with greater flexibility in allocation of work to the equipment and also to the workers. Imbalance caused in one section is not allowed to affect the working of the other sections.

. 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 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



A line layout for two products is given.      Product A                  Product B

**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.

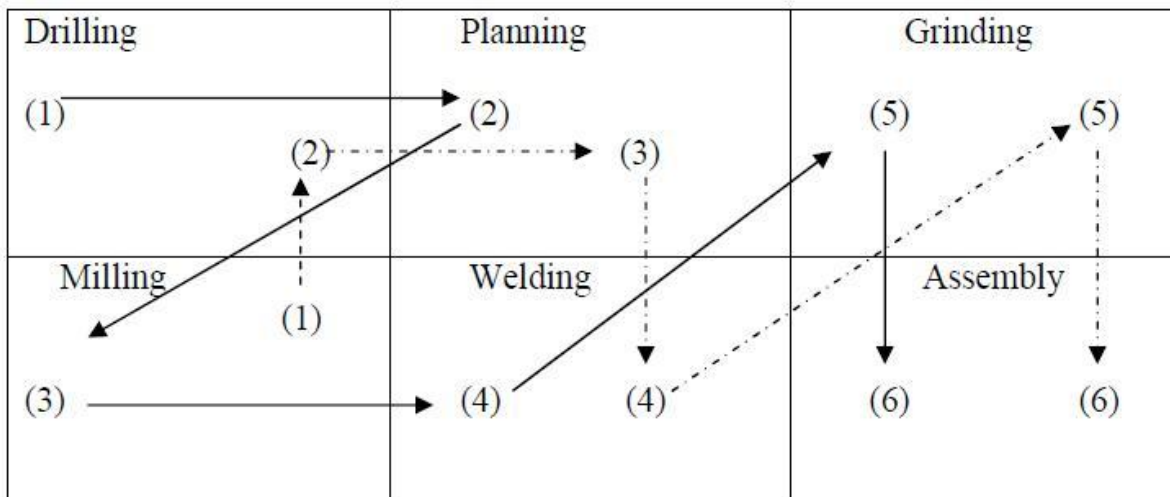
**(b) Process layout:**

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.

The work, which has to be done, is allocated to the machines according to loading schedules with the object of ensuring that each machine is fully loaded.

Process layout is shown in the following diagram.



Product A: —————→

Product B: - - - - -→

Process layout showing movement of two products

The grouping of machines according to the process has to be done keeping in mind the following principles

- a) The distance between departments should be as short as possible for avoiding long distance movement of materials
- b) The departments should be in sequence of operations
- c) The arrangement should be convenient for inspection and supervision

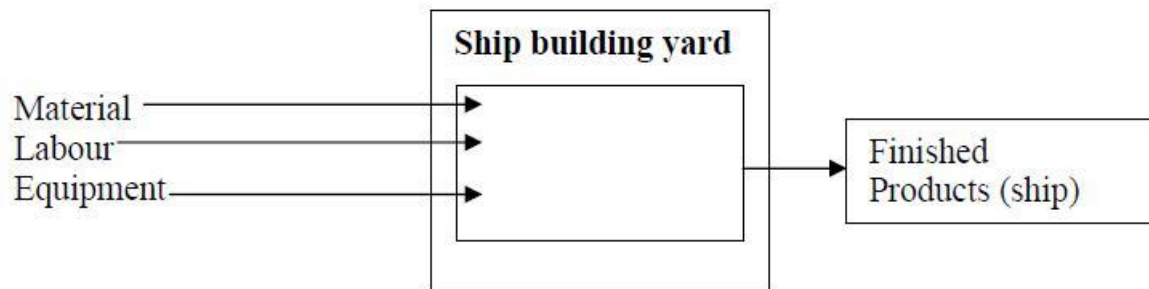
**Suitability:** Process layout is adopted when

1. Products are not standardized
2. Quantity produced is small
3. There are frequent changes in design and style of product
4. Job shop type of work is done
5. Machines are very expensive

Thus, process layout or functional layout is suitable for job order production involving non-repetitive processes and customer specifications and nonstandardized products, e.g. tailoring, light and heavy engineering products, made to order furniture industries, jewelry.

### (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 regarding shipbuilding.



**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).

**(d) 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 on a functional basis.

**Q.10 What are the safety consideration and environmental aspects in plant layout?**

**Ans** Minimum Handling of Materials:

A good plant layout takes into consideration the various flows of materials inside the plant thus minimizing the handling of materials..

**Minimum Damage and Spoilage of Materials:**

If adequate consideration regarding the handling and storage of materials is given, it automatically minimizes damage and spoilage of materials.

**Reduced Congestion of Materials, Machinery and Men:**

A good physical layout should eliminate confusion in the plant. By doing so, it not only makes the life of the supervisor easier but also contributes towards overall improvements in the productivity of the shop.

**Flexibility with Regard to Changing Production Conditions:**

A good layout, that is a good spatial system, should be one that is adaptable or flexible enough to take care of probable future changes in the volume of production, in the range of products manufactured, and changes in the method/processes of production.

## Unit II

# Production design

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### Multiple Choice Questions

1. Which of the following is true about business strategies?
  - a. An organization should stick with its strategy for the life of the business.
  - b. All firms within an industry will adopt the same strategy.
  - c. Well defined missions make strategy development much easier.
  - d. Strategies are formulated independently of SWOT analysis.
  - e. Organizational strategies depend on operations strategies.
  
2. The fundamental purpose for the existence of any organization is described by its
  - a. policies
  - b. mission
  - c. procedures
  - d. strategy
  - e. tactics
  
3. Which of the following activities takes place once the mission has been developed?
  - a. The firm develops alternative or back-up missions in case the original mission fails.
  - b. The functional areas develop their functional area strategies.
  - c. The functional areas develop their supporting missions.
  - d. The ten OM decision areas are prioritized.
  - e. Operational tactics are developed
  
4. Which of the following statements about organizational missions is false?
  - a. They reflect a company's purpose.
  - b. They indicate what a company intends to contribute to society.
  - c. They are formulated after strategies are known.
  - d. They define a company's reason for existence.
  - e. They provide guidance for functional area missions.



5. The impact of strategies on the general direction and basic character of a company is
  - a. short ranged
  - b. medium range
  - c. long range
  - d. temporal
  - e. minimal
  
6. The fundamental purpose of an organization's mission statement is to
  - a. create a good human relations climate in the organization
  - b. define the organization's purpose in society
  - c. define the operational structure of the organization
  - d. generate good public relations for the organization
  - e. define the functional areas required by the organization
  
7. Which of the following is true?
  - a. Corporate mission is shaped by functional strategies.
  - b. Corporate strategy is shaped by functional strategies.
  - c. Functional strategies are shaped by corporate strategy.
  - d. External conditions are shaped by corporate mission.
  - e. Corporate mission is shaped by functional strategies.
  
8. According to the authors, which of the following strategic concepts allow firms to achieve their missions?
  - a. productivity, efficiency, and quality leadership
  - b. differentiation, cost leadership, and quick response
  - c. differentiation, quality leadership, and quick response
  - d. distinctive competency, cost leadership, and experience
  - e. differentiation, distinctive competency, quality, leadership, and capacity
  
9. A firm can effectively use its operations function to yield competitive advantage via all of the following except
  - a. customization of the product
  - b. set equipment utilization goals below the industry average
  - c. speed of delivery
  - d. constant innovation of new products
  - e. maintain a variety of product options
  
10. Which of the following is not an operations strategy?
  - a. response
  - b. low-cost leadership
  - c. differentiation



- d. technology
  - e. marketing
11. Which of the following **is not** a key way in which business organizations compete with one-another?
- a. production cost
  - b. quality
  - c. product duplication
  - d. flexibility
  - e. time to perform certain activities
12. A strategy is a(n)
- a. set of opportunities in the marketplace
  - b. broad statement of purpose
  - c. simulation used to test various product line options
  - d. plan for cost reduction
  - e. action plan to achieve the mission
13. Which of the following statements best characterizes delivery reliability?
- a. a company that always delivers on the same day of the week
  - b. a company that always delivers at the promised time
  - c. a company that delivers more frequently than its competitors
  - d. a company that delivers faster than its competitors
  - e. a company that has a computerized delivery scheduling system
14. Which of the following is an example of competing on the basis of differentiation?
- a. A firm manufactures its product with less raw material waste than its competitors.
  - b. A firm's products are introduced into the market faster than its competitors'.
  - c. A firm's distribution network routinely delivers its product on time.
  - d. A firm offers more reliable products than its competitors.
  - e. A firm advertises more than its competitors.
15. Which of the following statements best characterizes delivery speed?
- a. a company that uses airlines, not trucks, to move its goods
  - b. a company that delivers frequently
  - c. a company that delivers faster than its competitors
  - d. a company that always delivers on the promised due date
  - e. a company that has a computerized delivery scheduling system

### Multiple Choice Answers

1. c, 2. B, 3. C, 4. C, 5. C, 6. B, 7. c  
8. b, 9. B, 10. D, 11. C, 12. E, 13. B, 14. D, 15. c

**Q.1 What is production design?**

**Ans** Designing new products and getting them in market is the challenge facing manufacturers in industries as diverse as computer chips and potato chips. Profitability of firm or success depend upon product design. in production design 3 concept are important:

- 1 **Product design:** Concerned with form and function of a product. it refers to the arrangement of elements or parts that collectively form a product.
- 2 **Process design:** concerned with the overall sequence of operation required to achieve the design specification of the product.
- 3 **Production design:** concept of designing products from the point of view of profitability

**Q.2 What are important factors affecting production design?**

**Ans**

1. Customers' requirements
2. Production facilities
3. Raw-materials to be used
4. Cost to price ratio
5. Quality policy
6. Plant and machineries
7. Effect on existing products
8. Reputation of the company

**Q.3 What do you mean by standardization and simplification?**

**Ans** **Simplification is a process of product analysis through which unnecessary varieties and designs are eliminated. Only a limited number of grades, types and sizes of the product are retained.**

**Standardization**

Standardization is the second step after simplification towards interchangeable manufacturing. Having selected the varieties and grades of the products to be retained as much of its manufacturing details are standardized as possible.

Since manufacturing involves a large number of decisions from selection of raw material to the process used for finishing, standardization of some of these items reduce unnecessary repetition of work. Use of standard components reduces inventory costs, ensures interchangeability and makes future maintenance easier.

**Q.4 What do you mean by product development?**

**Ans** Product means any marketable thing with some utility in it, produced either by a labour or through series of automated processes.

Development is an act of making or achieving a continuous progress in something by someone. Progress transit from an earlier policy (traditional approach) to an advanced policy (modern approach).

Product development is a specialized activity. It is done to improve the existing product or to introduce a new product in the market. It is also done to improve the earlier features or techniques or systems.

Generally, it means a new-product development.

**Product development takes place, works or functions as under:**

Creation of an entirely new product or upgrading an existing product by exploring all possibilities and outcomes.

Innovation of a new or an existing product to deliver better and enhanced services to end-users.

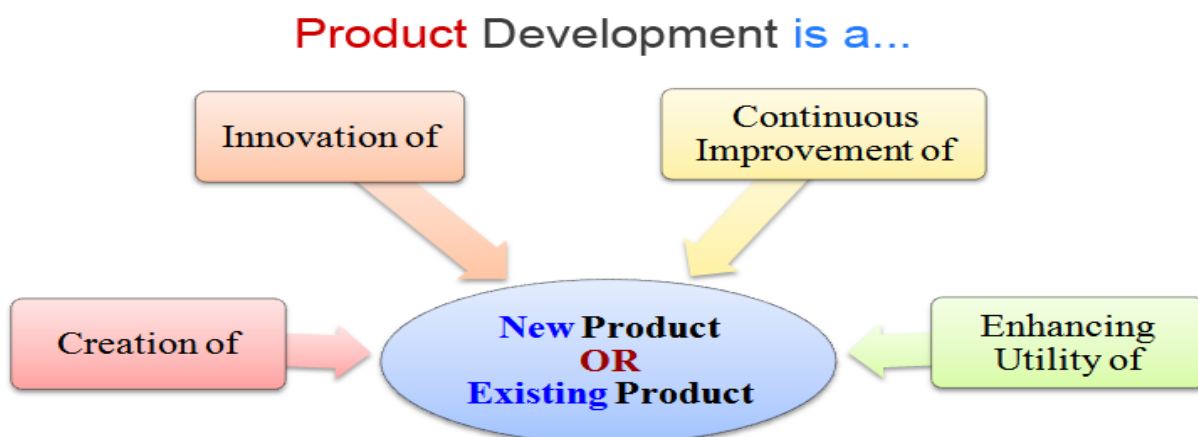
Continuous improvement of a new product or enhancing an existing product by giving preference to satisfy the demand of end-users.

Enhancing the utility of a new product or upgrading features of an existing product, for the personal and/or commercial use, to expand the defined goal (objective).

Following are some common examples of product development.

Packing wheat flour in retail bags for household consumption.

Packing cooking oil in retail pouches for household consumption.



**Q.5** Write the technique of product development?

**Ans** Idea Generation

Many methods are available for the idea generation stage such as brainstorming, Delphi and focus groups. The basic approach is to harness creativity in some form for the development of new ideas. While there is much to recommend for the more qualitative approaches, one of the drawbacks is the lack of quantitative validity to the ideas at this stage. That is, the ideas have not been shown to have popularity in the constituency that matters – the customers. We have found that the Smart Incentives approach can provide both creativity and validation in the same step. Respondents to a survey compete with each other to produce ideas thus introducing creativity into the process. The generated ideas are then evaluated by a peer group to provide the required market validation.

### **Feature Development**

Feature development is the process of identifying features that would be of interest to customers. Traditional methods such as Importance Scales can be used, but may not provide sufficient discrimination between features. Pairwise comparisons of features are a straightforward method for identifying feature importance. The task is simple, but can be tedious if a large list of features needs to be culled. More recently developed methods such as Max-Diff scaling can provide a better alternative. Max-Diff is similar to pairwise comparison, except that more than two features are evaluated at a time (3-5) and the most and least preferred alternative is chosen from each set.

### **Product Development**

In this stage, combinations of features are used to build or evaluate the product. The Configurator allows survey respondents to build their ideal product by selecting from a list of available features. Usually prices are provided at the feature level to ensure that respondents make realistic decisions. As respondents build their own ideal products, the most popular features and feature combinations rise to the surface, resulting in the automatic development of preference based market segments

### **Product Testing**

Conjoint analysis can be fruitfully used in this stage also to estimate the interest in various product combinations and especially in running market simulations. The latter ability is very important in cases where a strong competitive market exists and reasonable estimates of take rates and ability to choose the ideal combination for the market are requisites. Concept testing is much more limited than conjoint and is usually used when the product is almost set except for perhaps one or two questions, often relating to price.



## Unit III

# Production Planning and Control

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### Multiple Choice Questions

1. Which of the following is true regarding forward scheduling? Forward scheduling is the scheduling of
  - a. the end items or finished products
  - b. jobs as soon as the requirements are known
  - c. the start items or component parts
  - d. the final operation first beginning with the due date
  
2. Which of the following best describes how short-term schedules are prepared? Short-term schedules are prepared
  - a. directly from the aggregate plans
  - b. directly from the capacity plans
  - c. from inventory records for items that have been used up
  - d. from master schedules which are derived from aggregate plans
  
3. Which scheduling technique should be employed when due dates are important for a job order?
  - a. forward scheduling
  - b. loading
  - c. dispatching
  - d. backward scheduling
  - e. master scheduling
  
4. Which of the following is not an effectiveness criterion for scheduling?
  - a. maximizing flow time
  - b. minimizing completion time
  - c. minimizing WIP inventory
  - d. maximizing utilization
  
5. Forward scheduling



- a. begins with a delivery date, then each operation is offset one at a time, in reverse order
  - b. is well suited where the supplier is usually able to meet precise delivery dates
  - c. tends to minimize in-process inventory
  - d. assumes that procurement of material and operations start as soon as requirements are known
6. Which file contains important information regarding an item's flow through the shop?
- a. routing file
  - b. work center master file
  - c. control files
  - d. item master file
7. Which of these is not part of the planning files of a production planning and control system?
- a. a progress file
  - b. a work center master file
  - c. an item master file
  - d. a routing file
8. Which of the following files tracks work order progress?
- a. work center master files
  - b. routing files
  - c. item master files
  - d. control files
9. The production database containing information about each of the components that a firm produces or purchases is the
- a. routing file
  - b. work center master file
  - c. control file
  - d. item master file
10. The short-term scheduling activity called loading
- a. assigns dates to specific jobs or operations steps
  - b. specifies the order in which jobs should be done at each center
  - c. assigns jobs to work centers
  - d. assigns workers to jobs
11. The assignment method is
- a. a method to highlight overloads in a given work center

- b. a computerized method of determining appropriate tasks for an operation
  - c. a form of linear programming for optimally assigning tasks or jobs to resources
  - d. the same thing as the Gantt schedule chart
12. A scheduling technique used to achieve optimum, one-to-one matching of tasks and resources is
- a. the assignment method
  - b. Johnson's rule
  - c. the CDS Algorithm
  - d. the appointment method
13. Which of the following is an aid used to monitor jobs in process?
- a. a Gantt load chart
  - b. the assignment method
  - c. a Gantt schedule chart
  - d. Johnson's Rule
14. If an assignment problem consists of 6 workers and 7 projects,
- a. one worker will not get a project assignment
  - b. one worker will be assigned two projects
  - c. each worker will contribute work toward the seventh project
  - d. one project will not get a worker assigned
15. Orders are processed in the sequence in which they arrive if (the) \_\_\_\_\_ rule sequences the jobs.
- a. earliest due date
  - b. slack time remaining
  - c. first come, first serve
  - d. critical ratio

Chapter 15: Multiple Choice Answers

1. b, 2. D, 3. D, 4. A, 5. D, 6. A, 7. a  
8. d, 9. D, 10. C, 11. C, 12. A, 13. C, 14. D, 15. c

**Q.1 What is production planning control?**

**Ans** Production planning and control is one of the most important phases of production management, it is, as a matter of fact, the nervous system of a manufacturing organisation. In manufacturing organisation, it is essential that production is carried on in the best manner at the lowest cost, and the goods are of right quality and are produced at the proper time.

The concept of production planning and control can be better understood with reference to a few definitions:

According to Spriegel and Lansburgh. "Production planning and control is the process of planning production in advance of operations: establishing the exact route of individual item, part, or assembly; setting, starting, and finishing dates for each important item, assembly, or the finished product; and releasing the necessary order as well as initiating the required follow up to effectuate the smooth function of the enterprise."

**Q.2 Write the Objectives of Production Planning and Control?**

**Ans** Basically production control function involves the coordination and integration of the factors of production or production facilities to produce a product at an optimum efficiency. An elaborate definition of production control is given below: "Production control is the function of directing and regulating the orderly movement of goods through the entire production cycle from the requisitioning of raw materials to the delivery of finished products to meet the objectives of (i) customer service, (ii) minimum inventory investment and (iii) maximum production efficiency".

**Q.3 Write the Importance of Production Planning and Control?**

- Ans**
1. **Plant's Nervous Systems:** Production planning and control coordinates and regulates all plant operations just as our nervous system regulates and coordinates the breathing and muscular movement.
  2. **Intermittent Process Industry:** In intermittent process industry, under batch production, goods are made as per order. In such industries production planning and control become absolutely necessary to assure deliveries as planned and as demanded by customers.
  3. **Cost Control:** Good production planning and control help optimize the utilization of men, machinery, materials and money through effective planning, organizing, motivating and controlling multifarious operations in the plant. The net result is reflected in reducing all costs to the minimum.
  4. **Developing Economy:** In a developing economy, production planning and control is a boon for optimum use of scarce economic resources particularly capital, machinery and equipment. Proper planning and adequate control can accelerate industrial productivity and consequently helps develop economy.
  5. **Rationalization of Plant Operations:** Production planning and control helps rationalization of plant operations and helps optimum utilization of plant and machinery.

**Q.4 Explain the steps in Production Planning and Control?****Ans**

1. Planning
2. Routing
3. Scheduling
4. Dispatching
5. Expediting

**1. Planning**

Production plans determine what will be produced and where, at what type, by whom, and how. For detailed planning of operations, the relevant information may be obtained from several sources in the enterprise. Information about quantity and quality of products to be manufactured may be obtained from customers' orders and the sales budget, and information about production facilities may be obtained from the management and the engineering department.

**2. Routing**

The next important function of production planning and control is routing which involves the determination of the path (i.e. route) of movement of raw materials through various machines and operations in the factory. "Routing", "includes the planning of where and by whom work shall be done, the determination of the path that work shall follow, and the necessary sequence of operations".

The most efficient routing may have to be compromised with the availability of the machines at a particular time. In other words, "routing establishes the operations, their path and sequence, and the proper class of machines and personnel required for these operations."

**3. Scheduling**

Scheduling is planning the time element of production - i.e. prior determination of "when work is to be done". It consists of the starting and completion times for the various operations to be performed. In other words, scheduling function determines when an operation is to be performed, or when work is to be completed, the difference lies in the details of the scheduling procedure.

Schedules are of two types: Master schedule and Detailed schedule. Activities, if recorded on plant-wise basis, would be preparing master schedule, while mere detailed schedules are employed to plan the manufacturing and assembly operations required for each product.

**4. Dispatching**



Dispatching is the part of production control that translates the paper – work into actual production. It is the group that coordinates and translates planning into actual production. dispatching function proceeds in accordance with the details worked out under routing and scheduling functions.

**These orders contain the following information:**

The name of the product;  
 The name of the part to be produced, sub-assembly or final assembly;  
 The order number;  
 The quantity to be produced;  
 Descriptions and numbers of the operations required and their sequence,  
 The departments involved in each operation

**5. Expediting**

The aim is to ensure that what is intended and planned is being implemented. “Expediting consists in reporting production data and investigating variances from predetermined time schedules. The main idea behind expedition is to see that promise is backed up by performance”. It includes the following functions:

- (i) Check-up to ensure that all materials, tools, component parts, and accessories are available at all work centres in specified quantities for starting and carrying out manufacturing operations.
- (ii) Check-up on the status of work-in-progress and completed work at various work stations.
- (iii) Preparation of progress records and keeping the control boards up-to-date.
- (iv) Reporting to manufacturing management on all significant deviations so that corrective action may be taken.

**REQUIREMENTS OF AN EFFICIENT SYSTEM OF PRODUCTION PLANNING AND CONTROL**

The scheme of production planning and control system will require reliable information about productive capacities and production standards, a sound organizational structure, and trained and competent personnel, for it successful operations. These requirements are enumerated below:

1. Reliable information about productive capacity and production standards:
  - a. Complete knowledge of products be manufactured
  - b. Detailed information about the number and types of each machine and processing unit together with the complete data on power, speeds, and feeds of all machines.
  - c. Full information relating to production materials which are to be used.
  - d. Accurate knowledge of job analysis – particulars as to the work to be performed, and the type of skill required.



- e. Information relating to completion times of all previous operations and their actual cost.

#### **ADVANTAGES OF PRODUCTION PLANNING AND CONTROL**

1. **Efficient Service to Customers:** The greatest advantage of a proper system of production planning and control is that it renders prompt and economical service to customers.
2. **Lower Investment:** Proper production planning and control holds investment to the minimum necessary level by avoiding unnecessary stock inventories and machines.
3. **Reduced Costs:** Good production planning and control means minimum waste of materials and labour efforts, avoidance of idle machine time, and fewer production interruptions.
4. **Higher Morale of Workers:** Good production planning and control system avoids rush orders, maintaining an even flow of work, and providing congenial working conditions.
5. **Better Public Relations:** A well-planned and well-controlled production system not only reduces investment and costs for the enterprise, but also improves its image with the outside public.

Thus, a good and efficient system of production planning and control is beneficial to the manufacturer, workers, customers and the society.

## Unit IV

# Concept and Importance of Material Management

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**Q.1** What is material management?

**Ans** 'Materials management is concerned with planning, directing and controlling the kind, amount, location, movement and timing of the various flows of commodities (goods flow) used in and produced by a business enterprise.'

### IMPORTANCE OF MATERIALS MANAGEMENT

Materials management offers greater promise as a cost reducing device. Better and scientific management of material can not only bring about substantial cost savings but also result in improved production capacity of plants, savings of labour time, reduction in inventories, reduction in storage space, reduction in damage to materials, smooth flow of production, easier production control, reduced employee fatigue, and so on.

Material management system has four branches (i) procurement or purchasing, (ii) store keeping or inventory control, (iii) material handling, and (iv) transport of material from the producer to the consumer.

### Objectives of Inventory Management

The primary objectives of inventory management are:

- (i) To minimize the possibility of disruption in the production schedule of a firm for want of raw material, stock and spares.
- (ii) To keep down capital investment in inventories.

So it is essential to have necessary inventories. Excessive inventory is an idle resource of a concern. The concern should always avoid this situation. The investment in inventories should be just sufficient in the optimum level. The major dangers of excessive inventories are:

- (i) the unnecessary tie up of the firm's funds and loss of profit.
- (ii) excessive carrying cost, and
- (iii) the risk of liquidity.

**Q.2** Importance of inventory control in our country?

**Ans** 1) An efficient inventory control system minimizes the possibility of delay in production. there is no danger of closure of plant, unemployment, lower dividend and replacement of management - a dark picture resulting out

- of poor inventory control.
- 2) It helps a company to secure many economies. For instance, no duplication in ordering, better use of available materials by inter department transfers, economies due to bulk purchases such as low freight, higher discount, lower price, less clerical work etc.
  - 3) It is necessary for efficient accounting system, particularly for material aspect of cost accounting.
  - 4) It discourages dishonesty, e.g. stealing material from the plant.
  - 5) It expedites preparation of financial statements.
  - 6) Losses, damages, deterioration of materials can be minimized and enables careful material-handling.

**Q.3 Describe techniques of inventory control?**

**Ans** Inventory consists of stock of raw materials, work-in-progress, spare parts, consumables for production and finished goods for sale. Thus, inventory control includes control over raw materials, spare parts, consumables, partly finished goods, and finished goods. The following are the common techniques of inventory control:

1. Determination of various levels of materials
2. Economic Order Quantity
3. ABC Analysis
4. Perpetual Inventory System

**1. Determination of Various Levels of Materials**

The store-keeper plays an important role in deciding upon the various levels of materials. In order to ensure that the optimum quantity of materials is purchased and stocked neither less nor more, the store keeper applies scientific techniques of material management. Fixing of certain levels for each item of materials is one of the techniques.

These levels are not permanent but require revision according to the change in the factors which determine these levels. The following levels are generally fixed.

- (a) Re-order Level
- (b) Maximum Level
- (c) Minimum Level
- (d) Average Level
- (e) Danger Level

**(a) Re-order Level:**

Re-order level can be calculated by applying the following formula:

Re-order level = Minimum level + consumption during period required to get fresh delivery

**Another formula for Re-order level is:**

Re-order level = Maximum consumption x Maximum Re-order Period

**Illustration-1**

Calculate Re-order level for a material from the following information: Minimum level - 1,000 units Maximum level - 6,000 units Time required to get fresh delivery - 15 days. Daily consumption of the material - 100 units.

**Solution:**

Re-order level = Minimum Level + Consumption during the period required to get fresh delivery  
 = 1,000 units + (100 x 15) = 2,500 units.

**Illustration-2**

Calculate Re-order Level from the following particulars: Minimum consumption - 80 units' Maximum consumption - 120 units Re-order period - 10-12 days

**Solution:**

Re-order Level = Maximum consumption x maximum Re-order period = 120 units x 12 = 1,440 units

**(b) Maximum Level:**

The maximum level is that level of stock which can be held at any time. In other words, it is the level beyond which stock should not be maintained. The purpose is to avoid over-stocking and thereby using working capital in a proper way. This level is fixed after taking into account the following factors:

- (i) Rate of consumption
- (ii) Lead time
- (iii) Availability of capital
- (iv) Storage capacity
- (v) Cost of maintaining stores including insurance cost

Maximum level can be calculated by applying the following formula:

Maximum Level = Re-order level + Re-order Quantity - (Minimum consumption x Minimum Re-order period)

**(c) Minimum Level:**

This is the level below which the stock of an item should not fall. This is known as safety or buffer stock. An enterprise must maintain minimum quantity of stock so that the production is not hampered due to non-availability of materials. This level is fixed after considering the following factors:

- (i) Re-order level
- (ii) Lead time
- (iii) Rate of consumption

The formula for calculating minimum level is:



Minimum level = Re-order level - (Normal consumption × Normal Re-order period)

## 2. Economic Order Quantity (EOQ)

The economic order quantity, known as EOQ, represents the most favorable quantity to be ordered each time fresh orders are placed.

The quantity to be ordered is called economic order quantity because the purchase of this size of material is most economical. It is helpful to determine in advance as to how much should one buy when the stock level reaches the re-order level. If large quantities are purchased, the carrying costs would be large.

On the other hand, if small quantities are purchased at frequent intervals the ordering costs would be high. The economic order quantity is fixed at such a level as to minimise the cost of ordering and carrying the stock. It is the size of the order which produces the lowest cost of material ordered.

While determining the economic order quantity, the following three cost factors are taken into consideration:

- (i) The cost of the material
- (ii) The inventory carrying cost
- (iii) The ordering cost

Where, EOQ = Economic order quantity.

C = Annual consumption or usage of material in units.

O = Cost of placing one feeder including the cost of receiving the goods.

I = Cost of carrying one unit of inventory for one year.

### Assumptions in the Calculation of Economic Order Quantity:

The economic order quantity is based on the following assumptions:

Quantity of the item to be consumed during a particular period is known with certainty.

The pattern of consumption of material is constant and uniform throughout the period.

Cost per unit is constant and known and quantity discount is not involved.

Ordering cost and carrying cost are known and they are fixed per unit and will remain constant throughout the period.

### Illustration-4

From the following information, calculate the economic order quantity: Annual consumption - 10,000 units Cost of material per unit - Rs.10 Cost of placing and receiving one order - Rs.50 Annual carrying cost of one unit - 10% of inventory value.

#### Solution:

Where, C = Annual consumption of materials in units = 10,000 units

$O = \text{Cost of placing one order including the cost of receiving} = \text{Rs.}50$   
 $I = \text{Carrying cost per unit per annum} = 10\% \text{ of Rs.}10 = \text{Re.}1.$

Economic order quantity can also be calculated by using the tabular method. A comparison of total costs at different order sizes is made to determine the economic order quantity. The order size having the least total cost is accepted as economic order quantity. At this point, both carrying costs and ordering costs would be equal.

Taking the figures from the illustration 4, calculate the economic order quantity by using the tabular method.

**Solution:**

The above table reveals that the cost of placing order for materials and the carrying costs are exactly equal when the order quantity is 1,000 units. At this point, the total cost is also the least. Hence, the economic order quantity is 1,000 units and the number of orders per year would be 10.

**3. ABC Analysis**

This technique of inventory control is also known as Always Better Control technique. ABC analysis is an analytical method of control which aims at concentrating efforts on those areas where attention is needed most.

This is a principle of selective control. The emphasis of ABC analysis technique is that the management should concentrate its energy in controlling those items that mostly affect the organisational objects. Manufacturing concerns find it useful to group the materials into three classes on the basis of investment involved.

Materials having higher values but constitute small percentage of total items, are grouped in 'A' category. On the other hand, a large percentage of items of materials which represent a smaller percentage of the values, are grouped in 'C' category. Items of materials having moderate value and moderate size are grouped in 'B' category. On the basis of physical quantities and value of materials used, the following table illustrates the above classification:

After the items of materials are classified into A, B and C category, control can be exercised in a selective manner as follows:

- (i) Greater care and strict control should be exercised on the items of category 'A' as any loss or breakage or wastage of any item of this category may prove to be very costly. Economic order quantity and re-order level should be carefully fixed for such category of items.
- (ii) Moderate and relaxed control is required for the items of category 'B'.
- (iii) There is not much need for exercising control over the items of category 'C'. Periodic or annual verification is required for this category of materials.

**Q 2. Explain make or buy decision?**

**Ans** Make or buy decision is always a valid concept in business. No organization should attempt to make something by their own, when they stand the opportunity to buy the same for much less price.

When you are supposed to make a make-or-buy decision, there are four numbers you need to be aware of. Your decision will be based on the values of these four numbers.

The volume

The fixed cost of making

Per-unit direct cost when making

Per-unit cost when buying

Now, there are two formulas that use the above numbers. They are 'Cost to Buy' and 'Cost to Make'. The higher value loses and the decision maker can go ahead with the less costly solution.

Cost to Buy (CTB) = Volume x Per-unit cost when buying

Cost to Make (CTM) = Fixed costs + (Per-unit direct cost x volume)

**Reasons for Making:**

There are number of reasons a company would consider when it comes to making in-house. Following are a few:

Cost concerns

Desire to expand the manufacturing focus

Need of direct control over the product

Intellectual property concerns

Quality control concerns

Supplier unreliability

Lack of competent suppliers

Volume too small to get a supplier attracted

Reduction of logistic costs (shipping etc.)

To maintain a backup source

Political and environment reasons

Organizational pride

**Reasons for Buying:**

Following are some of the reasons companies may consider when it comes to buying from a supplier:

Lack of technical experience

Supplier's expertise on the technical areas and the domain

Cost considerations

Need of small volume

Insufficient capacity to produce in-house

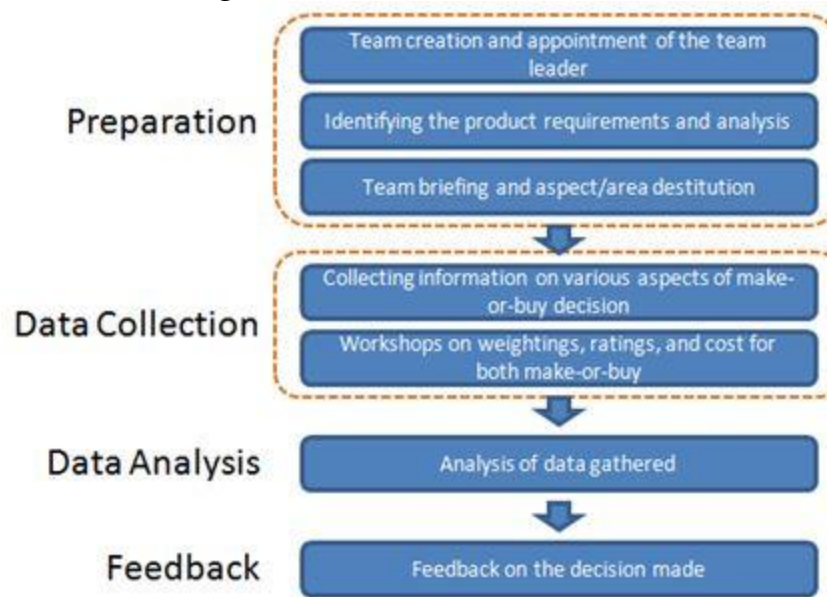
Brand preferences

## Strategic partnerships

### The Process:

The make or buy decision can be in many scales. If the decision is small in nature and has less impact on the business, then even one person can make the decision. The person can consider the pros and cons between making and buying and finally arrive at a decision.

When it comes to larger and high impact decisions, usually organizations follow a standard method to arrive at a decision. This method can be divided into four main stages as below.



#### 1. Preparation:

Team creation and appointment of the team leader  
 Identifying the product requirements and analysis  
 Team briefing and aspect/area destitution

#### 2. Data Collection:

Collecting information on various aspects of make-or-buy decision  
 Workshops on weightings, ratings, and cost for both make-or-buy

#### 3. Data Analysis:

Analysis of data gathered

#### 4. Feedback:

Feedback on the decision made

By following the above structured process, the organization can make an informed decision on make-or-buy. Although this is a standard process for



making the make-or-buy decision, the organizations can have their own varieties.

### Conclusion:

Make-or-buy decision is one of the key techniques for management practice. Due to the global outsourcing, make-or-buy decision making has become popular and frequent.

Since the manufacturing and services industries have been diversified across the globe, there are a number of suppliers offering products and services for a fraction of the original price. This has enhanced the global product and service markets by giving the consumer the eventual advantage.

If you make a make-or-buy decision that can create a high impact, always use a process for doing that. When such a process is followed, the activities are transparent and the decisions are made for the best interest of the company.

### Illustration No. 1

Adarsh & Co. has been purchasing a separate part from an outside source @ Rs. 11 per unit. Adarsh's son, after completion of his MBA, has come up with a proposal to improve profitability.

He has put up a proposal that the spare part be produced in the factory itself, utilizing the available free space in the factory shed. For this purpose a machine costing Rs. 80,000, with an annual capacity of 20,000 units and a life of 10 years, will be required. A foreman with a monthly salary of Rs. 600 will have to be engaged. Materials required will be Rs. 3.00 per unit and wages Rs. 2.00 per unit. Variable overheads are 150% of direct labour. The firm can easily raise funds @ 10% p.a. There is a guaranteed requirement for the part, presently purchased, for a period of 12 years.

Advise the firm for purchase or making, based on the son's advice.

### Solution:

Increase in Fixed Costs Rs.

Depreciation of Machine 8,000+

+Salary of Foreman 7,200

+Interest on Capital 8,000

= 23,200

Contribution per unit Rs.

Purchase Price 11

Less: Variable Cost: Rs. Material 3.00

Wages 2.00

Variable Overheads 3.00

= 8.00

Contribution per unit 3

Minimum Volume =  $23,200 / 3 = 7,733$  units.

In order to accept the proposal, it is essential that the required volume should be at least 7,733 units. In this case, the expected volume is 8,000 units. The firm has a guaranteed demand for a period of 12 years, which is more than the life of the fixed asset, which is to be bought. So, firm should go for manufacturing.

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## Unit V

# Warehousing and Store Management

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### Multiple Choice Questions

1. Which of the following is a function of inventory?
  - a. to decouple or separate parts of the production process
  - b. to provide a stock of goods that will provide a selection for customers
  - c. to take advantage of quantity discounts
  - d. to hedge against inflation
  - e. all of the above are functions of inventory
2. Which of the following would not generally be a motive for a firm to hold inventories?
  - a. to decouple or separate parts of the production process
  - b. to provide a stock of goods that will provide a selection for customers
  - c. to take advantage of quantity discounts
  - d. to minimize holding costs
3. All of the following statements about ABC analysis are true except
  - a. inventory may be categorized by measures other than dollar volume
  - b. it categorizes on-hand inventory into three groups based on annual dollar volume
  - c. it is an application of the Pareto principle
  - d. it states that all items require the same degree of control
  - e. it states that there are the critical few and the trivial many inventory items
4. ABC analysis is based upon the principle that
  - a. all items in inventory must be monitored very closely
  - b. there are usually a few critical items, and many items which are less critical
  - c. an item is critical if its usage is high
  - d. the safety stock in terms of volume should be higher for A items than for C items
5. Which of the following statements about ABC analysis is false?

- a. ABC analysis is based on the presumption that controlling the few most important items produces the vast majority of inventory savings.
  - b. In ABC analysis, "A" Items are tightly controlled, have accurate records, and receive regular review by major decision makers.
  - c. In ABC analysis, "C" Items have minimal records, periodic review, and simple controls.
  - d. ABC analysis is based on the presumption that all items must be tightly controlled to produce important cost savings.
6. ABC analysis divides on-hand inventory into three classes, generally based upon
- a. item quality
  - b. unit price
  - c. the number of units on hand
  - d. annual demand
  - e. annual dollar volume
7. Cycle counting
- a. is a process by which inventory records are verified once a year
  - b. provides a measure of inventory accuracy
  - c. provides a measure of inventory turnover
  - d. assumes that all inventory records must be verified with the same frequency
8. Among the advantages of cycle counting is that it
- a. does not need to be performed for less expensive items
  - b. does not require the detailed inventory records necessary when annual physical inventory is used
  - c. does not require highly trained people
  - d. allows more rapid identification of errors and consequent remedial action than is possible with annual physical inventory
9. The two most basic inventory questions answered by the typical inventory model are
- a. timing and cost of orders
  - b. quantity and cost of orders
  - c. timing and quantity of orders
  - d. order quantity and service level
10. A certain type of computer costs \$1,000, and the annual holding cost is 25%. Annual demand is 10,000 units, and the order cost is \$150 per order. What is the approximate economic order quantity?



- a. 70
  - b. 110
  - c. 250
  - d. 12,000
11. Most inventory models attempt to minimize
- a. the likelihood of a stockout
  - b. the number of items ordered
  - c. total inventory based costs
  - d. the number of orders placed
12. In the basic EOQ model, if the cost of placing an order doubles, and all other values remain constant, the EOQ will
- a. increase by about 41%
  - b. increase by 100%
  - c. increase by 200%
  - d. either increase or decrease
13. In the basic EOQ model, if  $D = 6,000$  per year,  $S = \$100$ ,  $H = \$5$  per unit per month, the Economic Order Quantity is approximately
- a. 527
  - b. 100
  - c. 490
  - d. 142
14. Which of the following statements about the basic EOQ model is true?
- a. If the ordering cost were to double, the EOQ would rise.
  - b. If annual demand were to double, the EOQ would increase.
  - c. If the carrying cost were to increase, the EOQ would fall.
  - d. All of the above statements are true.
15. Which of the following statements about the basic EOQ model is false?
- a. If the setup cost were to decrease, the EOQ would fall.
  - b. If annual demand were to increase, the EOQ would increase.
  - c. If the ordering cost were to increase, the EOQ would rise.
  - d. If annual demand were to double, the EOQ would also double.

### Multiple Choice Answers

1. e, 2. D, 3. D, 4. B, 5. D, 6. E, 7. B, 8. D, 9. C, 10. b  
11. c, 12. A, 13. D, 14. D, 15. d

### Q.1 What is store management?

**Ans** Stores play a vital role in the operations of a company. It is in direct touch with

the user departments in its day-to-day activities. The most important purpose served by the stores is to provide uninterrupted service to the manufacturing divisions. Further, stores are often equated directed with money, as money is locked up in the stored.

The functions of stores can be classified as follows:

- (1) To receive raw materials, components, tools equipments and other items and account for them.
- (2) To provide adequate and proper storage and preservation to the various items.

**Q.2 Explain centralized store?**

**Ans Meaning of centralized stores:**

A centralized store is that store which receives materials for and issues them to all departments, divisions and production floors of the company. Such a store is only one in the company which receives materials for and issues to all who need them. The materials required for all the departments and branches are stored and issued by only one store.

*Advantages Of Centralized Stores*

*The followings are the main advantages of centralized stores.*

1. A better supervision of store is possible because the store is located under a single supervision.
2. A better layout of store and its control are possible.
3. Less space is occupied.
4. Investment in stock is minimized.
5. It is economical for storing materials.
6. Safety of materials is possible according to the nature of materials.
7. Trained and specialized persons can be appointed.
8. Wastage of materials can be minimized.

### ***Disadvantages Of Centralized Store***

*The followings are the main disadvantages of centralized stores.*

1. Delay in sending materials to the departments and branches.
2. Increase in material handling cost.
3. Greater risk of loss by fire.
4. Not suitable for a large company

### **Q.3 Explain decentralized store?**

**Ans** A decentralized store is that type of store which receives materials for and issues them to only one department and not to the whole company. The decentralized store may be in many numbers in the company, as each department has its own such store. Purchasing and handling of materials are undertaken by each and every department separately. If the volume of material activities is large, this type of store is suitable because each and every branch has their own store for facilitating smooth operations of their production activities.

### **Advantages Of Decentralized Stores**

1. Controlling a and storing function can be accomplished easily.
2. Delay in material handling will be eliminated.
3. Minimizes the chances of loss by fire.
4. No need of internal transportation costs.
5. Specific needs of individual departments can be easily fulfilled.
6. Saving in material handling cost.

### **Disadvantages Of Decentralized Stores**

1. Higher cost of supervision.
2. More space is required for individual departments.
3. Higher amount of investment is required.
4. More time for stock taking and taking.
5. Higher cost of staff and stationary.
6. Improved technique is less possible for controlling of materials

### **Q.4 Explain various methods of store accounting?**

**Ans** A Stores is a virtual money that can be encashed. However, this money needs to be properly counted or accounted for. Stock accounting is thus a systematic way of assessing the money value of the items lying in stores as also the items under transaction through stores.

Transactions , in terms of receipts and issues are a regular feature in any stores and therefore Stock accounting process , in most of the cases, concentrates only on the stock in hand, lying in Stores.

The most popular methods of accounting are, FIFO i.e First In First Out and LIFO, Last In First Out.

**FIFO** and **LIFO** Methods as accounting techniques are used in managing inventory (Stock lying in Stores for future use) and financial matters involving the amount of money a company has tied up within inventory of produced goods, raw materials, parts, components, or feed stocks. These methods are used to manage assumptions of cost flows related to inventory, stock repurchases (if purchased at different prices), and various other accounting purposes.

FIFO standing for first-in, first-out, implies that the oldest inventory items are recorded as sold first but do not necessarily mean that the exact oldest physical object has been tracked and sold.

LIFO stands for last-in, first-out, meaning that the most recently produced items are recorded as sold first. Since the 1970s, some U.S. companies shifted towards the use of LIFO, which reduces their income taxes in times of inflation, but with International Financial Reporting Standards banning the use of LIFO, more companies have gone back to FIFO

### **First In First Out (FIFO)**

This method assumes that inventory purchased first is sold first. Therefore, inventory cost under FIFO method will be the cost of latest purchases. Consider the following example:

#### **Example**

Bike LTD purchased 10 bikes during January and sold 6 bikes, details of which are as follows:



January 1 Purchased 5 bikes @ \$50 each

January 5 Sold 2 bikes

January 10 Sold 1 bike

January 15 Purchased 5 bikes @ 70 each

January 25 Sold 3 bikes

The value of 4 bikes held as inventory at the end of January may be calculated as follows:

The sales made on January 5 and 10 were clearly made from purchases on 1st January. Of the sales made on January 25, it will be assumed that 2 bikes relate to purchases on January 1 whereas the remaining one bike has been issued from the purchases on 15th January. Therefore, the value of inventory under FIFO is as follows:

Date	Purchase			Issues			Inventory		
	Units	\$/Units	\$ Total	Units	\$/Units	\$ Total	Units	\$/Units	\$ Total
Jan 1	5	50	250				5	50	250
Jan 5				2	50	100	3	50	150
Jan 10				1	50	50	2	50	100
Jan 15	5	70	350				5	70	350
Jan 15							7		450
Jan 25				2	50	100			
				1	70	70	4	70	280

3. The Weighted Average Cost Method

This method assumes that **we sell all our inventories simultaneously.**

The weighted average cost method is most commonly used in manufacturing businesses where inventories are piled or mixed together and cannot be differentiated, such as chemicals, oils, etc. Chemicals bought two months ago cannot be differentiated from those bought yesterday, as they are all mixed together.

So we work out an average cost for all chemicals that we have in our possession. The method specifically involves working out an average cost per unit at each point in time after a purchase

**Q.5 Write comparison between LIFO AND FIFO?**

**Ans** Comparison chart

	FIFO	LIFO
<b>Stands for</b>	First in, first out	Last in, first out
<b>Unsold inventory</b>	Unsold inventory is comprised of goods acquired most recently.	Unsold inventory is comprised of the earliest acquired goods.
<b>Effect of Inflation</b>	If costs are increasing, the items acquired first were cheaper. This decreases the cost of goods sold (COGS) under FIFO and increases profit. The income tax is larger. Value of unsold inventory is also higher.	If costs are increasing, then recently acquired items are more expensive. This increases the cost of goods sold (COGS) under LIFO and decreases the net profit. The income tax is smaller. Value of unsold inventory is lower.
<b>Effect of Deflation</b>	Converse to the inflation scenario, accounting profit (and therefore tax) is lower using FIFO in a deflationary period. Value of unsold inventory, is lower.	Using LIFO for a deflationary period results in both accounting profit and value of unsold inventory being higher.

	FIFO	LIFO
<b>Record keeping</b>	Since oldest items are sold first, the number of records to be maintained decreases.	Since newest items are sold first, the oldest items may remain in the inventory for many years. This increases the number of records to be maintained.
<b>Fluctuations</b>	Only the newest items remain in the inventory and the cost is more recent. Hence, there is no unusual increase or decrease in cost of goods sold.	Goods from number of years ago may remain in the inventory. Selling them may result in reporting unusual increase or decrease in cost of goods.

**Q.6 Give brief about stock verification?**

**Ans** It is the process of physically counting, measuring or weighing the entire range of items in the stores and recording the results in a systematic manner. The purposes served by stock verification are as follows:

- To reconcile the stock records and documents for their accuracy and usefulness.
- To identify areas which require more disciplined document control
- To back up the balance sheet stock figures, and
- To minimize pilferage and fraudulent practices.

Stock verification is usually carried out by the materials audit department, reporting to either the materials manager or the internal audit. One person is usually given the exclusive responsibility with adequate facilities and authority. Stock verification is usually carried out by the materials audit department, reporting to either the materials manager or the internal audit. One person is usually given the exclusive responsibility with adequate facilities and authority. Physical verification can be carried out periodically or on continuous basis.

**Periodic Verification**

Under this system, the entire cross-section is verified at the end of one period, which is usually the accounting period. In big organizations this is not achieved in a day and usually several days are taken to complete this task. As no

transactions can take place during the verification, this could pose some problems. Physical verification requires careful planning and execution. The various steps involved are detailed below:

## Important Exam Questions

1. Define Production Management
2. Discuss the system concept of production management
3. Discuss different Models of production systems with suitable examples
4. List out the basic functions of production management
5. Define operation management, state the historical development of OM
6. Explain different Factors influencing plant location-
7. What is Plant layout and what are its Types of layout?
8. What is meant by productivity?
9. An automobile company has extra capacity that can be used to produce gears that the company has been buying for Rs.300 each. If the company makes the gears, it will incur materials cost of Rs.90 per unit, labour cost of Rs.120 per unit and variable overhead cost of Rs.30 per unit. The annual fixed cost associated with the unused capacity is Rs.2, 40,000. Demand over the next year is estimated at 4000 units. Would it be profitable for the company to make the gears.
10. What is the required systems capacity ?
11. ABC Corporation has developed a forecast for a group of items that has the following seasonal demand pattern.
12.

Quarter Demand	Cumulative Demand
1	270
2	490
3	960
4	1630
5	2080
6	2350
7	2550
8	2920

  1. Suppose that the firm estimates that it costs Rs.150 per unit to increase the production rate, Rs.200 to decrease the production rate, Rs.50 per quarter to carry the items on inventory, and an incremental cost of Rs.100 per unit if subcontracted.
  2. Compare the cost incurred if pure strategies are used.
13. What is service level?
14. What is meant by Safety stock?



15. What do you mean by Re- Order point?
16. List out and explain different types of model of inventory system
17. Derive the EOQ formula for the purchase model without shortages
18. Explain the basic principles and Bottlenecks in implementing JIT in Indian Industry
19. Briefly explain the steps which are followed in a KANBAN system
20. List out and explain the control systems in inventory.
21. Beta industry estimates that it will sell 24000 units of its product for the forthcoming year. the ordering cost is rs.150 per order and the carrying cost per unit per year is 20% of the purchase price per unit. the purchase price per unit is rs.50  
Find
- EOQ
  - No. of orders per year
  - Time between successive orders
  - Total annual cost
22. The demand for an item is 18000 per year. Its production rate is 3000 per month. the carrying cost is Re.0.15/unit/month and the set-up cost is Rs.500 per set-up. the shortage cost is Rs20.00 per unit per year. find the various parameters of the inventory system.
23. The annual demand for an item is 48000 units per year. The average lead time is 4 weeks. the standard deviation of a demand during the average lead time is 75 units / week. The cost of ordering is Rs.400 per order. The cost of purchase of the product per unit is Rs.10. the cost of carrying per unit per year is 15% of the purchase price. The maximum delay in lead time is 2 weeks and the probability of this delay is 0.25. assume a service level of 0.95 . If Q system is followed, find the reorder level.
24. If P system is followed, find the maximum inventory
25. 14. A job consists of three work elements and all are performed by the same operator. An analyst conducted work sampling to determine the standard time for the job. the duration of the study is two shifts each with 400 minutes of effective time. The details of the observations are summarized in the following table. The total number of acceptable units produced during the study period is 150 units. Determine the standard time by assuming the allowance of 10%

26. Work element	27. Frequency of 28. performance	29. Performance 30. rating
31. 1	32. 70	33. 80%
34. 2	35. 80	36. 120%
37. 3	38. 50	39. 110%

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