



PRODUCTION MANAGEMENT

INTRODUCTION

- It is defined as **planning , implementation and control** of industrial production process to ensure smooth and efficient operation. production management techniques are used in both **manufacturing and service industries.**
- Simply, production management is a process of **planning, organizing, directing and controlling** the activities of the production function.

Production Management

Operation Management

1. It's concerned with manufacturing

1. It is concerned with services

2. Out put is tangible

2. Output is intangible

3. Job use less labour and more equipment

3. Job use more labour and less equipment

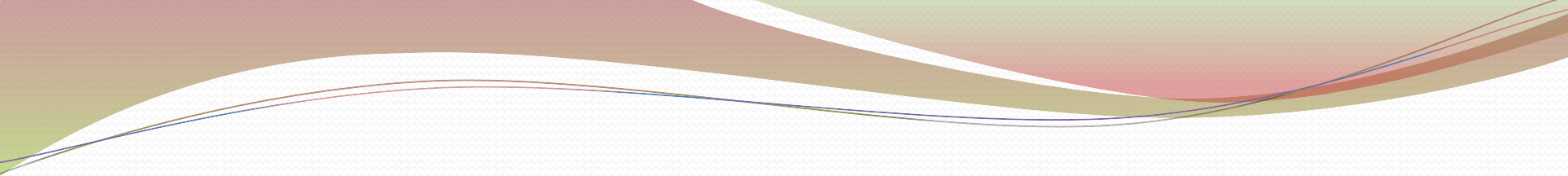
4. There is no customer participation

4. Frequent customer participation

HISTORY

- For over **2** centuries operations and production management has been recognised as an important factor in a **country's economic growth**.
- The traditional **view** of manufacturing management began in **18th** century when **Adam Smith** recognised the **economic benefits of specialisation of labour**. He recommended breaking of jobs down into **subtasks** and recognises workers to **specialised tasks** in which they would become highly skilled and efficient.

- In the early **20th** century, **F.W. Taylor** developed **scientific management**.
- From then **till 1930**, many techniques were developed prevailing the traditional view.
- **Production management** becomes the acceptable term from **1930s to 1950s**. As F.W. Taylor's works become more widely known, **managers developed** techniques that focussed on **economic efficiency** in manufacturing.

- 
- **Workers** were studied in great detail to eliminate wasteful efforts and achieve greater efficiency. At the same time, psychologists, socialists and other social scientists began to **study people and human behaviour in the working environment.**
 - In addition, economists, mathematicians, and computer socialists contributed more sophisticated analytical **newer approaches.**

- With the **1970S** emerges **2** distinct changes in our views.
- The most obvious of these reflected in the new name **operations management** was a shift in the **service & manufacturing** sectors of the economy.
- As service sector became more prominent, the change from **'production'** to **'operations'** emphasized the broadening of our field to service organizations.
- The second, more suitable change was the beginning of an emphasis **on synthesis**, rather than **just analysis**, in management practices.

CONCEPT OF PRODUCTION

- 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**. At each stage of processing, there will be value addition.
- Edwood Buffa defines production as ‘*a process by which goods and services are created*’.

Example For Production

- **Manufacturing custom-made products**

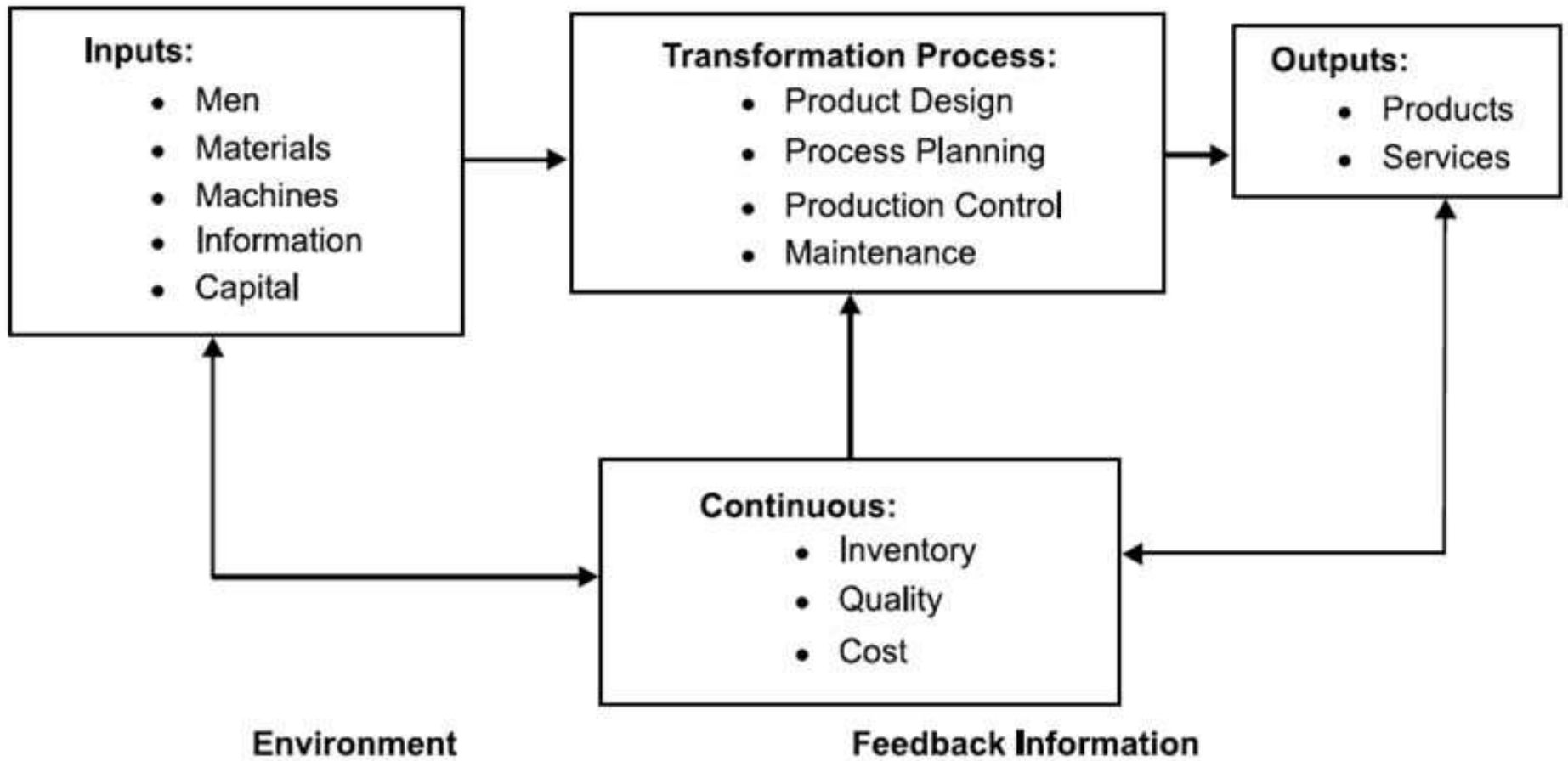
- Like-**
1. Boilers with a specific capacity
 2. Constructing flats
 3. Structural fabrication works for selected customers, etc.

- **manufacturing standardized products**

- Like-**
1. Car
 2. Bus
 3. Motor cycle
 4. Television, etc.

PRODUCTION SYSTEM

- The production system of an organization is that part, which **produces products** of an organization.
- It is that activity whereby **Resources**, flowing within a defined system, are **combined & transformed** in a controlled manner **to add value** in accordance with **the policies communicated by management**.



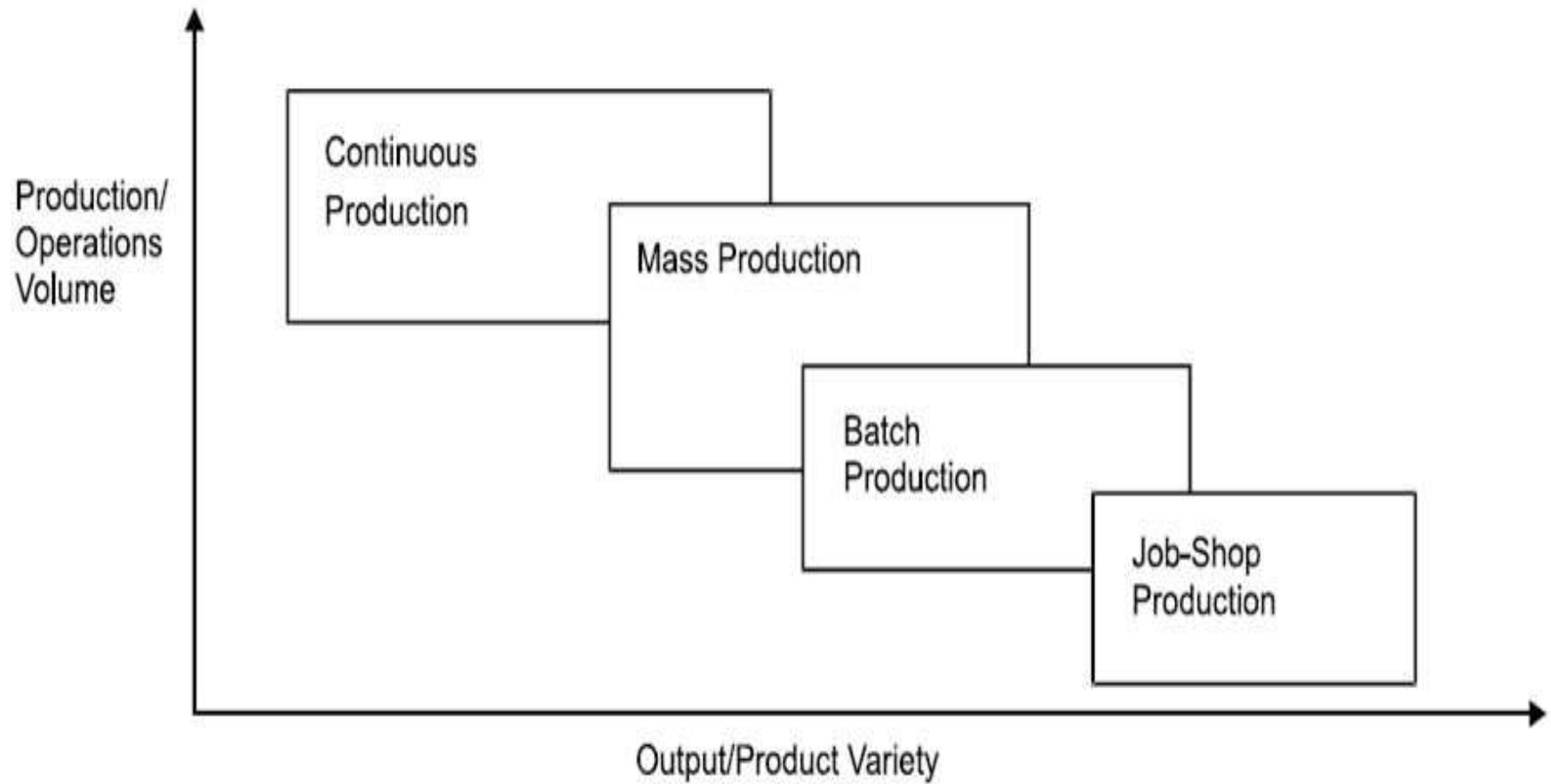
Schematic production system

Characteristics Of Production System

- 1. Production is an **organized activity**, so every production system has an **objective**.
- 2. The system **transforms** the various Inputs to useful Outputs.
- 3. It doesn't operate in **Isolation** from the other organization system.
- 4. There exists a **feedback** about the activities, which is essential **to control and improve system performance**.

CLASSIFICATION

- **Production systems can be classified as:**
 1. Job Shop Production
 2. Batch Production
 3. Mass Production
 4. Continuous Production



Classification of production systems

JOB SHOP PRODUCTION

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

Characteristics

- 1. **High variety** of products and low volume.
- 2. Use of **general purpose machines** and facilities.
- 3. **Highly skilled** operators who can take up each job as a challenge because of uniqueness.
- 4. **Large inventory** of materials, tools, parts.
- 5. **Detailed planning** is essential for sequencing the requirements of each product, capacities for each work centre and order priorities.

ADVANTAGES

- 1. Because of general purpose machines and facilities **variety of products** can be produced.
- 2. Operators will **become more skilled** & competent, as each job gives them learning opportunities.
- 3. **Full potential of operators** can be utilised.
- 4. Opportunity exists for **creative methods & Innovative ideas**.

LIMITATIONS

- 1. **Higher cost** due to frequent set up changes.
- 2. **Higher level of inventory** at all levels and hence higher inventory cost.
- 3. Production planning is **complicated**.
- 4. **Larger space** requirements.

BATCH PRODUCTION

- Batch production is defined *“as a form of manufacturing in which the job passes through the functional departments in lots or batches and each lot may have a different routing.”*
- It is characterised by the manufacture of **limited number of products** produced at regular intervals and **stocked awaiting sales**.

CHARACTERISTICS

- 1. There is **shorter production runs**.
- 2. Plant and machinery are **flexible**.
- 3. Manufacturing lead **time & cost are lower** as compared to job shop production.

ADVANTAGES

- 1. **Better utilisation** of plant and machinery.
- 2. Promotes **functional specialisation**.
- 3. **Cost per unit is lower** as compared to job shop production.
- 4. **Lower investment** in plant and machinery.
- 5. **Flexibility** to accommodate and process **number of products**.
- 6. **Job satisfaction** exists for operators.

LIMITATIONS

- 1. **Material handling is complex** because of irregular and longer flows.
- 2. **Production planning and control is complex.**
- 3. Work in process **inventory is higher** compared to continuous production.
- 4. **Higher set up costs** due to frequent changes in set up.

MASS PRODUCTION

- *‘ Manufacture of discrete parts or assemblies using a continuous process are called mass production ’.*
- This production system is justified by **very large volume of production.**
- The machines are arranged in a **line or product layout.** Product and process standardisation exists and all outputs follow the **same path.**

CHARACTERISTICS

1. Standardisation of product and process **sequence**.
2. **Large** volume of products.
3. Shorter cycle **time** of production.
4. Lower in process **inventory**.
5. Perfectly balanced **production lines**.
6. Production planning and control is **easy**.
7. Material handling can be completely **automatic**.

ADVANTAGES

- 1. **Higher rate** of production with reduced cycle time.
- 2. Higher capacity utilisation due to **line balancing**.
- 3. **Less skilled** operators are required.
- 4. **Low process** inventory.
- 5. **Manufacturing cost** per unit is low.

LIMITATIONS

- 1. **Breakdown** of one machine will stop an entire production line.
- 2. **Line layout needs** major change with the changes in the product design.
- 3. **High investment** in production facilities.
- 4. **The cycle time** is determined by the slowest operation.

CONTINUOUS PRODUCTION

- Production facilities are arranged as per the sequence of production operations **from the first operations to the finished product.**
- The items are made to flow through the sequence of operations through material handling devices such as **conveyors, transfer devices, etc.**

CHARACTERISTICS

- 1. **Dedicated** plant and equipment with **zero flexibility**.
- 2. Material handling is **fully automated**.
- 3. Process follows a **predetermined** sequence of operations.
- 4. Component materials can't be readily **Identified** with final product.
- 5. Planning and scheduling is a **routine action**.

ADVANTAGES

- 1. **Standardisation** of product and process sequence.
- 2. **Higher rate** of production with reduced cycle time.
- 3. Higher capacity utilisation due to **line balancing**.
- 4. Manpower is not required for material handling as it is **completely automatic**.
- 5. Person with **limited skills** can be used on the production line.
- 6. **Unit cost is lower** due to high volume of production.

LIMITATIONS

- 1. **Process number of products** doesn't exist.
- 2. **Very high investment** for setting flow lines.
- 3. **Product differentiation** is limited.

OBJECTIVES OF PRODUCTION MANAGEMENT

- The objective of the production management is *'to produce goods services of right quality and quantity at the right time and right manufacturing cost'*.
- **RIGHT QUALITY:**

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

- **2. RIGHT QUANTITY**

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

- **3. RIGHT TIME**

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



- **4. RIGHT MANUFACTURING COST**

Manufacturing costs are established before the product is actually manufactured.

- All attempts should be made to produce the products at **pre-established cost**, so as to reduce the variation between **actual and the standard (pre-established) cost**.

DIFFERENCE BETWEEN PRODUCTION & PRODUCTIVITY

- Production is **number of goods made**.
- Productivity is **the number of goods produced divided by employees**.

$$\text{Productivity} = \frac{\text{Units produced}}{\text{Input used}}$$

- **Example:**

Business A produced 40 chairs with 5 employees

- Production: **40 chairs**
- Productivity: **40chairs/5 employees= 8**

SCOPE OF PRODUCTION MANAGEMENT

- Production management concern with the **conversion of inputs into outputs**, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability.
- It distinguishes itself from other functions such as personnel, marketing, finance, etc., by its primary concern for **'conversion by using physical resources.'**

- **Following are the activities which are listed under production management functions:**
- 1. Location of facilities
- 2. Plant layouts
- 3. Product design
- 4. Process design
- 5. Production and planning control
- 6. Quality control
- 7. Materials management
- 8. Maintenance management.

LOCATION OF FACILITIES

- Location of facilities for operations is a **long-term capacity decision** which involves a **long term commitment** about the geographically static factors that affect a business organization. It is an important strategic level decision-making for an organization.
- **The selection of location is a key-decision** as large investment is made in building plant and machinery.

- An improper location of plant may lead to waste of all the investments made in plant and machinery equipments.
- Hence, location of plant should be based on the company's expansion plan and policy, diversification plan for the products, changing sources of raw materials and many other factors.
- The purpose of the location study is to find the optimal location that will results in the greatest advantage to the organization.

PLANT LAYOUT

- Plant layout refers to the physical arrangement of facilities. It is the configuration of departments, work centres and equipment in the conversion process.
- The overall objective of the plant layout is to design a physical arrangement that meets the required output quality and quantity most economically.

OBJECTIVES OF PLANT LAYOUT

1. Integrate the production centres
2. Reduce material handling
3. Effective utilization of available space
4. Worker convenience and job satisfaction
5. Flexibility
6. Quick disposal of work
7. Smooth flow of operation
8. Avoids industrial accidents

TYPES OF PLANT LAYOUT

1. Process layout or functional layout:

- Similar machine grouped together
- Used in job and batch production and non-repetitive type of work.
- This type of layout makes production planning and control more difficult.
- For example, all lathes grouped together in turning section.

2. Product layout or line layout:

- Machines and auxiliary services arranged in line according to sequence of operation to be performed on the work.
- Raw material enters in line at one end, operations are carried out in succession
- In a smooth flow and the finished product is delivered at the other end of the line
- Used in mass production and repetitive work.

3. Mixed Or Combined Layout:

- Combination of process and line layout is commonly used in industry.
- Combined layout incorporates the benefits of process and product layout.

4. Static Or Fixed Position Layout:

- It is adopted when work piece is very big or too heavy to move from one position to other and is consequently fixed in one place.
- Used in custom ordered type production
- e.g. in construction work , ship building , air craft, pressure vessel, locomotives , etc.

IMPORTANCE OF PLANT LAYOUT

1. Determine the arrangement of facilities and services in the plant
2. Outlines the relationship between production centres and service departments.
3. Outlines the nature of the flow in the plant and affects the distance travelled by materials and personnel.
4. Determines the type of handling systems and machine utilization.
5. Specifies the location , accessibility , and size of stores.
6. Affects the amount of work in process and work awaiting further processing.

PRODUCT DESIGN

- Product design deals with conversion of ideas into reality. Every business organization have to design, develop and introduce new products as a survival and growth strategy.
- Developing the new products and launching them in the market is the biggest challenge faced by the organizations.
- The entire process of need identification to physical manufactures of product involves three functions: marketing, product development, manufacturing.

- 
- Product development translates the needs of customers given by marketing into technical specifications and designing the various features into the product to these specifications.
 - Manufacturing has the responsibility of selecting the processes by which the product can be manufactured.
 - Product design and development provides link between marketing, customer needs and expectations and the activities required to manufacture the product.

PROCESS DESIGN

- Process design is a macroscopic decision-making of an overall process route for converting the raw material into finished goods.
- These decisions encompass the selection of a process, choice of technology, process flow analysis and layout of the facilities.
- Hence, the important decisions in process design are to analyze the workflow for converting raw material into finished product and to select the workstation for each included in the workflow.

PRODUCTION PLANNING AND CONTROL

- The principle of production planning and control lies in the statement 'First Plan Your Work and then Work on Your Plan'.
- Main functions of production planning and control includes planning, routing, scheduling, dispatching and follow-up.

- **Planning** is deciding in advance what to do, how to do it, when to do it and who is to do it.
- **Routing** may be defined as the selection of path which each part of the product will follow, which being transformed from raw material to finished products. Routing determines the most advantageous path to be followed.
- **Scheduling** may be defined as 'the fixation of time and date for each operation' as well as it determines the sequence of operations to be followed.

- **Dispatching** is concerned with the starting the processes. It gives necessary authority so as to start a particular work, which has already been planned under 'Routing' and 'Scheduling'.
- The function of **follow-up** is to report daily the progress of work in each shop in a prescribed proforma and to investigate the causes of deviations from the planned performance.

QUALITY CONTROL

- Quality Control (QC) may be defined as ‘a system that is used to maintain a desired level of quality in a product or service’.
- Quality control can also be defined as ‘that industrial management technique by means of which product of uniform acceptable quality is manufactured’. It is the entire collection of activities which ensures that the operation will produce the optimum quality products at minimum cost.

- The main objectives of quality control are:
- 1. To reduce companies cost through reduction of losses due to defects.
- 2. To achieve interchangeability of manufacture in large scale production.
- 3. To produce optimal quality at reduced price.
- 4. To ensure satisfaction of customers with productions or services or high quality level, to build customer goodwill, confidence and reputation of manufacturer.
- 5. To make inspection prompt to ensure quality control.
- 6. To check the variation during manufacturing.

MATERIALS MANAGEMENT

- Materials management is that aspect of management function which is primarily concerned with the acquisition, control and use of materials needed and flow of goods and services connected with the production process having some predetermined objectives in view.

- The main objectives of materials management are:
- 1. To minimize material cost.
- 2. To purchase, receive, transport and store materials efficiently and to reduce the related cost.
- 3. To cut down costs through simplification, standardization, value analysis, import substitution, etc.
- 4. To trace new sources of supply and to develop cordial relations with them in order to ensure continuous supply at reasonable rates.
- 5. To reduce investment tied in the inventories for use in other productive purposes and to develop high inventory turnover ratios.

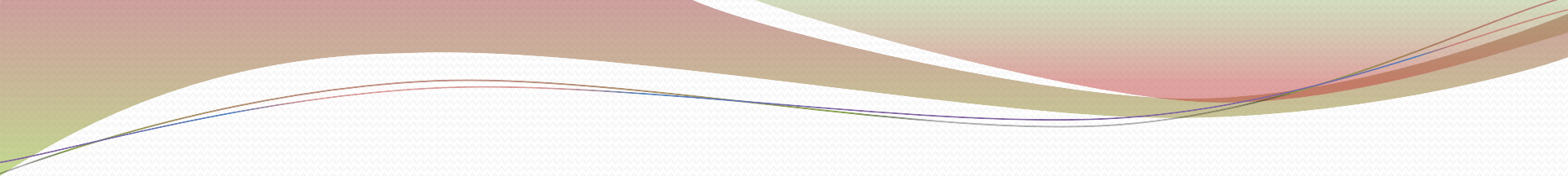
MAINTENANCE MANAGEMENT

- In modern industry, equipment and machinery are a very important part of the total productive effort. Therefore, their idleness or downtime becomes are very expensive. Hence, it is very important that the plant machinery should be properly maintained.

- The main objectives of maintenance management are:
- 1. To achieve minimum breakdown and to keep the plant in good working condition at the lowest possible cost.
- 2. To keep the machines and other facilities in such a condition that permits them to be used at their optimal capacity without interruption.
- 3. To ensure the availability of the machines, buildings and services required by other sections of the factory for the performance of their functions at optimal return on investment.

MANAGING GLOBAL OPERATIONS

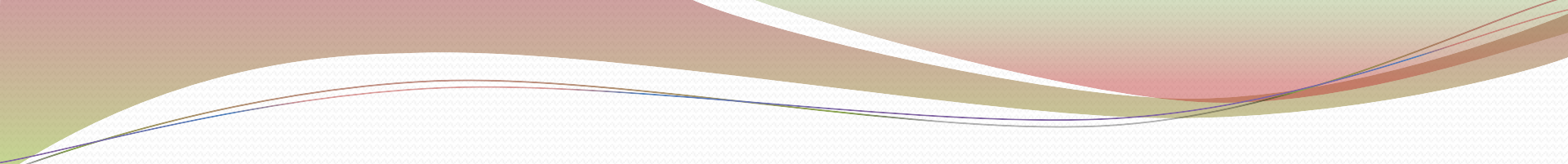
- The term 'globalization' describes businesses' deployment of facilities and operations around the world.
- It can also be defined as worldwide drive toward a globalized economic system dominated by supranational corporate trade and banking institutions that are not accountable to democratic processes or national governments.

- 
- There are four developments, which have spurred the trend toward globalization:
 - 1. Improved transportation and communication technologies;
 - 2. Opened financial systems;
 - 3. Increased demand for imports; and
 - 4. Reduced import quotas and other trade barriers.

- Managing global operations would focus on the following key issues:
 1. To acquire and properly utilize the following concepts and those related to global operations, supply chain, logistics, etc.
 2. To associate global historical events to key drivers in global operations from different perspectives.
 3. To develop criteria for conceptualization and evaluation of different global operations.
 4. To associate success and failure cases of global operations to political, social, economical and technological environments.
 5. To envision trends in global operations.

BREAK EVEN ANALYSIS

- Break even analysis is the study of cost-volume-profit relationship
- Break even point is the point where the gains equal the losses
- The point defines when an investment will generate a positive return
- The point where sales or revenues equal expenses
- The point where total costs equal total revenues
- There is no profit made or loss incurred at the break even point
- It is the lower limit of the profit when prices are set and margins are determined
- Also known as “point of zero profit”

- 
- Break even analysis can be carried out in two ways:
 1. Algebraic method
 2. Graphical method

1. ALGEBRAIC METHOD

- BEP is the ratio of Fixed cost to the Contribution per unit

$$\text{BEP} = (\text{Fixed cost}) / (\text{Contribution per unit})$$

where,

Contribution = Selling cost – Variable cost,

Fixed cost = Contribution - Profit

2.GRAPHICAL METHOD

- The point of intersection of the total cost line and the income line is called as the break even point
- Right of the BEP shows the profit potential while to the left represents the loss potentials
- BEP is also called “NO PROFIT NO LOSS POINT”

Break-even Point Representation



Limitations of B-E Chart Analysis

- In practice all the costs are not always either fixed costs or a variable costs.there are some semi variable overhead costs.
- In the long run all costs are variable,so the break even analysis holds good only for short run requirements.
- It is suitable only when the firm produces one type of product.

Relation of Production with Finance

- The relationship is integral.
- Production department is involved and concerned with the making of the product or development of the service.
- It is the heart of the business as they need to provide something that consumer wants.
- Production department deals with the making and development of product to make the consumer want it or feel that they need it in their life.

- The finance department deals with the all kind of monetary transfer that the business is involved with, and of course the production department is one of the biggest areas of loss.
- The production department needs to go about creating the product and in near enough every business ,there is the cost to creating the product of service hence the finance department will deal with how much of the firm's funds or assets are being lost to this and will decide whether the efficiency of the business is sufficient.
- The cost per unit will be monitored by the finance department and this is and incredible important concepts that overlaps between the two firms.

Relation of Production and Marketing

- Both are important parts of total business system aimed at providing consumer with need satisfying goods and services together
- They provides five basic economic utilities-form ,task, possession,time and place utilities that are needed to provide consumers satisfaction.
- Here utility means the power to satisfy human needs.

1. FORM UTILITY:

- This associated primarily with production, the physical and chemical changes that make product more valuable and satisfy consumer needs.
- Marketing thinking guides production side of business.
- Marketing decisions focus on the customers and include decisions about what goods and services to produce.
- Marketing is concerned with what customers want and it should guide what is produced and offered.

2. TASK UTILITY:

- It is provided when someone provides services to others or produces tangible goods that are services to clients. This is associated with production.

3. TIME UTILITY:

- It means having the product available when the customer wants it. This is also provided by marketing only.

4. PLACE UTILITY:

- It means having the product available where the customer wants it to exist when a product is readily accessible to potential customers. This is also provided by marketing only.

WHAT IS 'KAIZEN'?

- Simply kaizen means '**continuous improvement**'.
- It is daily process, the purpose of which goes beyond simple productivity improvement.
- It is also process that, when done correctly, humanizes the workplace ,eliminates the overly hard work, and teaches the people how to perform experiments on their work by using scientific method and how to eliminate business waste.

Improvements in Production

- If we increase the output and reduce the input then we can increase the production efficiency.

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

- General ways of increase output are :
 1. Process improvement
 2. Regulate work flow
 3. Use more modern equipments
 4. Train and motivate employees



- General ways of decreases input are:

1. Improve quality

2. Minimize waste

3. Reduce the cost of labour

4. Reduce cost of supply

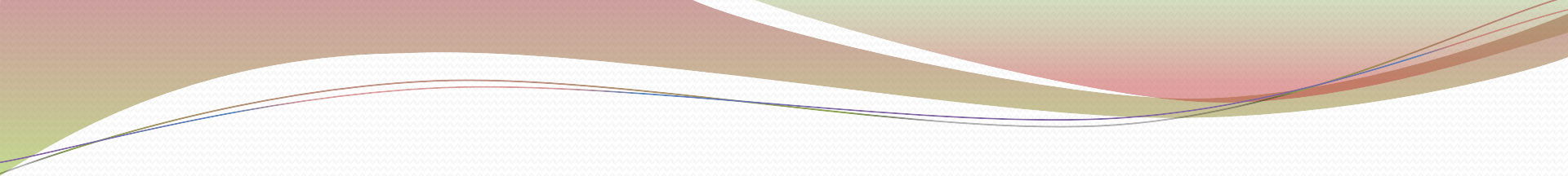
❑ Roll of Technology in Production:

- It is now quite difficult to imagine world without modern invention.
- Technology makes way for fast & efficient operations in manufacturing companies, as well as facilitates cost cutting measures.
- Technology brought significant changes to traditional production system that have been so beneficial to all industrial players, including suppliers and customers.
- A pharmaceutical company, for example employees advanced machinery in capsulising & wrapping medicine.

- Traditionally, the making of medicine was manually done.
- However, to prevent contamination & mitigate errors from human intervention, pharmaceutical companies have employed robots & computerized machines.
- It results in mass production of medicine at faster speed & lower cost.
- So advanced technology plays major roll in production. it will improve production rate and also product quality.

❑ Innovation in Production:

- Innovation is the act of introducing something new. it is associated with generation of new idea.
- In contrast, innovation refers to taking those new ideas and actually implementing them in marketplace.
- Developers create an invention designed to satisfy an existing market need.
- Developers assess the feasibility of the innovation in terms of both sales and production potential.

- 
- After this step, developers conduct research in order to manufacture the product successfully and to ensure that the product will satisfy market demand.
 - Finally, the new product is launched and its success is gauged. if needed , the product's marketing plan can be modified or the product itself improved.
 - Innovation is important part of production to satisfy consumer demand and is needed to be in a competition with others.



THANK YOU