6th semester BBA

Calicut university

PG Department of commerce and management

Operation management

PREPARED BY

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Core course

UNIVERSITY OF CALICUT

BACHELOR OF BUSINESS ADMINISTRATION

BBV B09 OPERATIONS MANAGEMENT

Time: 5 Hours per week Credits: 4

Course objectives:

3. To familiarize the students with the concepts, tools and practices of operations management, and,

4. To learn about the decisions and processes of operations management in a business firm.

UNIT I Operations management—meaning, definitions, scope and objectives— interaction of operations management with other areas—manufacturing and non manufacturing operations and their characteristics.

15 Hours

UNIT II Facilities planning—plant location—factors determining plant location— plant layout—process layout and product layout—materials handling—MRP— Principle equipments.

12 Hours

UNIT III Capacity planning—estimation of capital requirements—maintenance management—types of maintenance -work study—time and method study—work measurement, meaning, scope and importance.

15 Hours

UNIT IV Operations planning and control—objectives of operations planning— planning procedure—operations planning categories (concept only) operations control—meaning , importance and objectives—techniques of operations control. 15 Hours

UNIT V Quality control—Concept of quality—quality planning—statistical quality control—control charts(X chart and R chart Only)—management of quality in organizations—quality circles—TQM.

15 Hours

6 th semester BBA
OPERATION MANAGEMENT
Module 1

Introduction

Operation is concerned with the transformation of inputs into the required output or services. It transforms various resources used in the operations system of the organization into value added services. Operation Management is the set of interrelated management activities, which are involved in manufacturing of certain products or services.

Concept of Production

Production is the step-by-step conversion of one form of material into another form through continuous process to create the utility of the product to the user. Production is a value addition process. Edwood Buffa defines production as ‘a process by which goods and services are created’. Production function is concerned with the transformation of a range of inputs into the required outputs .For example, manufacturing of standardized products like, car, motor cycle, radio, television, soaps, etc.

Production system

The production system is that part of an organisation, which produces goods of an organisation. It is a planned and integrated activity whereby resources are transformed in a controlled manner to add value for the product.

The production system has the following features:

1. Production is a well organised activity with pre-established objectives. 2. The production system converts the various inputs into outputs.
3. Production function is integrated with other activities of the organisation. 4.

Feedback system is necessary to control and improve the system performance.
5.It is a continuous process.

Production Management

Production management is a process of planning, organising, directing and controlling the activities of the production function. It combines and transforms various resources used in the production subsystem of the organization into value added products. Production management deals with decision-making related to production processes so that the resulting goods or services are produced according to specifications, in the amount and by the schedule demanded and out of minimum cost.

Objectives of production management

The objectives of the production management are given below:

1. Right Quality: Quality is the important factor, which should be considered at the time of manufacturing process. All efforts should be taken to ensure the quality of the manufactured goods.
2. Right Quantity: The manufacturing organisation should produce the goods in right number. If they are produced in excess of demand the capital will block up in the form of inventory. If the quantity is produced in short of demand, it leads to shortage of products.
3. Timeliness: Timeliness of delivery is one of the important factors to judge the effectiveness of production department. The production department has to make the optimal utilization of resources to achieve its objectives.
4. Low Manufacturing Cost: Manufacturing costs are determined before the product is actually produced. Hence, all attempts should be taken to produce the products at pre-established cost so as to reduce the variation between actual and standard cost.

Operation management

Operation Management is a part of management sciences. Operation Management is concerned with the production of quality goods and services and ensures that the business operations are performed smoothly, efficiently, effectively. It is a field of management that deals with effective planning, scheduling, use and control of a manufacturing or service organisation. Operations management is the business function that plans organises, co- ordinates, and controls, the resource needed to produce a company’s goods and services.

Operations Management is the process whereby resources, flowing within a defined system, are combined and transformed by a controlled manner to add value in accordance with policies communicated by management.

Definition of Operation Management

According to S.Buffa ‘production or operation management deals with decision making related to production process so that the resulting goods and services are produced according to specifications ,in the amount and by the schedule demanded and at a minimum cost’.

The Association of Operation Management defines operation management as ‘the field of study that focuses on the effective planning ,scheduling, use and control of manufacturing or service organisations through the study of concepts from design engineering, industrial engineering, MIS, quality management etc.

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The value addition to an input can be done in the following ways. They are mentioned below:

1. Alteration
It refers to the transformation of the state of input. This transformation can be a physical change in the input to produce goods.
2. Transportation
It refers to physical movement of goods from one location to another.
3. Storage
It refers to preserving goods in a protected environment.
4. Inspection
It refers to the verification of and confirmation towards the requirements of an Entity.
The definition of the operations Management contains the concepts such as Resources, Systems, transformation and Value addition Activities

Resources

Resources are in the forms of the human, material and capital inputs.
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Systems
Systems are the arrangement of components designed to achieve objectives.
Productivity
The effectiveness of the production factors in the transformation process is known as productivity. The productivity refers to the ratio between values of output per work hour to the

cost of inputs.

.Objectives of Operation Management

The following are the objectives of Operations Management.

1. To provide customer service

Operation management focuses on providing the right products at a right price at the right time. Hence, this objective will influence the operations manager's decisions to achieve the required customer service.

2. Effective utilisation of resources

Ineffective utilisation of resources or inadequate customer service leads to commercial failure of an organisation. It aims at obtaining maximum output from the available resources with minimum cost.

3. To reduce cost of production

Operation management aims at reduction in the cost of production of goods and services. This variable cost can be checked by means of inventory and labour control techniques.

4. To improve product quality

Quality control and maintenance are the two important objectives of operations management., quality control involves determination of quality standards and its actual measurement .

5.To fix time schedule

The schedule fixation include inventory cycle time, inventory turn over rate machine utilisation rate etc.

6. Proper utilisation of Machinery

New machines should be installed and the old machines are to be replaced. It has to ensure judicious utilisation of machinery and equipment.

7. Material control

This involves estimating the individual requirements of parts, preparing materials budget, forecasting the levels of inventories, scheduling the orders and monitoring the performance in relation to production and sales.

MANUFACTURING AND NON –MANUFACTURING OPERATIONS

On the basis nature of operations the organisations can be divided in to:

1. Manufacturing organisations
2. Non-manufacturing organisations

The following are the differences between manufacturing organisations and non- manufacturing organisations:

1. Manufacturing organisation produces the goods that are tangible in nature. On the other hand service organisations render service to the customers instead of tangible products.
2. The products of manufacturing units can be stored in physical form. But the products of non-manufacturing organisation cannot be stored.
3. In manufacturing organisation, most of the customers have no direct contact with the operations.On the other hand, in the case service organisations the customers are present during the creation of the service.

Differences between the goods and the service goods service

Goods are tangible. Services are intangible

Goods can be stored and transported. Services cannot be produced beforehand They are produced in a factory environment. Services are produced in a market environment Goods are mainly standardised. Services are often customised

Quality is inherent in the product. Quality is inherent in the process

second module

FACILITIES PLANNING AND PRODUCT DESIGN

Designing a good product is the major challenge of any organisation. Design gives the blueprint idea about the product. Design starts with conceptualization of ideas. A product design reflects a company's overall strategy. Therefore, it should be undertaken carefully. Product development and design is primarily governed by management decisions.

There are a number of factors which affect the design of the product. They are given below:

1. Requirements of customers
2. Production facilities of the manufacturers
3. Availability of materials
4. Method of works

The following are the different stages involved in the product development process:

1. Generation of ideas from multiple sources
2. Screening of ideas for further analysis
3. Business analysis of data
4. Development of product
5. Market testing
6. Commercialisation of the products

PROCESS SELECTION

A process is a way to convert raw materials into finished products. Process selection involves the decisions with regard to workstation and the choice of work flow. Work station selection involves the choice of machines to be included in the manufacturing process. Workflow analysis concerns with the flow of work between these stations.

The following are the factors affecting the choice of process of manufacture:

1. Product features
2. Requirements of customers
3. Availability of capital
4. Availability of technologies
5. Legal factors
6. Availability of employees

TYPES OF PRODUCTION PROCESS

There are mainly three types of production systems or production process. They are

1. Continuous System
2. Intermittent System
3. Project systems

1. Continuous System

Continuous production refers to the manufacturing of large volume of a single or a very few varieties of products with a standard set of processes. The mass production is carried on continuously for stock in anticipation of demand.

Features

1. The volume of output is large
2. The product design and the operations stages are standardised
3. Special purpose automatic machines are used to perform standardised operations
4. Product layout is designed according to a separate line for each product.

Intermittent Production System

In this system, the goods are generally produced to fulfill customers' orders rather than producing against stock. Intermittent situations are those where the facilities must be flexible enough to handle a variety of prod.

Characteristics

1. flow of production is intermittent, not continuous.

2. The volume of production is generally small.

3. A wide variety of products are manufactured.

4. General purpose machines and equipment are used.

5. No single sequence of operations is used for a long period.

6. Process layout is most suited in a highly competitive environment.

7. Periodical adjustments are made to suit different jobs or batches.

Job Production

In the case of Job production, the products are manufactured as per the specifications of the customers within predetermined time and cost. The main feature of this method is low volume and high variety of products compared to mass production. Under this method, each job demands unique production activities..

2.2. Batch Production

Under batch production method, items are processed in lots or batches and a new batch is undertaken for production only when the production on all items of a bath is complete. .

3. Project process

A project process is one in which there is a very high degree of customization and the job is undertaken to meet specific requirements. Each project is unique. Project process is valued more on the basis of their capabilities to do certain kinds of jobs, rather than to produce specific products at low cost.

FACILITY OR PLANT LOCATION

Facility location decision is the systematic process of determining a geographic site for a firm's operations. Managers of both service and manufacturing organizations should consider the desirability of a particular site, including proximity to customers and suppliers, labour costs, and transportation cost

Steps in site Selection

The following are the different stages involved in the site selection process:

1. Selection of the region in which the plant is to be established

2. After selecting the region, the next step is to select a locality with in the region.

3. Selection of site for plant construction

4. Final investment decision

There are mainly two sets of factors affecting the location decision:

1. General locational factors, which include controllable and uncontrollable factors for all types of organisations.

2. Specific locational factors specifically required for manufacturing and service organisations.

Following are the general factors required for location of plant in case of all types of organisations.

1. Proximity to markets

2. Supply of materials

3. Transportation facilities

4. Infrastructure availability

5. Labour and wages

6. External economies

7. Capital.

8. Government policy

9. Climate conditions

10. Supporting industries and services

11. Community infrastructure

PLANT/FACTORY LAY OUT

Plant layout refers to the physical arrangement of production facilities. It is the configuration of departments, work centres and equipment in the conversion process. It is a floor plan of the physical facilities.

Definition of plant layout

According to Moore ‘Plant layout is a plan of an optimum arrangement of facilities including personnel, operating equipment, storage space, material handling equipment and all other supporting services along with the design of best structure to contain all these facilities’.

OBJECTIVES OF LAY OUT

The basic objective of the plant layout is to arrange production facilities

economically. The objectives of plant layout are given below:

1. Streamline the flow of materials through the plant.

2. Facilitate the manufacturing process.

3. Minimise materials handling cost.

4. Effective utilisation of men, equipment and space.

5. Flexibility of manufacturing operations and arrangements.

6. Provide for employee convenience, safety and comfort.

7. Minimize investment in equipment

.Job Production

In the case of Job production, the products are manufactured as per the specifications of the customers within predetermined time and cost. The main feature of this method is low volume and high variety of products compared to mass production. Under this method, each job demands unique production activities.

Features of job production

The following are the features of job production system:

1. More variety of products are manufactured as per customer's requirements.

2. Volume of production is low.

3. Highly skilled employees are required to do the work.

4. Detailed planning is essential for sequencing the requirements of each

product.

5.Employees should be able to take each job as a challenge.

2.2. Batch Production

Under batch production method, items are processed in lots or batches

and a new batch is undertaken for production only when the production on all

items of a bath are complete. In fact, batch type of production system can be

considered as an extension of job type system.

Characteristics of batch production

Batch Production is characterised by

1. Shorter production runs.

2. Products are manufactured in small batches.

3. Plant and machinery set up is used for the production of item in a batch and

change of set up is required for processing the next batch.

4. Manufacturing lead-time and cost are lower as compared to job order

production..

3. Project process

A project process is one in which there is a very high degree of customization and the job is undertaken to meet specific requirements. Each project is unique. Project process is valued more on the basis of their capabilities to do certain kinds of jobs, rather than to produce specific products at low cost.

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The following are the different stages involved in the site selection process:

1. Selection of the region in which the plant is to be established

2. After selecting the region, the next step is to select a locality within the region.

3. Selection of site for plant construction

4. Final investment decision

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3. Transportation facilities

4. Infrastructure availability

5. Labour and wages

6. External economies

7. Capital.

8. Government policy

9. Climate conditions

10. Supporting industries and services

11. Community and labour attitudes

12. Community Infrastructure.

PLANT/FACTORY LAY OUT

Plant layout refers to the physical arrangement of production facilities. It is the configuration of departments, work centres and equipment in the conversion process. It is a floor plan of the physical facilities. There are several factors which affect the choice of factory layout.

Definition of plant layout

According to Moore ‘Plant layout is a plan of an optimum arrangement of facilities including personnel, operating equipment, storage space, material handling equipment and all other supporting services along with the design of best structure to contain all these facilities’.

OBJECTIVES OF LAY OUT

1. Streamline the flow of materials through the plant.

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5. Flexibility of manufacturing operations and arrangements.

6. Provide for employee convenience, safety and comfort.

7. Minimize investment in equipment

PRINCIPLES OF LAYOUT

The following are the principles plant layout:

1. Principle of integrati

2. Principle of minimum distance

3. Principle of cubic space utilisation

4. Principle of flow

5. Principle of maximum flexibility

6. Principle of safety, security and satisfaction

Factors to be considered in plant layout

1. Need for plant expansion

2. Protection of operation equipment

3. Maintenance requirement.

4. Location

TYPES OF LAY OUT

Layouts can be classified into the following five categories:

1. Process layout
2. Product layout
3. Combination layout
4. Fixed position layout
5. Group layout

Organisation of Physical Facilities

1. Factory building
2. Lighting
3. Climatic conditions
4. Ventilation
5. Work-related welfare facilities.

Material requirement planning MRP

Material requirement planning is an inventory system that is computer based and used to manage the manufacturing process .It is designed to assist in the scheduling and filling of orders for raw materials that are manufactured in to finished goods.

The following are the objectives of MRP:

1. Reduction in inventory cost
2. Meeting delivery schedule
3. Improve the performance of production

Material handling

The material handling involves the movement of material form one section to another for the purpose of processing. They can be moved either manually or mechanically. For this purpose different types material handling equipment are used. The material handling system in any manufacturing setting plays an important role in the performance of the entire manufacturing system.

Material handling can be defined as the art and science involving the movement, packing and storing of substances in any form.

Objectives of material handling

1. Principle of minimum distance
2. Principle of cubic space utilisation
3. Principle of flow
4. Principle of maximum flexibility
5. Principle of safety, security and satisfaction

Factors to be considered in plant layout

The following are the important factors to be considered at the time of plant lay out. They are given below;

1. Need for plant expansion

2. Protection of operation equipment

3. Maintenance requirements

4. Location

TYPES OF LAY OUT

Layouts can be classified into the following five categories:

1. Process layout

2. Product layout

3. Combination layout

4. Fixed position layout

5. Group layout

The following are the most important physical facilities to be organised:

1. Factory building

2. Lighting

3. Climatic conditions

4. Ventilation

5. Work-related welfare facilities.

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OPERATION MANAGEMENT

6th SEM BBA module 3

Jan 2021 note

OPERATION PLANNING AND CONTROL

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PRODUCTION PLANNING

Operation planning is concerned with deciding in advance what is to be produced, when to be produced, where to be produced and how to be produced. It involves foreseeing every step in the process of production so as to avoid all difficulties and inefficiency in the operation of the plant. It determines the requirements for materials, machinery and man-power; establishes the exact sequence of operations for each individual item and lays down the time schedule for its completion.

Objectives of Operation Planning

The basic objectives of operation planning are as under:

1. To estimate resource requirements like men, materials, machines, methods etc. in proper quantities and qualities.

2. It also estimates when and where these resources will be required so that the production of the desired goods is made most economically.

3. It also aims to make all necessary arrangements to see that production target is reached.

For an effective planning of operation activities, the manager concerned should have complete information regarding the following:

1. Information regarding the machine operations

2. The various types of tools and equipment required.

3. Full information regarding the type, quality and quantity of the raw material to be used in each process or operation.

4. The characteristics of each job and the degree of skill and experience required for the operation.

Levels or Categories of Production Planning

Production planning can be done at three levels namely

1. Factory Planning,

2. Process Planning

3. Operation Planning.

1. Factory Planning

The sequence of work task is planned in terms of building, machines and equipment required for manufacturing the desired goods and services. This stage deals with plant location and layout.

2. Process Planning

There are many operations involved in factory planning for transforming the inputs into outputs. In process planning these operations are located and the sequence of these operations in the production process is determined.

3. Operation Planning

Operation planning is concerned with planning the details of the methods required to perform each operation .It involves the selection of work centers, and designing of tools required for various operations.

OPERATION CONTROL

Production control makes use of production plans. It involves the use of various control techniques to ensure production performance as per plans. Co-coordinating men and materials and machines are the major tasks of operation control. Operation control is the art and science of

ensuring that all which occurs is in accordance with the rules established and the instructions issued. Operation control regulates the orderly flow of materials in the manufacturing process from the raw material stage to the finished product. Operation control aims at achieving production targets, optimum use of available resources, increased profits through productivity, better and more economic goods and services etc. An effective operation control system requires reliable information, sound organisation structure and trained personnel.

Objectives of Production Planning and Control

The success of an enterprise mainly depends on the performance of its production control department. The objectives of production and planning department are given below:

1. Provision of raw material, equipment, machines and labour to production system.

2. To organize production schedule in conformity with the demand forecasts.

3.To ensure that the cost of production is minimized and delivery date is maintained.

4. Determination of economic production runs with a view to reduce setup costs.

5. Proper co-ordination of the operations of various sections responsible for production.

6. To ensure regular and timely supply of raw material.

7. To perform inspection of semi-finished and finished goods and use quality control techniques to ascertain that the produced items are of required specifications.

8. It is also responsible for product design and development.

Factors Determining Production Control Operations

The following factors affect the nature of production control methods.

1. Nature of production
   In job-oriented production system, operations are designed for some particular order which may or may not be repeated in future. Production usually requires more time than other type of manufacturing.
2. Nature of activities
   The nature of activities also determines the pattern of production and control system. Therefore, the control procedure requires continuous modifications and adjustments to suit the requirements of each order.
3. Magnitude of operations

Decentralization of production control function becomes necessary in a highly complicated manufacturing system. The degree to which the performance of an activity should be decentralized depends upon the scope of operations.

Objectives of operation Control

The objective of operation control is given below:

1. Operational control tries to ensure the continuous flow of operation through well-planned routing and scheduling of work.
2. Production planning and controlling seeks to ensure the availability of all the inputs for the smooth production purpose.
3. It aims at minimum investment in inventories without disturbing the production process.
4. Production planning and controlling aims at increased productivity by increasing efficiency of the operating activities Importance of operation Control

The following are the significances of operation control:

1.Operation planning and control activities help in providing better services to customers in terms of better quality goods .
2. A sound system of operation management system helps in maintaining inventory at proper levels.
3. An efficient operation control system makes the most effective use of equipment and other production facilities.
4. Operation control system helps in reducing the idle time involved in the production system.

Limitations of Production Planning and Control

1. Operation planning and control is based on certain assumptions about availability of materials, power, equipment etc. In case these assumptions do not go right, the whole system will suffer.
2. Operation planning and controlling is a time consuming process.

3. Operation planning and control is a costly affair. 4. The effectiveness of operation planning and control is sometimes limited because of external factors which are beyond the control of production manager.

Steps in operation Planning and Control

The implementation of operation

1. Routing
2. Loading
3. Scheduling
4. Dispatching
5. Expediting or Follow up
6. Corrective Action

1. Routing Production routing involves fixation of path through which work will flow.
   It is the order in which various operations will be carried out. It consists of the determination of operations through which the product must pass. It is the arrangement of operations in the sequence that requires a minimum of handling, transportation, storage.

   The following routing procedure is followed

   1. Determining What to Make and What to Buy
   2. Ascertaining the Requirements of Materials
   3. Preparation of Route Sheet
   4. Determining Lot Sizes
   5. Determining Scrap Factors
   6. Estimation of the cost of the Product:
   7. Preparation of Production Control Forms

2. Loading
   Loading deals with the amount of work assigned to a machine. It deals with the record of work-load of different shops. The total time required to perform the operations is computed by multiplying the unit operation time given on the standard process sheet

by the number of parts to be processed. The total time is then added to the work already planned for the work station.

3. Scheduling

   Scheduling involves fixing priorities for different tasks. It establishes the time sequence of operations .It indicates the time required for each job and operation. A schedule is a time-table of operations specifying the time and date when each operation is to be started and completed.

4. Dispatching

   Dispatching is the process of setting of productive activities in motion through release of orders and instructions, in accordance with previously planned timings. Dispatch provides official authorization for (i) Movement of materials to different work stations, (ii) movement of tools and fixtures necessary for each operation, (iii) beginning of work on each operation, (iv) recording of beginning and completion time, (v) movement of work

5. Expediting or Follow Up

   This is the last step in operation planning and control. It involves determination of the progress of work, removing bottlenecks in the flow of work and ensuring that the productive operations are taking place in accordance with the plans.

6. Corrective Action

   Corrective action is needed to make the system effective. By resorting to corrective measures, the production manager maintains full control over the production activities. The production manager should try to rectify the routes and lay down realistic and flexible schedules.

Module 4

Capacity Planning

Notes for the month of Feb 2021

Capacity is the amount of goods that a firm is capable of producing over a specified period of time. Capacity can be defined as highest reasonable output rate which can be achieved with the current product specifications, product mix, work force, plant and equipment. Capacity planning for manufacturing and service systems are different.

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The important elements of the capacity requirement planning process are of establishing, measuring and adjusting the limits or levels of the production capacity based on the process of determining the amount of labour and machine resources required to accomplish the tasks of production.

Types of capacity

1. Maximum capacity Maximum capacity or design capacity is the highest rate of output a process or activity can achieve. It
2. Effective capacity Effective capacity identifies the output rate that managers expect for a given activity or process
3. Demonstrated or actual capacity deals with actual rather than planned production.

TIME STUDY

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The process of time study involves systematically recording, analysing and synthesizing the times required to perform a motion. By using time study, an analyst is taking a small sample of one worker's activity and using it to derive a standard for tasks of that nature. The following are the steps involved in conducting a time study:

1. Select the work to be studied under time study.

2. Record all the information available about the job, the operator and the working conditions which may affect the time study work.

3. Breakdown the operation into elements

. 4. Measure the time by means of a stop watch taken by the operator to perform each element of the operation

MOTION STUDY

Frank and Lillian Gilbreth developed the concept of motion study as an engineering and management technique. The concept of motion study is a widely discussed management tool. The objectives of motion study are
: 1.To eliminate all non-productive and ineffective motions
. 2. To develop more effective and productive patterns of movements.

4. To modify tools, lighting and other factors to help in optimizing the effects of management

Maintenance management

Equipment must be kept at the best operating condition. Otherwise, there will be interruption of production if it is used in a mass production line. Poor working of equipment will lead to quality related problems. It is a necessity to maintain the equipment in good operating conditions with economical cost. Therefore, an integrated approach to minimize the cost of maintenance is essential. In certain cases, the equipment will be obsolete over a period of time. If a firm wants to be in the same business competitively,

6th sem BBA

Notes for the month of March 2021

UNIT-5 QUALITY CONTROL

A widely accepted definition of the quality of a product is its fitness for use for its intended purpose. Therefore, quality is some prescribed or desired characteristics present in raw material, semi-finished or finished items. It is a relative term and is generally used with reference to the end use of the product viz. fitness for purpose, degree of preference, degree of excellence, fulfillment of the promises made to the customer, quality of design, etc His fundamental objective is to manufacture the product of desired quality in the most economical manner with minimum risk of being rejected by the consumer. For that quality of the product should be ensured. Cost of quality It is to be noted that poor quality creates dissatisfied customers and eventually leads to loss of business.

The following are the important costs of quality:

1.Prevention costs

This is the cost of all activities incurred to prevent poor quality in products and services. They include cost of developing and implementing a quality plan

2. Appraisal cost

This is the cost associated with measuring, evaluating, auditing products and services to assure conformance to standards and performance requirements.

3. Failure costs

This is the cost resulting from products and services not conforming to requirements or customer needs.

Quality planning

Quality control is the process of verification or correction in the quality of the product when the deviations in the quality are found to be more. According to A. Y. Feigarbaum, 'Quality-control is an effective system for integrating the quality development, quality maintenance and quality improvement efforts of the various groups in an organization, so as to enable production of goods and services at the most economical levels which allow full customer satisfaction'.

OBJECTS OF QUALITY CONTROL

1. To assess the quality standards at different stages of the production process.
2. To recommend for the corrective action when the process goes out of control.
3. To suggest suitable improvements in the quality of the product without affecting the cost of production.
4. Quality control operations enhance confidence, goodwill and reputation for the manufacturer.
5. Reliability regarding the quality of the product is improved.

Functions of Quality Control

1. To see that the product or service is designed in such a way so that it meets customers' specifications.

2 To maintain discipline amongst the employees and to increase their morale

.3. To see that the materials, parts, components, tools, equipment etc. of standard quality only are purchased and used.
4. To make the employees quality conscious by fixing their responsibility at various stages of production.
5. To reduce the proportion of scrap, waste and spoilage during the process:

Uses of control charts

1 It is a proven technique for improving productivity
2. It is an effective system in defect prevention
3. It prevents unnecessary process adjustments
4. It provides diagnostic information
5. It provide about process capability

METHODS USED TO ASSURE OR TO CONTROL THE QUALITY

Quality of a product can be assured by the following methods:

1. Inspection method
2. Statistical Quality Control Method

1. Inspection

Inspection is the process of examining an object for identification of verification in quality and quantity. The following points to be noted:-

1. Maintenance of specified standards of the quality of products.
2. Developing means for conducting inspection at lower cost.
3. Maintaining inspection equipment in good condition.
4. Detection of defects at source to reduce defective work
. 5. Furnishing advice to Managers when production difficulties arise. 6. Reporting source of manufacturing troubles to management.

STATISTICAL QUALITY CONTROL

Statistica1 quality control (SQC) is the term used to describe the set of statistical tools used by quality professionals for the purpose of quality control. Statistical quality control can be sub divided into three broad groups:
1. Descriptive statistics 2. Statistical process control 3. Acceptance sampling

1. Descriptive statistics Descriptive statistics are used to describe quality characteristics and relationships.

2.. Statistical process control (SPC) Statistical process control involves inspecting a random sample of the output from a process .

. 3. Acceptance sampling

Acceptance sampling is the process of randomly inspecting a sample of goods and deciding whether to accept the entire lot based on the results

There are different methods of Monitoring quality of product. The important among them is

CONTROL CHARTS

A control chart (also called process chart or quality control chart) is a graph that shows whether a sample of data falls within the common or normal range of variation. A control chart has upper and lower control limits that separate common from assignable cause

A typical control chart consists of the following 3 horizontal lines : together with a number of sample points as exhibited in the following fig.

1. Upper Control Limit (UCL) 2. Lower