UNIT 1: CONCEPTS OF MANAGEMENT

Administration:

- Any enterprise whether it is run for profit or not, need to be controlled.
- The control of the enterprise is happens through Administration and Management.
- Administration makes policies and decides the goals/targets to be achieved. It is not directly concerned with the implementation of policies.

Management:

- Art of getting work done by the people and through the people is called management.
- Management is the servant of administration
- Management uses organization for achieving the goals of an enterprise.

Organization:

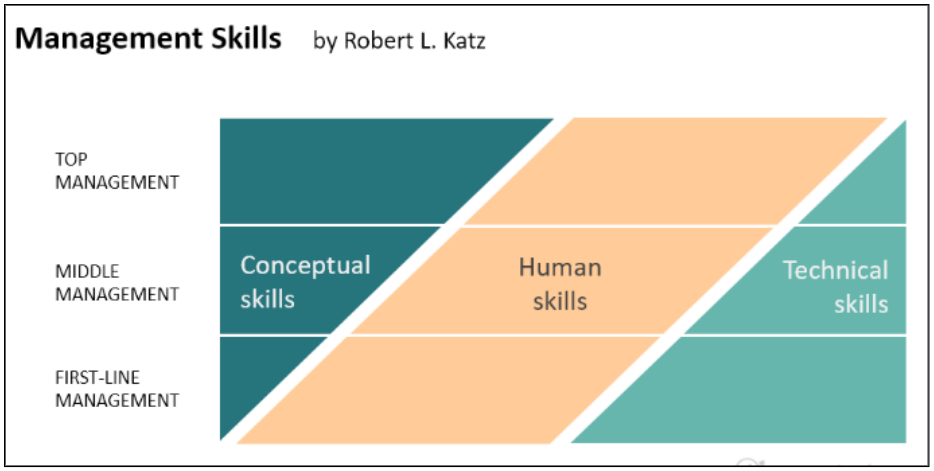
- Organization is a frame work of management
- It is a system
- Organization is group of people deliberately structured for achievement of goals.

Management carries out the policies of Administration through the framework of the organization

MANAGERIAL SKILLS:

A manager needs the following three types of skills.

- Conceptual skills:
  - ✓ It is the ability to see the organization as a whole, to recognize inter-relationships among different functions of the business
  - ✓ Conceptual skill is critical in top executive positions where as technical skill is essential for lower level management.
  - ✓ It is easier to learn technical skills than conceptual skills
- Human skills:
  - ✓ Human skill is the ability to work with people.
  - ✓ It is the ability to motivate, lead and to communicate effectively with others.
  - ✓ It is also known as ‘people’, ‘interpersonal’ or ‘behavioural’ skill.
- Technical skills: Technical skill is the ability to use the procedures, techniques, methods and knowledge of a specialized field.



Difference among Policies, Goals and Objectives:

Policies: Policies are the Guidelines for Actions.

- A policy may be a verbal, written or implied overall guide for decision making. In other words, policies provide guidelines and limits for decision making.
- Policy may be taken as an expression of intentions of Top Management and is long lasting. Policies are valuable because they allow lower levels of management to handle problems without going to top management for a decision every time. Policies provide a broad guide as to how the objectives of a firm are to be achieved.

Objectives: Objectives are the ends towards which the activities of the enterprise are aimed.

Goals: A goal is any achievement of an end point that is stated in quantitative terms, an example of which is the achievement of a certain amount of profit for a specified time period. Goals represent the desired future conditions, which the organization strives to achieve.

Reference: https://www.businessmanagementideas.com/management/difference-among-policies-goals-and-objectives/9898

https://www.businessmanagementideas.com/management/management-administration-and-organisation-difference/9904

Definitions of Management:

F.W. Taylor: "Management is the art of knowing what you want to do and then seeing that they do it in the best and the cheapest may."

Mary Parker Follett: she says that Management is the "art of getting things done through people."

Koontz and O'Donnel: "Management is defined as the creation and maintenance of an internal environment in an enterprise where individuals working together in groups can perform efficiently and effectively towards the attainment of group goals".

Levels in Management :

Top Level Management:

Top level management consists of Chairman, Board of Directors, Managing Director, General Manager, President, Vice President, Chief Executive Officer (C.E.O.), Chief Financial Officer (C.F.O.) and Chief Operating Officer etc. It includes group of crucial persons essential for leading and directing the efforts of other people. The managers working at this level have maximum authority.

Main functions of top level management are:

(a) Determining the objectives of the enterprise. The top level managers formulate the main objectives of the organisation. They form long term as well as short term objectives.

(b) Framing of plans and policies. The top level managers also frame the plans and policies to achieve the set objectives.

(c) Organising activities to be performed by persons working at middle level. The top level management assigns jobs to different individuals working at middle level.

Middle Level Management:

This level of management consists of departmental heads such as purchase department head, sales department head, finance manager, marketing manager, executive officer, plant superintendent, etc. People of this group are responsible for executing the plans and policies made by top level.

Low level Management /Supervisory Level/Operational Level:

This level consists of supervisors, superintendent, foreman, sub-department executives; clerk, etc. Managers of this group actually carry on the work or perform the activities according to the plans of top and middle level management.

Management as an art or science:

Just as an engineer uses the science of engineering while building a bridge, a manager uses the knowledge of management theory while performing his managerial functions. Engineering is a science; its application to the solution of practical problems is an art. Similarly, management as a body of knowledge and a discipline is a science; its application to the solution of organizational problems is an art. The practice of management, like the practice of medicine, is firmly grounded in an identifiable body of concepts, theories and principles. A medical practitioner, who does not base his diagnosis and prescription on the

science of medicine, endangers the life of his patient. Similarly, a manager who manages without possessing the knowledge of management creates chaos and jeopardizes the well-being of his organization.

Function of management or Processes of management:

Different experts have classified functions of management. But the most widely accepted functions of management are given by Koontz and O'donnel which are listed below:

1. Planning,
2. Organizing,
3. Staffing,
4. Directing and
5. Controlling.

1. Planning:

- It is the basic function of management.
- It deals with chalking out a future course of action & deciding in advance the most appropriate course of actions for achievement of pre-determined goals.
- According to Koontz, "Planning is deciding in advance - what to do, when to do & how to do.
- It bridges the gap from where we are & where we want to be".
- A plan is a future course of actions.
- It is an exercise in problem solving & decision making.
- Planning is determination of courses of action to achieve desired goals. Thus, planning is a systematic thinking about ways & means for accomplishment of pre-determined goals. Planning is necessary to ensure proper utilization of human & non-human resources.
- It is all pervasive, it is an intellectual activity and it also helps in avoiding confusion, uncertainties, risks, wastages etc.

2. Organizing:

Organizing involves identification of activities required for the achievement of enterprise objectives. Every manager has to decide what activities have to be undertaken in his department or section for the achievement of the goals entrusted to him. Having identified the activities, he has to group identical or similar activities in order to make jobs, assign these jobs or groups of activities to his subordinates, delegate authority to them so as to enable them to make decisions and initiate action for undertaking these activities, and

provide for coordination between himself and his subordinates, and among his subordinates. Organizing thus involves the following sub-functions:

- **Identification of activities required for the achievement of objectives Grouping the activities so as to create self-contained jobs.**
- **Assignment of jobs to employees.**
- **Delegation of authority so as to enable them to perform their jobs and to command the resources needed for their performance.**
- **Establishment of a network of coordinating relationships.**

Organizing process results in a structure of the organization. It comprises organizational positions, accompanying tasks and responsibilities, and a network of roles and authority-responsibility relationships.

3. Staffing :

Staffing is a continuous and vital function of management. After the objectives have been determined, strategies, policies, programmes, procedures and rules formulated for their achievement, activities for the implementation of strategies, policies, programmes, etc. identified and grouped into jobs, the next logical step in the management process is to **procure suitable personnel for manning the jobs. Since the efficiency and effectiveness of an organization significantly depends on the quality of its personnel and since it is one of the primary functions of management to achieve qualified and trained people to fill various positions.**

4. Directing :

Directing is the function of leading the employees to perform efficiently, and contribute their optimum to the achievement of organizational objectives. Jobs assigned to subordinates have to be explained and clarified, they have to be provided guidance in job performance and they are to be motivated to contribute their optimum performance with zeal and enthusiasm

5. Controlling:

Controlling is the function of ensuring that the divisional, departmental, sectional and individual performances are consistent with the predetermined objectives and goals. Deviations from objectives and plans have to be identified and investigated, and correction action taken. Deviations from plans and objectives provide feedback to managers, and all other management processes including planning, organizing, staffing, and directing are continuously reviewed and modified, where necessary. The purpose of controlling is to ensure that everything occurs in conformities with the standards. An efficient system of

control helps to predict deviations before they actually occur. Therefore **controlling has following steps:**

- **Establishment of standard performance.**
- **Measurement of actual performance.**
- **Comparison of actual performance with the standards and finding out deviation if any.**
- **Corrective action.**

CONTRIBUTIONS OF F.W. TAYLOR TOWARDS SCIENTIFIC MANAGEMENT:

- Frederick W. Taylor (1856-1915), is **the father of scientific management**.
- Scientific management (also called Taylorism or the Taylor system) is a theory of management that analyzes and synthesizes workflows, with the objective of improving labour productivity.
- **Scientific management is the result of applying scientific knowledge and scientific methods to the various aspects of management and the problems that arise from them**
- Taylor believed that decisions based upon tradition and **rules of thumb should be replaced by precise procedures** developed after careful study of an individual at work.
- While working in Midvale Steel Company as a manager Taylor observed that employees were not performing as per their capacity of productivity.
- Taylor worked towards the experiments at his work place to increase the worker's efficiency so that maximum output could be achieved by utilizing effort at maximum level.
- **Scientific recruiting and training:** staffs and workers should be selected and employed on scientific basis. Management should develop and train every worker by providing proper knowledge and training to increase their skills and make them effective.
- Taylor argued that both management and workers should try to understand each other instead of quarrelling for profits and benefits which would increase production, profit and benefits.
- **He developed the time and motion study**
- **He suggested a wage incentive system known as Taylor differential piece rate system**.
- **His aim is to apply scientific knowledge and scientific method to the various aspects of management.**

- His primary concern is to increase productivity through greater efficiency in production and increase pay for workers through the application of scientific management.
- He developed the functional organization in which one foreman was made in-charge for each function.

PRINCIPLES OF SCIENTIFIC MANAGEMENT:

1. Replacing rule of thumb with science
2. Harmony in group action
3. Co-operation
4. Maximum output
5. Development of workers

CONTRIBUTIONS OF HENRY FAYOL:

- He is the father of modern management theory or administrative theory
- He analyzed the process of management and divided the workdone in business in six primary groups.
    - Technical activities (includes production of goods)
    - Commercial activities (buying, selling, exchange etc)
    - Financial activities (optimum usage of capital)
    - Security activities (protection of property and persons)
    - Accounting activities (balance sheet preparation etc.)
    - Management activities (planning, organizinf, staffing, directing and controlling)
- He proposed **14 PRINCIPLES OF MANAGEMENT**,

1, Division of Labor

- Work of all kinds must be divided & subdivided and allotted to various persons according to their expertise in a particular area.
- If you divide and do the work, we may achieve maximum productivity and efficiency in all spheres of the acitivity.

2. Authority & Responsibility

- The right to command or right to order is called Authority
- Responsibility means obligation of a subordinate to obey the command given by his superior.

. 3. Unity of Command

- A sub-ordinate should receive orders and be accountable to one and only one boss at a time.
- He should not receive instructions from more than one person.
- Unity of command avoids the confusion, mistakes and delays in getting the workdone

4. Unity of Direction

- Organization and department goals must be same

5. Equity of treatment:

- Managers should have fairness in treatment for all his subordinates.
- Managers should deal with his subordinates with kindness and justice.
- This will make the employees more loyal and devoted towards the management or enterprise.

6. Order

- This principle is concerned with proper & systematic arrangement of things and people.
- The principles of right place for everything and for every man need to be observed by the management.
- To put things in an order needs effort

7. Discipline

- Discipline is essential for smooth running of business
- Discipline means sincere effort in achieving the organization goals, obedience to authority, respect towards superiors, following the rules and regulations of the enterprise.

8. Initiative

- Initiative means freedom to think out and execute a plan.
- Innovation is possible only where employees are encouraged to take initiative
- Employees should be encouraged to make all kinds of suggestions to conceive and carry out their plans, even some mistakes result.

9. Remuneration

- Remuneration is the price paid to the employees for the services rendered by them for the enterprise
- Remuneration paid to the workers or personnel should be fair
- Fair remuneration increases workers efficiency and morale

10. Stability of Tenure

- Stable and secure workforce is an asset to the enterprise
- An average employee who stays with concern is much better than an outstanding employee who merely comes and goes.
- Instability is the result of bad management.

11. Scalar Chain or line of authority

- Scalar chain means the hierarchy of authority from the highest executive to the lowest one for the purpose of communication

12. Sub-ordination of Individual Interest to general interest:

- Individuals may be trying to maximize their benefits or satisfaction
- The interests of any one employee or group of employees should not take precedence over the interests of the organization as a whole.

13. Centralization of authority:

- If subordinates are given more role and importance in the management, it is decentralization
- The management must decide the degree of centralization or decentralization of authority on the basis of the nature of the circumstances, size of the undertaking and complexity of the (business) enterprise

14. Espirit De' Corps

- Management should create team spirit among the employees.

Contributions of Gilbreth:

- Frank Bunker Gilbreth (1868-1924) and Lillian Moller Gilbreth (1878-1972) are respected for their unique contributions to the advancement of motion study, fatigue study and work simplification.
- Frank and Lillian Gilbreth earned an eminent place in the field of management.
- Their achievement in improving the productivity of workers, while simultaneously reducing fatigue, led to higher profits.
- Using camera techniques, Frank Gilbreth collected data from which he identified unnecessary motions. Human fatigue could then be decreased by eliminating wasted motions.
- Frank and Lillian Gilbreth did a lot of work to improve the work methods and thus to discover one best way of accomplishing a task. Their main field of interest is motion study.
- Gilbreth defined the motion study as the science of eliminating wastefulness resulting from unnecessary, ill directed and inefficient motions.
- Gilbreth evolved the principles of motion economy.
- He introduced process chart
- Gilbreth identified therbligs – the fundamental motions involved in doing an activity
- He developed micro-motion study and simo chart
- He invented cycle graph, chrono-cycle graph and flow diagrams.
- While serving U.S. Army, he used motion study to find the best method to assemble and disassemble the weapons.

- They carried out studies on fatigue and its elimination. They concluded that fatigue could be considerably reduced by eliminating the load, introducing the rest periods etc.

Types of ownership

Single ownership (Sole proprietorship)

- Money (capital) required to run the business is contributed by a single person.

Business owned by one man is called single ownership. It is called single ownership when an individual exercises and enjoys the rights in his owner interest.

eg: Auto repair shop, wood working plant etc.

Advantages:

- Simple in nature and easy to manage.
- Beginning a business needs no legal formalities.
- Owner is free to take quick decision and speedy action.
- It is easy to maintain secrets of business.
- Better employeer -employee relationship is possible.
- More the owner works, more benefit he reaps.
- It is easy to liquidate this company.

Disadvantages:

- Due to limited capital, it is not possible to expand the business, even if it is profitable.
- Life of single ownership is limited.
- Employees get no extra benefit from higher benefits small time business men cannot compute with big time business men.

Partnership

When the capital required to finance the business become too big or when the size of the enterprises grows, a single person may wish to associate himself with more persons either for more capital or for some skills and knowledge to run the business. A partnership business is owned by two or more person (up to 20) who share the powers, responsibilities and profit according to an agreement reached among themselves.

Partnership can be formed with a written agreement. The written agreement in called partnership deed, end has to be registered under the Indian partnership Act, 1932. Thus a partnership deed enjoys legal status and helps is setting day disputes in future between the partners.

General duties of partners

(i) be faithful to each other

(ii) Give true accounts and full information

(iii) Co-operate and accommodate each other

Types of partners:

(i) Active or managing partners:

They take part in the management of activities and formulation of policies. Some tines they get salaries in additon to the normal profits as partakers.

(ii) Sleeping or silent partners:

They do not take active part in the business. They simply get their share of profit from the firm according to their investment. But they are liable fare all the company debts.

(iii) Nominal Partners:

They lend their name to enhance company's repetition. They do not invest money and do not take any active part in the management but enjoy a small predefined share of the profit. They are not liable for company debts.

Advantages:

- Formation is easy.
- Adequate capital is available for investment and expansion programs.
- Work is divided and responsibility is reduced among partners.
- There is less possibility of errors in decisions. Persons having different abilities and skills may come together as partners giving specialization.
- Partnership business can be dissolved easily.

Disadvantages:

- Each partner has unlimited liability.
- It is difficult to maintain the secrets of the company.
- Possibility of misunderstanding between partners is high.
- A partners cannot being in another person in his place, i.e. he cannot transfer his position and assets to anybody without the consent of all other partners.

Applications:-

For small and medium size business, eg, small scale industries, warehousing, transport services, more production trading in stock market etc.

Joint stock company:

With the advent of factory system and consequent mass production, the individual ownership and partnership firms with their limited capital, short life span and limited managerial skill could not meet the demand of the industry. This resulted in the evolution of joint stock company .

The person who purchase the shares are called shareholders and the highest managing body known as Board of directors is elected by the shareholders.

The companies so forced have to be registered under the Indian Companies Act, 1956.

Types of joint stock companies.

(i) Private Limited Company

(ii) Public Limited Company

(i) Private Limited Company : A private limited company is a bigger and improved version of partnership. But here the member of shareholders may be up to 50 excluding the employees. The registration of the company is also compulsory according to the Indian Companies Act, 1956.

The shares can be transferred only among the members. Normally the members of such a company are friends, relatives or employees of some organization. Secret of the business can be maintained to a certain extent in such a company.

A private limited company need not obtain a business commencement certificate from the Registrar of the joint stock companies. If also need not circulate the Balance sheet, profit and loss account etc, among its members. But it has to hold an annual general meeting and place the financial statements in such a meeting.

Application

Companies like Bharati Enterprises, Bata Shoe Company, House of Khodays etc.

(ii) Public Limited Company:- A private limited Company is formed where the capital is collected from general public by issuing Shares usually having a face value like Rs.10, 20, 50,100. The minimum number of persons required to form a public limited company is 7 but there is no limit. Companies can advertise and attract the general public to buy its shares which are transferable and can be sold to anybody at any price. The affairs of the company are managed by a group of members called. Board of directors who are elected by the shareholders. One of the directors usually is selected as the Managing directors who has enormous powers to been the company, but is answerable to the Board of Directors. The board of directors formulates the plans and policies of the company, takes for reaching decision and generally adviser the Managing director on the administrative aspects of the company. The managing director implements these plans and policies and is in charge of

the major activities of the company like production, planning and sales. He is responsible for the smooth functioning of the company.

Advantages

- Large amount of capital can be raised.
- Shares are transferable.
- Shareholders liability is limited to the shares they hold.
- It create huge employment possibilities.
- Risks of losses are spread out to many shareholders.
- Share holders are protected by Government restriction on the company on the company.
- Business can be run efficiently by employing professionals.

Disadvantages

- A great deal of legal formalities are required to start the company.
- Some decisions may be delayed because they have to be approved by the Board of directors who do not meet very often.
- Labour related problems are difficult to solve.
- It is difficult to maintain secrets of business.
- The directors may select their own men for high posts and build up their power.
- Application
- Companies like infosys, TISCO, L & T, Hindustan lever, Reliance are all public limited companies.

Co-operative societies:

Co-operative Society is a form of collective ownership where a number of people associate together for obtaining the necessities of everybody life at a rate less than the market rate.

The members of the Society Supply the capital, manage the business and share all profits and losses. Equality, mutual trust, mutual supervision, self reliance and laid works are the five pillars of a stable and successful co-operative organisation. If continues the features of large partnership as well as some features of joint stock company. This form of ownership was first developed in Germany due to two important reasons.

(i) The poor were exploited through long working hours poor wages, bad working condition etc; by the capitalists who owned large scale industries.

(ii) Too many middlemen between the producers and end users, increased the prices of the products and reduced the profit of the producers.

Types of Co-operative Societies:

(1) Producers Co-operative Society:- They manage their own business right from production upto retail sales their eliminating the middle area. They are their own bosses and they are theirown employees. They put in hand works and learn how to work in team spirit.

eg: Milk and dairy products Co-operative Society in villages.

(2) Consumers Co-operative Society:- In this form of co-operative consumers living in a particular area come together, open a stock, buy goods directly from the manufactures and sell it at wholesale late to its members.

eg: Malleswaram Co-operative Society, Bangalore

(3) Housing Co-operative Society:- In this form of Co-operative, employees of an organisation come together, buys large plots of land at a cheap rate, convert them into sites, and help its members to build their own houses.

eg: B.E.L. Employees Housing Co-operative Society.

(4) Co-operative Banks:- In this form of co-operative members of the general public come together, contribute capital and start a bank. The bank accepts fixed deposits, extends loan facilities and encourages entrepreneurship among its members.

eg: Sir. M. Visvesvaraya Co-operative bank.

Advantages of Co-operative Societies

- Daily needs of life are available at low rates.
- It is a democratic form of ownership.
- Middlemen are avoided and so both produces and consumers are benefited.
- Holding of stocks and blade marketing are eliminated
- Once head costs are reduced because of honorary services by the members.

References:

http://managements6.blogspot.com/2011/05/industrial-ownership.html

LEADERSHIP STYLES:

- Leadership is the knack of getting other people to follow you and to do willingly the things you wants them to do.

Styles (Types) of Leadership:

1. **Authoritarian**
2. **Democratic and**
3. **Laissez Faire**

Authoritarian leadership:

- ✓ The leader makes all the decisions (no matter it is right or not) and demands obedience from the people he supervises
- ✓ All policies are determined by the leader without consulting the subordinates
- ✓ The leader dictates the subordinates
- ✓ Authoritarian leadership is negative because the subordinates remain uninformed; they feel insecure and remain afraid of the leader.
- ✓ In this type of leadership decisions can be taken quickly
- ✓ This technique is old fashioned but it works well in many cases

Democratic leadership:

- ✓ It is most popular today
- ✓ The leader consult his subordinates and discuss the problems
- ✓ A democratic leader promotes participation of subordinates and develops strong team work
- ✓ All policies come out of group discussion
- ✓ The leader take decisions after consulting his subordinates
- ✓ Subordinates know the long term plans on which they are supposed to work, thus they are kept well informed
- ✓ Democratic leadership: motivates employees to work and improves their attitude towards work
- ✓ It promotes healthier relations between workers and management
- ✓ It minimizes the employee grievances
- ✓ It raises the employee morale
- ✓ It works very well if the subordinates(also) feel their responsibility

Free rein or Laissez faire Leadership:

- ✓ The leader acts as an information centre and exercises minimum of control
- ✓ There is complete freedom for group and individual decision with a minimum of leader participation
- ✓ The leader depends upon subordinates sense of responsibility and good judgment to get the work done
- ✓ The leader simply a contact man, he ignores leader contribution

- ✓ This leadership work only if the subordinates are highly educated, brilliant and they possess good sense of responsibility

Human Resource Management/Personnel Management:

The management function that deals with recruitment, placement, training and development of organisation members.

Functions of HRM:

- Development of a personnel policy
- Manpower planning
- Recruitment and selection of manpower
- Analysis, description and valuation of work
- Compensation and schemes of appraisal
- Keeping records of personnel
- Welfare and safety programs
- Training and development of manpower
- Wages and salary administration
- Collective bargaining
- Employee grievance handling
- Promotions, transfers and retirement of employees

RECRUITMENT AND SELECTION OF MANPOWER:

- Recruitment: is the process of searching for prospective employees and stimulating them to apply for jobs in the organisation"
- It is the development and maintenance of adequate manpower resources. It involves the creation of a pool of available labour upon whom the organisation can depend when it needs additional employees

Sources of recruitment:

- Sources can be broadly classified as Internal and External
  - Internal: recruitment from within the industry
    - May be through promotions, transfers, company's training schemes

Advantages	Disadvantages
• Creates a goodwill of the employees towards the industry • Employees are fully aware about the environment and can rapidly adjust themselves	• Pre-convinced ideas and prejudices may hinder the performance of job • Inflow of new blood for new ideas may not be possible • May not be possible to find required talent and skill from within the organisation

• Less time-consuming	

- External Sources of Recruitment:
  - Former Employees (Retired Employees)
  - Recommendations
  - Employment Exchange
  - Advertisement
  - Applications at the gate
  - Educational and Academic Institutions
  - Labour Unions

SELECTION PROCEDURE:

- The various steps in selection procedure are as follows:
  1. Receipt of applications
  2. Scrutiny of applications
  3. Preliminary interview
  4. Application blank
  5. Employment test
  6. Employment interview
  7. Investigation of previous history (reference check)
  8. Preliminary Selection
  9. Physical/ medical Examination
  10. Final Selection

1. Receipt of applications:
   Applications give fair idea of applicant
   Details such as age, educational qualifications, experience etc. Will be present in the application
2. Scrutiny of applications (Preliminary Screening):
   The applications received can be categorised as:
   Must be (interviewed)
   Should be (interviewed)
   Need not be (interviewed)
   If there are adequate candidates in 'must be considered' then candidates in should be considered are deleted at this stage.

3.Preliminary Interview

- To eliminate unfit, unqualified applicants
- A sort of screening test
- To judge a person's suitability for the job

4. Application Blank:

- Successful candidates of preliminary interview are given a printed standardised application form
- Application blank is used to obtain information in the applicant's own handwriting
- Should incorporate questions such as personal details, education, experience, references, salary expected etc.

5.Employment Test:

- Some commonly used employment tests are as follows:
    - **Intelligence tests**: to measure individuals ability to understand instructions, to reason and to make judgement
    - **Trade tests**: Conducted for technical jobs, to judge the candidate with respect to his proficiency and skilfulness for a particular trade
    - **Psychological tests**: designed to measure emotional stability, introversion, extroversion etc.
    - **Aptitude tests**: To determine whether an individual has certain minimum natural abilities or talents that can be developed through proper training. Special aptitude tests may be conducted for specific jobs
    - **Interest tests**: to identify the areas in which an individual is particularly interested
    - **Personality tests**: Judging personality traits, ability to handle stress, etc.

6. Employment Interviews:

- Most important and widely used tool in selection process
- A verification of information furnished by candidate in the application blank must be made
- Interview should be conducted in a confidential and quiet environment
- Candidate should be encouraged to ask questions

7. Reference Check:

- Generally the last step before the candidate is offered job in an organisation
- Investigation is made to the reference regarding past employment, education, character, personal reputation
- Desirable candidates may be put in waiting list

8. Preliminary Selection

9. Medical Examination

- Ensure the candidates are medically fit

10. Final Selection:

- Successful candidates are ranked in order of preference
- Appointment letters are issued depending on the number of vacancies to be filled up
- Appointment letter must include post for which candidate is selected, pay scale, terms and conditions of appointment, date of joining etc.
- If appointment offer is not accepted by certain candidates then those in the waiting list may be considered

JOB EVALUATION:

- A job evaluation is a systematic way of determining the value/worth of a job in relation to other jobs in an organization. It tries to make a systematic comparison between jobs to assess their relative worth for the purpose of establishing a rational pay structure.
- Job evaluation is a systematic and objective process used by organizations to compare the jobs within the organization to determine the relative value or worth of each job. Keep in mind that the focus is on evaluating the job, not the people that perform the job.

Beth's (Beth is human resource specialist) employer will use job evaluations to determine the comparative worth of each job, which will then help determine the basis of the wages and salaries offered for each job. It helps ensure that everyone is paid fairly relative to one another based upon the value they bring to the organization. For example, if a mail clerk is paid more than an engineer, then there's probably a problem with pay equity because an engineer generally brings more value than a mail clerk.

Criteria used in job evaluations can include factors such as education qualifications, skills needed, working conditions and job responsibilities. Moreover, there are different types of methods available for Beth to use.

Ranking method:

- It is the simplest method of job evaluation.
- In this method, jobs are arranged from highest to lowest, in order of their value or merit to the organisation.
- Jobs can also be arranged according to the relative difficulty in performing them.

- Jobs are usually ranked in each department and then the department rankings are combined to develop an organisational ranking.

Job classification:

- According to this method, a predetermined number of job groups or job classes are established and jobs are assigned to these classifications.

- This method places groups of jobs into job classes or job grades.

- Separate classes may include office, clerical, managerial, personnel, etc.

- Following is a brief description of classification in an office:
  Class 1- Executives: Office manager, deputy office manager, department supervisor, etc.
  Class 2- Skilled workers: Purchasing assistant, cashier, receipts clerk, etc.
  Class 3- Semiskilled workers: Stenotypists, machine operators, switchboard operator, etc.
  Class 4- Semiskilled workers: file clerks, office boys, etc.

Point method:

- This method is widely used currently.
- In this method jobs are expressed in terms of key factors.
- Points are assigned to each factor after priortising each factor in order of importance.
- The points are summed up to determine the wage rate for the job.

Jobs with similar point totals are placed in similar pay grades

Factor comparison method:

- It is more systematic and scientific method of job evaluation.
- Though it is the most complex method of all, it is consistent and appreciable.

Under this method, instead of ranking complete jobs, each job is ranked according to a series of factors. **These factors include:** mental effort, physical effort, skills needed, responsibility, working conditions, know-how, problem solving abilities, accountibility, etc.

MERIT RATING:

http://www.yourarticlelibrary.com/ergonomics/difference-between-merit-rating-and-job-evaluation/34653

Merit Rating assesses the merit of the person doing the job. Merit rating determines the extent to which an employee meets job requirements. Job evaluation and Merit Rating are two complementary aspects of a sound personnel policy.

Merit Rating is a systematic and orderly approach to assess the relative worth of an employee working in an organisation in terms of his job performance, integrity, leadership, intelligence, behaviour, etc.

Merit rating is commonly referred to as Employee Rating, Employee Appraisal or Staff Reporting.

Objectives of Merit Rating:

(1) Merit rating provides a record of the worth of employees; they, therefore, can be put on the most appropriate jobs depending upon their capabilities.

(2) Merit rating unfolds the limitations of an employee and thus helps in employee improvement.

(3) Merit rating records form a basis for: (a) Wage-increase, (b) Promotion, (c) Special assignments, (d) Training, (e) Transfer, and (f) Discharge.

The different methods of merit rating, merit rating plans or merit rating systems are discussed below:

1. Rating Scale Method:

The steps involved in Rating Scale method are:

(a) Define the merit factors (i.e., standards) to rate the employees.

> The different factors, according to the nature of job may be as follows:
>
> i. Standard of output, ii. Quantity of output, iii. Intelligence, iv. Job knowledge, v. Leadership, vi. Integrity, vii. Dependability, viii. Education and experience, ix. Efforts and initiative, x. Adaptability, xi. Co-operation, xii. Judgment, xiii. Character, xiv. Loyalty, and xv. Health and appearance.
>
> The number of factors employed for rating an employee may vary from six to ten.

(b) Divide each factor into three to five different grades or degrees like Excellent, Very good, Good, Fair and Unsatisfactory.

(c) Impart certain points (marks) to each grade.

(d) The worth of an employee can be determined from the total points he gets for all his merit factors. On the basis of these points different workers can also be compared.

2. Check List Method:

The method employs a list of questions and several statements which are concerned with the employee performance on various aspects of the job and which are considered important for evaluating the merit of an employee for that job. The questions are of Yes or No type. Each question or statement possesses certain points which when totaled together for all the relevant questions indicate the rating of an employee.

Advantages:

(i) It is a good method of merit rating.

(ii) It reduces Halo-Effect.

Disadvantages:

It is time consuming and very difficult to construct statements and prepare appro-priate questions.

3. Employee Comparison Method:

The method compares a worker on a job with all other workers on the same job, in pairs. Suppose there are four workers namely W, X, Y and Z.

Then,

W is compared with X and suppose W is better

W is compared with Y and suppose Y is better

W is compared with Z and suppose W is better Next,

X is compared with Y and suppose Y is better

X is compared with Z and suppose Z is better

Y is compared with Z and suppose Y is better

The summary of the results shows that

W turned out to be better – 2 times

X turned out to be better – Nil.

Y turned out to be better – 3 times (maximum) and

Z turned out to be better – 1 time.

Therefore, the worker Y is taken to be the best worker.

This method consumes much time especially when the number of employees to be compared is large.

Advantages of Merit Rating:

Besides a few mentioned under objectives, other advantages of Merit Rating are as listed below:

(1) Merit rating develops the ability of a rater,

(2) Meritorious employees are encouraged,

(3) Employee-employer relations improve.

(4) It is easy to deal with the unions as merit rating is a systematic method to rate the employees.

(5) It involves lesser calculations as compared to other incentive schemes.

Disadvantages of Merit Rating:

(i) It entails Halo Effect. Halo effect means the tendency of the rater to rate an employee consistently low, average or high in all jobs, simply basing upon the general impression formed by him about the employee.

(ii) Correct results will not be obtained, if merit factors relevant to a particular job are, somehow or other omitted or points allocated to them are not fair.

(iii) A rater may play safe and tend to impart average grade to an employee who otherwise deserves unsatisfactory rating.

(iv) A rater, if he does not make enough personal contacts with each employee cannot rate them correctly.

(v) A rater (i.e., supervisor) may not like to degrade his subordinates who maybe excellent otherwise but not good at work.

(vi) Merit rating does not reward employees immediately for their performance.

Difference Between Merit Rating and Job Evaluation:

1. Rating of job/Employees:

Job evaluation is related with the rating of the job whereas merit rating is a systematic process or evaluation of the capacities and abilities of the man doing the job.

2. Purpose:

The purpose of the job evaluation is to fix wages for the jobs by considering certain factors such as skill, responsibility etc. In case of merit rating, the purpose is to evaluate the employee for the purpose of promotion, training, pay increase or incentives etc.

3. Job difference/Individual differences:

Job evaluation considers the differences in jobs whereas merit rating recognizes the individual differences.

4. Objectives/Subjective Qualities:

The type of factors to be considered are objective in case of job evaluation, whereas in case of merit rating subjective qualities are considered.

5. Performance of individual versus job:

Job evaluation becomes the basis of determining wages whereas merit rating is undertaken to find out the efficiency of the individual for doing specific jobs.

6. Test of worth versus merit:

In job evaluation, an attempt is made to know the worth of a job in terms of certain factors such as responsibility and effort (mental as well as physical). Merit rating identifies the capacity and capability of an individual for doing specific job.

7. Uses:

Job evaluation is meant for determining the wages on an employee. On the other hand, merit rating is utilized for placement and training etc.

WAGE AND INCENTIVES

Wage: a fixed regular payment earned for work or services (or) wage is the return given to workers for their mental and physical efforts which they put into the production process

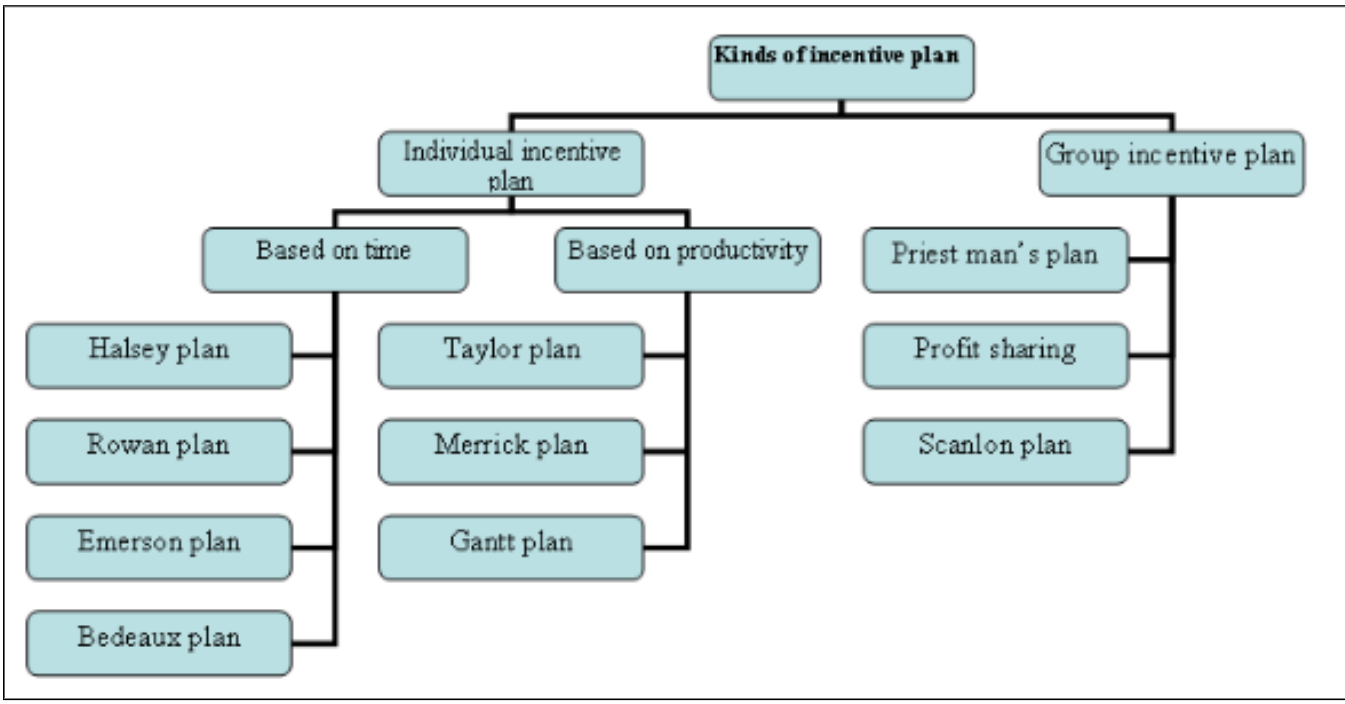
Incentive: Incentives are an additional remuneration payable to efficient workers for their meritorious performance to motivate them to be more productive.

Types of incentive plans:

2 types or kinds or methods of incentive plans exist.

1) Individual incentive plan

2) Group incentive plan



1) Individual incentive plan: it may either be time based or production based. Under time based plan a standard time is fixed for doing the job. A worker is said to be efficient if he completes the job in time and he is given the reward for his efficiency.

i) The time based individual incentive plans are:

a) Halsey plan

b) Rowan plan

c) Emerson plan

d) Bedeaux plan

a) Halsey plan: under Halsey plan minimum wages are guaranteed to every worker. A standard time is fixed for the workers. If the workers finish the work before standard time they are given bonus. But there no penalty if they fails to do that.

Total wages (W) =T×R+ 50% of (S – T)×R

Standard time(S) =15 hours

Time taken (T) = 10 hours

Rate of wages(R) = Rs 10 per hour

Bonus (P) = wages of 50% of time saved

Than wages= 10×10+50 %×(15-10)×10 = Rs. 125

Advantages of Halsey Plan:

1. It guarantees minimum wages to all workers, whether efficient or inefficient.

2. Efficient workers are induced to show better results by offering them additional wages as incentive.

3. The employer also gains under this system because worker s are not ‘ paid for full time saved by them and fifty percent goes to management.

4. This method is very simple. Workers can make their calculations very easily.

5. There is no need to over speed because incentive is not for more production but for time saved as is clear from above example.

Limitations of Halsey Plan:

1. The workers are not given full reward to their efforts. Normally they are paid for half of the time saved and not for full time. This may discourage workers.

2. It may be difficult to fix standard time for completing a job.

3. The quality of products suffers because workers try to complete the work in shortest possible time.

b) Rowan plan: it is the modification of the Halsey plan it also guarantees the minimum wages and does not penalize the slow workers. Standard time is fixed and the bonus is paid on the basis of time saved

Total wages (W) =T×R+[T×R×(Time saved/ Standard time)]

Standard time(S) =15 hours

Time taken (T) = 10 hours

Rate of wages(R) =Rs. 10 per hour

Bonus (P) = Time saved/ Standard time

Than wages= 10×10+[10×10×(5/15)] = Rs. 133.33

Advantage of Rowan Plan:

1. This method provides minimum wages to workers.

2. The worker is not induced to rush through the work because bonus increases at a decreasing rate at higher levels of efficiency. Thus the quality of goods, under this system will not suffer.

3. Labour cost per unit is reduced because time saved is shared by the worker and management both.

4. The increase in production will reduce overhead cost per unit produced.

Disadvantages of Rowan Plan:

1. The calculation of bonus under this system is complicated. In Halsey plan workers know that he will get additional wages for half of the time saved. In this method a certain proportion of time saved is paid as incentive. The calculation involved is difficult for workers to understand.

2. This method is unjust for efficient workers since bonus is paid at decreasing rate.

3. Labour cost is generally higher in this method.

c) Emerson plan: in this plan minimum wages are guaranteed to the workers efficiency is measured on the basis of the comparison of actual performance with the standard fixed. Under this plan bonus is 20% of wages earned at 100% efficiency and increases by 1% with every percent increase in efficiency. If efficiency is 110% then bonus will be 30% at this level. Efficiency of workers is well acknowledged in this system.

Benefits of Emerson Plan:

1. It is simple easily understandable by workers.

2. Workers get security because minimum wages are paid if efficiency is upto 66 2/3 %

3. It provides stimulus to workers for increasing their efficiency. The rate of bonus increases progressively so provides encouragement for improving efficiency.

4. It provides incentive even to beginners and less efficient persons.

Limitations of Emerson Plan:

1. Standards may be set fairly high and workers may not be able to achieve them.

2. Workers may not be encouraged to increase their output beyond the standard level because benefits may be nominal after that level.

3. The records of standards will have to be kept separately for different categories of workers. It increases clerical work.

d) Bedeaux plan: under this minute is the time unit described as the standard minute. The standard time for each job is fixed after undertaking time and motion study expressed in terms of B. the standard time for a job is the number of B's allowed to complete it. Generally the bonus paid to the worker is 75% of the wages for time saved. The rest 25% goes to the foreman.

Standard time(S) = 360 B's (6hours×60 minutes)

Actual time (T) =300 B's (5hours×60 minutes)

Wage rate(R) = Rs 10 per hour

Value of time saved=[(360-300)/60]×10 = Rs10

Total wages (W) =S×R+75%of value saved

=6×10 + **(75/100)×10**

=Rs. 67.5

Advantages of Bedeaux Plan:

1. It ensures minimum wages to all workers.

2. This method is very simple and is easy to understand.

3. The supervisor is motivated to co-operate with the workers for increasing their efficiency.

Limitations of Bedeaux Plan:

1. Workers are tempted to hurry up with the job and strict supervision will be necessary for maintaining proper quality control.

2. Worker resent sharing of their efforts with supervisors or superior.

3. The standard task may be too difficult to perform within a specified time.

ii) The production based individual incentive plans are:

Under the production based incentive plan a standard output is fixed and the workers are paid on the basis of the production. They are given incentive if they produced more number of units than the standard fixed. it includes the

a) Taylor plan (Taylor differential piece rate system)

b) Merrick plan

c) Gantt plan (Gantt Task and Bonus Plant)

1. Straight Piece Rate Plan: (Piece rate system)

Under the straight piece rate plan workers are paid based on their output. For example, if the piece rate is Rs. 4 per piece of the product, then a worker who turns out 40 pieces/day earns Rs. 160 (Rs. 4 x 40) as his wage for that day. Whereas another employee who produces 32 pieces/ day earns Rs. 128 (Rs. 4 x 32 pieces). Hence a fast worker earns more compared to the slow worker.

Advantages:

i. Motivates the workers to increase their output.

ii. Simple and easy to understand.

iii. improve productivity.

Disadvantages:

i. No guaranteed minimum wage. This makes workers insecure.

ii. Great disparity of earning between slow and fast workers.

iii. Wastage might increase.

iv. Quality of production may suffer as the workers concentrate on quantity.

v. Interpersonal relationship suffers due to jealousy and competition to earn more.

vi. Enforced idleness like electricity failure or machine breakdown, adversely affect earning of workers.

a) Taylor's differential piece rate system: in this plan, Taylor did not give minimum guarantee to each worker. As per his statement it is possible to calculate standard workload for every worker on the basis of time and motion studies. He gave two piece rates for the workers. The lower rate for average and less efficient workers, who produce less than the standard production and the higher piece rate for the above average or efficient workers. So the efficient workers are paid more than the inefficient workers.

Standard production = 40 units in a day

Wage rate = between 60 to 70 Rs

If the worker produces 40 units in a day he will be paid 40×70= Rs. 2800

If the worker produces 30 units in a day he will be paid 30×60 = Rs. 1800

As only those who give standard output or more will be paid at Rs 70 and rest will be paid at Rs 60 only.

Thus in this method inefficient workers are penalized. Workers are treated like machines and there is no guarantee of minimum wages in this method.

b) Merrick's multiple piece rate plan: under this plan there are three grade piece rate rather than two given by Taylor.

Workers who produce Less than 83% are paid basic piece rate

Workers who produce between 83%- 100% are paid 110% of basic piece rate

Workers who produce more than 100% paid 120% of basic

Thus this system is improvement over the Taylor's plan. But this system also does not give guarantee minimum wages to the workers. All the workers producing between 1 to 82% of standard output are considered same and paid at the same piece rate.

Example:

Standard Output = 200 units
Piece-rate = 10 paise

Case (1): Output = 160 units
Efficiency = 160/200 x 100 = 80%

Since the efficiency is less than 83%, the worker is paid only the basic rate, i.e. 10 paise. Thus, **earnings will be Rs 8 (80 x 0.1).**

Case (2): Output= 180 units
Efficiency = 180/200 x 100 = 90%

As the efficiency is more than 83% but less than 100 percent, 10% above the normal rate is paid to the worker. Thus,
Earnings = 90 x 110/100 x 0.1 = Rs 9.9

Case (3): Output = 220 units
Efficiency = 220/200 x 100 = 110%

As the efficiency is 110%, 20% above the normal rate is paid to the worker. Thus,
Earnings = 110 x 120/100 x 0.1 = Rs 13.30

Note: Under Merrick differential piece-rate system the workers are not penalized for producing below the standard output up to 83%.

c) Gantt's bonus plan: under this method minimum wages are guaranteed. If the worker fails to complete the task within the standard time he receives only the wages for actual time spent at the specified rate. But if he completes the task within time he gets extra wages.

Suppose the standard time fixed for the job is 8 hours and time rate is Rs. 10 per hour and the rate of bonus is 25%, then a worker who completes the job in 10 hours will be paid Rs. 10 x 8 = Rs. 80. On the other hand the worker who completes the job in 6 hours will be paid Rs 100 (Rs. 80 + 25% of Rs. 80).

Advantages:

i. Minimum guarantee exists.

ii. Fast worker is paid bonus at higher rate proportional to their output.

iii. Standard worker is paid 20% bonus.

iv. Part of bonus is shared by the organisation.

Disadvantages:

i. Sharing of bonus by organisation is resentment.

ii. Disunity among the slow and the fast workers.

PROJECT MANAGEMENT:

A project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. So a project team often includes people who don't usually work together – sometimes from different organizations and across multiple geographies.

the development of software for an improved business process, the construction of a building or bridge, the relief effort after a natural disaster, the expansion of sales into a new geographic market — all are projects.

Project management, is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

Project managers (PMs) are responsible for planning, organizing, and directing the completion of specific **projects** for an organization while ensuring these **projects** are on time, on budget, and within scope.

Project management processes fall into five groups:

- Initiating
- Planning

- Executing
- Monitoring and Controlling
- Closing

Project management techniques: CPM (Critical Path Method) and PERT (Programme Evaluation and Review Technique)

Management Information system (MIS):

- Management Information System may be defined as a formal method of making available to management the accurate and timely information necessary to facilitate the decision making process and enable the organizations planning, control and operational functions to be carried out effectively.

A management information system (MIS) is a computer system consisting of hardware and software that serves as the backbone of an organization's operations. An MIS gathers data from multiple online systems, analyzes the information, and reports data to aid in management decision-making.

The following are types of information systems used to create reports, extract data, and assist in the decision making processes of middle and operational level managers.

- Decision support systems (DSS) are computer program applications used by middle and higher management to compile information from a wide range of sources to support problem solving and decision making. A DSS is used mostly for semi-structured and unstructured decision problems.
- Executive information systems (EIS) is a reporting tool that provides quick access to summarized reports coming from all company levels and departments such as accounting, human resources and operations.
- Marketing information systems are management Information Systems designed specifically for managing the marketing aspects of the business.
- Accounting information systems are focused accounting functions.
- Human resource management systems are used for personnel aspects.
- Office automation systems (OAS) support communication and productivity in the enterprise by automating workflow and eliminating bottlenecks. OAS may be implemented at any and all levels of management.
- School Information Management Systems (SIMS) cover school administration, often including teaching and learning materials.
- Enterprise resource planning (ERP) software facilitates the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders.[10]

- Local Databases, can be small, simplified tools for managers and are considered to be a primal or base level version of a MIS.

The following are some of the benefits that can be attained using MIS:

Improve an organization's operational efficiency, add value to existing products, engender innovation and new product development, and help managers make better decisions.[12]

- Companies are able to identify their strengths and weaknesses due to the presence of revenue reports, employee performance records etc. Identifying these aspects can help a company improve its business processes and operations.
- Giving an overall picture of the company.
- Acting as a communication and planning tool.
- The availability of customer data and feedback can help the company to align its business processes according to the needs of its customers. The effective management of customer data can help the company to perform direct marketing and promotion activities.
- MIS can help a company gain a competitive advantage.
- MIS reports can help with decision-making as well as reduce downtime for actionable items.

Some of the disadvantages of MIS systems:

- Retrieval and dissemination are dependent on technology hardware and software.
- Potential for inaccurate information.

UNIT 2: ORGANIZATION STRUCTURE AND PLANT LAYOUT

Organisation:

* An organisation is a social unit or human grouping deliberately structured for the purpose of specific goals.

* Organization may be defined as the process of (i) identifying and grouping the work to be performed (ii) defining and delegating responsibility and authority and (iii) establishing relationships for the purpose of enabling people to work most effectively together in accomplishing their objectives.

Importance of organisation:

* Facilitates administration
* Facilitates growth and diversification.
* Facilitates effective use of manpower
* Stimulates creativity.
* Optimum use of resources.
* A sound organisation leads to specialization.
* A sound organisation minimises inefficiencies.
* A sound organisation does not generate confusion There is less wastage and expenditure.
* A sound organization facilitates the training and management development of personnel.

Characteristics of an organisation:

* It should have a purpose or goal
* A clear concept of the major duties or activities required to achieve the purpose.
* classification of activities into jobs and
* establishment of relationships between these jobs.

Process of organising or organisation:

In performing the organising function, the manager differentiates and integrates the activities of his organisation.

By differentiation is meant the process of departmentation or segmentation of activities on the basis of some similarity.

Integration is the process of achieving unity of effort among the various departments (segments or subsystems).

We can describe this differentiation and integration in terms of the following steps.

(1) Consideration of objectives:

- The first step in organizing, is to know the objectives of the enterprise.
- Objectives determine the various activities which need to be performed and the type of organisation which needs to be built for this purpose.

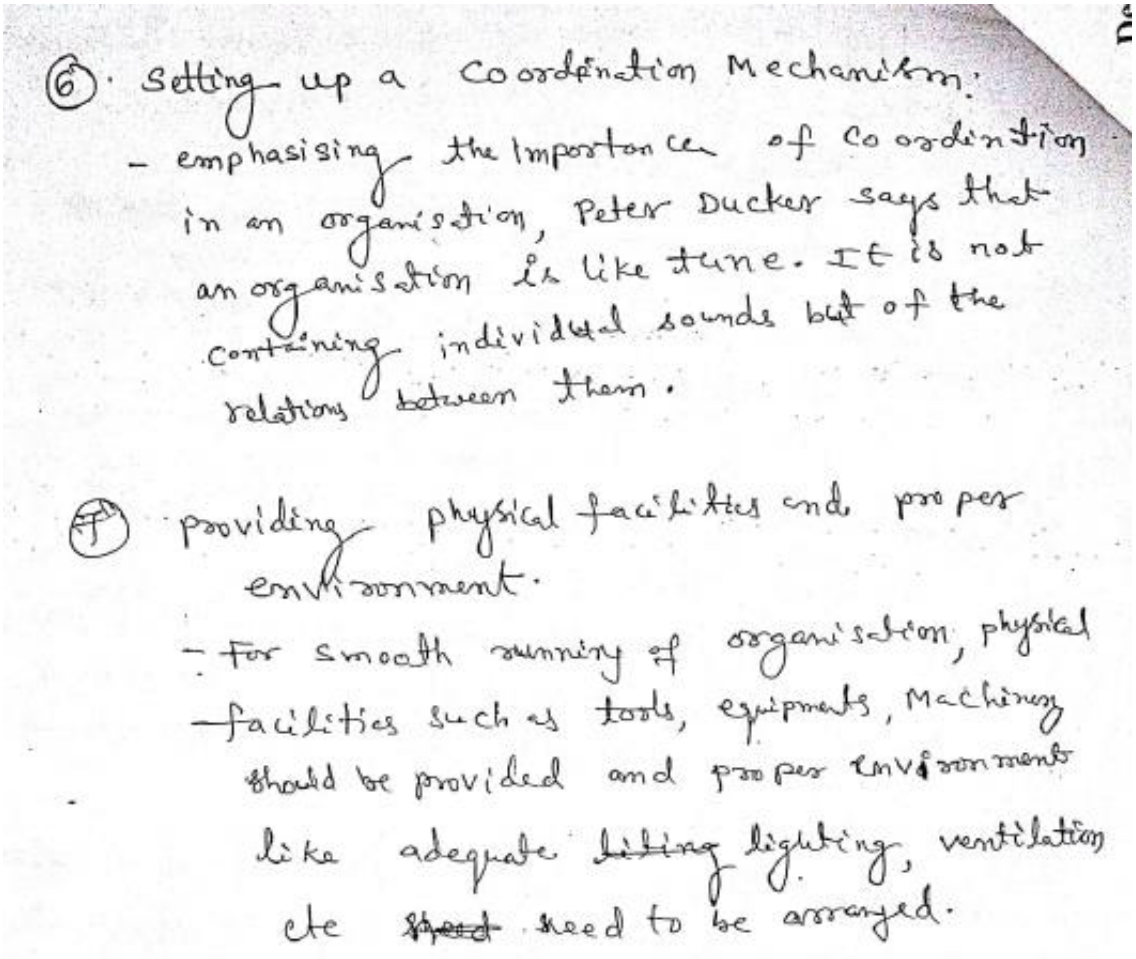
(2) Grouping the activities into Departments:

- After the consideration of objectives, the next step is to identify the activities necessary to achieve them and to group the closely related and similar activities into departments and sections.
- In addition, the activities of each department may further classified and placed under the charge of different sections of the department.

Deciding which department will be key departments
- Key departments are those which are rendering key activities. i.e activities essential for the fulfilment of goals.
- Such key departments demand key attention.
- other departments exists merely to support or serve them.

(4) Determining Levels at which various Type of Decision are to be made:
- After deciding the relative importance of various departments, the levels at which various major and minor decisions are to be made must be determined.
- Each firm must decide for itself as to how much decentralisation of authority and responsibility it wants to have.
- extream decentralisation may lead to loss of control as a result of which firms as a whole may fail to achieve its overall objectives.
- Extream centralisation may lead to wrong decisions at wrong times and complete breakdown of the morale of employees.

(5) Determining the Span of management:
- Next step to be taken in designing organisation structure is to determine the number of subordinates who should report directly to each executive.



Principles of organization:

- Consideration of Objectives
- Combination of Line and Staff Functions
- Division of Labour or Specialisation
- Departmentation
- Decentralisation
- Principle of Scalar Chain
- Principle of Span of control
- Principle of Unity of Command
- Principle of Balance
- Principle of Flexibility
- Authority and Responsibility

- **The Principle of Objective**

  Every enterprise, big or small, prescribes certain basic objectives. Organisation serves as a tool in attaining these prescribed objectives

- **Principle of Specialization**

  Precise division of work facilitates specialization. According to this principles division of work between the employees must be based on their ability, capability, tasks, knowledge and interest. This will ensure specialization and specialization will lead to efficiency, quality and elimination of wastage etc.

- **The Scalar Principle**

  This principle is sometimes known as the 'chain command'. There must be clear lines of authority running from the top to the bottom of the organisation.

- **The Principle of Authority**

  It is the tool by which a manager is able to create an environment for individual performance.

- **The Principle of Unity of Command**

  One subordinate should be kept in the supervision of one boss only. This principle avoids the possibility of conflicts in instructions and develops the feeling of personnel responsibility for the work.

- **The Principal Span of Control**

  It is also known as 'span of management', 'span of supervision' or 'levels of organisation', etc.

- **The Principle of the Unity of Direction**

  The basic rationale for the very existence of organisation is the attainment of certain objectives. Major objective should be split into functional activities and there should be one objective and one plan for each group of people.

Organization structure:

Organizational structure refers to how individual and team work within an organization are coordinated. To achieve organizational goals and objectives, individual work needs to be coordinated and managed. Structure is a valuable tool in achieving coordination, as it specifies reporting relationships (who reports to whom), delineates formal communication channels, and describes how separate actions of individuals are linked together. Organizations can function within a number of different structures, each possessing distinct advantages and disadvantages. Although any structure that is not properly managed will be plagued with issues, some organizational models are better equipped for particular environments and task.

TYPES OF ORGANISATION OR TYPES OF ORGANISATIONAL STRUCTURES

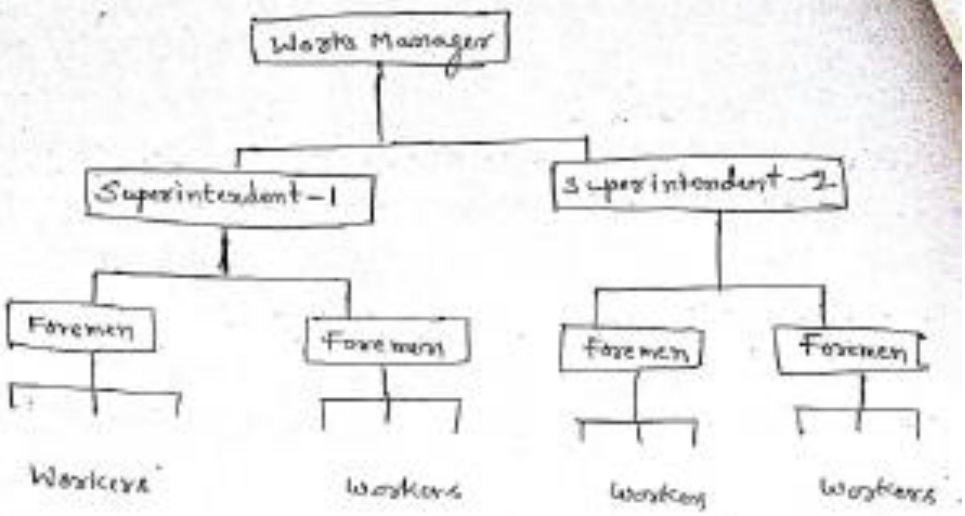
* Organisation structure marks lines of authority, responsibility and coordination.

* The structure of one industrial organisation differs from that of another organisation.
* Structure of an organisation depends upon
  (i) size of the organisation
  (ii) Nature of the product being manufactured.
  (iii) Complexity of the problems being faced.
* Choosing the right organisation structure is one of the most important decisions in the Company.
* organisational structure is dynamic, not static, because of the Constant change in the organisational environment.

* organisation structure has to provide:
  - Reaching organisation goals.
  - Optimal grouping of activities
  - Full attention on key functions
  - Efficient use of all available resources
  - clear responsibility

① Line, Military or scalar organisation:

- Line organisation is shown in figure below



* It was called military organisation because it resembled to olden military organisations.
* Line organisation is based upon relative authority and responsibility rather than on the nature and kind of operation or activities.
* The authority flows directly from the Waste Manager to Superintendent to foremen and from them to workers.
* Line organisation is direct and people at different levels knows to whom they are accountable.
* The immediate superior (or boss) give orders to the subordinates, assigns duties, dismisses and takes disciplanary action against them.
* An enterprise that starts small, probably starts with a line type of organisation.

Features:

* The lines of authority are vertical
* There is a command relationship between the superior and subordinate.
* The line of authority is the chain of communi-cation, coordination and delegation.
* It provides the channel of accountability in the organisation.

Advantages:

* It is simple and easy to understand.
* It makes clear division of authority (The authority and responsibility are clearly defined.
* Communication is easy and quick.
* It is easy to maintain discipline (because it fixes responsibility on an individual).
* It facilitates quick decisions and prompt action.
* It is flexible; easy to expand and contract.
* It is capable of developing the all-round executives at the higher levels of authority.

Disadvantages:

* It neglects specialists.
* It overloads a few key executives.
* In big organizations, the line authority can't operate satisfactorily.
* It encourage dictorial way of working.
* Due to lack of specialization perhaps there is more wastage of materials and manhours.
* Managers have to become experts in too many fields.

Applications:

Line organization is suitable for:

- Small concerns free from all complexities and
- Automatic and continuous process industries such as paper, sugar, textile etc.

(2) Functional organization:

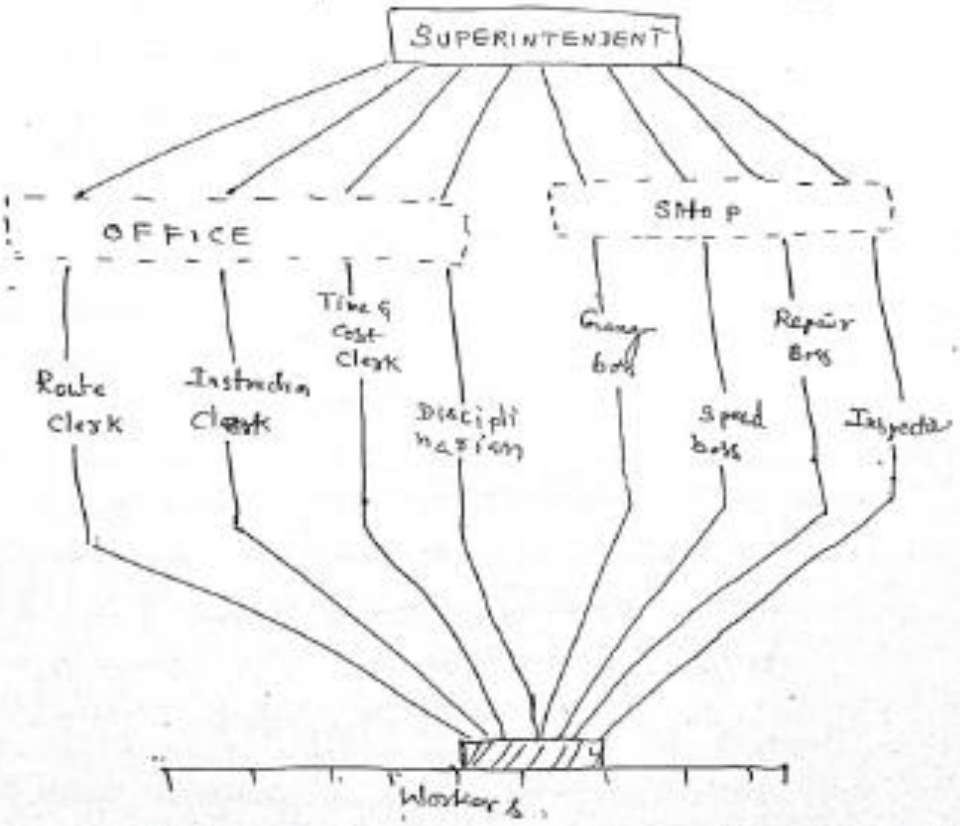
* F.W. Taylor suggested functional organization because it was difficult to find all-round persons qualified to work at middle management levels in the line organization.

* Taylor felt that a foreman can not be a specialist in all the fields. So he advised substitution of line organisation by functional foremanship at the lower levels of the organisational structure.

* In line organisation only one foreman is there over some workers and he should be a master or specialist of everything. But getting such a person is very hard. Hence, in this function organisation, there are eight functional foremen, four of them are located on the shop floor and remaining four in the office but everyone having direct and equal authority over the workers.

* Each function foreman who is a specialist in an activity is incharge of one function.

* Functional organisation is shown in figure below.



1. Route clerk : or order of work
Route clerk is incharge of issuing work orders and routing the jobs.

2. Instruction Clerk ; would issue specifications and instructions related to jobs to the workers.

3. Time and cost clerk : keeps records pertaining to the time (the workers have spent in doing work) and cost (i.e workers wages etc.)

4. Disciplinarian keeps the personal records of the workers and handles cases of insubordination

5. Gang boss : has the charge of the preparation of all work up to the time that the work piece set in the machine

6. Speed boss ensures that proper cutting tools are being used, cut is started at right place in the work piece, and the optimum speeds, feeds and depths of cut are being employed.

7. Repair boss : is responsible to keep the machines and tools in working condition.

8. Inspector or Inspection boss : looks after and is responsible for the quality of the product.

Advantages :

* Since a foreman is responsible for one function, he can perform his duties in a better manner.
* Functional organization makes use of specialists to give expert advice to workers.
* It relieves the executives of routine, specialised decisions.
* Expert guidance reduces the number of accidents and wastage of raw materials, man and machine hours.
* Quality of work is improved.
* It relieves pressure of need to search a large number of all-round executives.

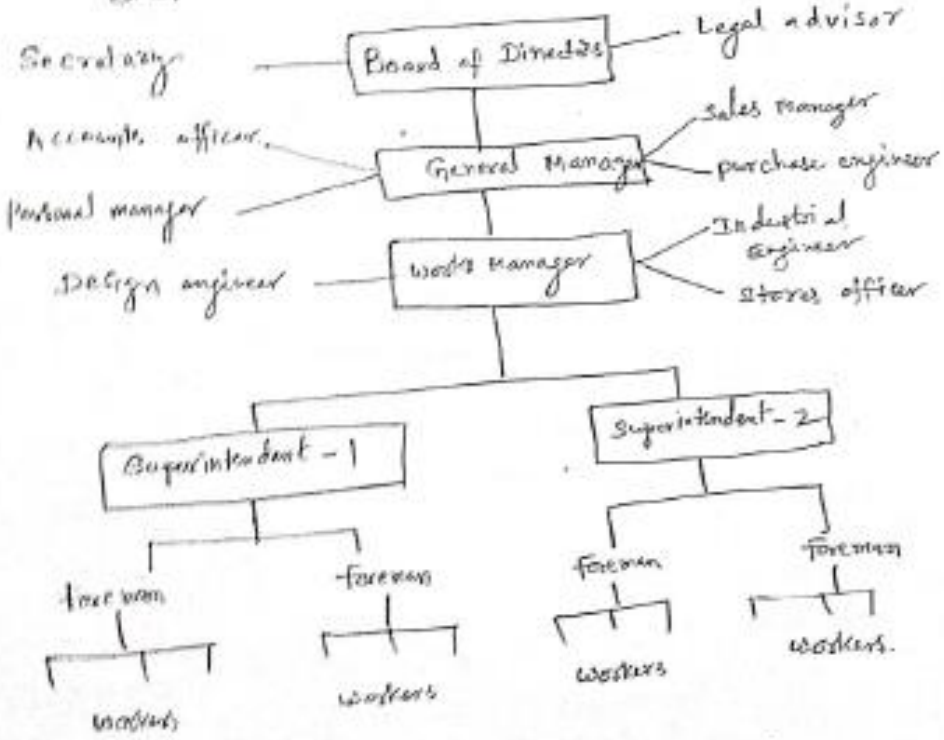
Disadvantages:

* It is difficult to main discipline as each worker is responsible to eight foremen.
* It is very difficult to fix up the responsibility to any one foreman in case something goes wrong.
* workers always remain confused about the Authority and activity of each foreman
* workers are not given opportunity to make use of their initiative
* All round executies cannot be developed.
* This type of organisation is not suited for non-manufacturing concerns.
* It violates the principle of unity of command as the workers have to report to a number of bosses.

3. Line and Staff Organisation:

* The line organisation gradually developed to shape as the line and staff organisation.
* As the Industry grew in size and complexity, the line executives could not perform properly all other functions such as R&D, planning, distribution, etc. This necessitated the employing of Speial executies to assist line executives and they were known as staff as they were recruited to perform Staffor Specialist function.

- Line executives have direct authority or direct control over the work of their subordinates. Staff executives have no such authority. Rather, they are meant to aid and advise the line managers at the same level.
- The final decision whether to accept and implement the recommendations of the staff executive remain in the hands of the line executive.
- The following figure shows a line and staff organisation. The line executives are marked vertically where as staff executives are placed horizontally.
- A variation of line and staff organisation is Line functional organisation in which staff executives has full authority over his particular function which may be inspection, work study, purchasing, employment etc.



Advantages of line and staff organisation:

* Expert advice from staff executives can be used.
* Line executives are relieved of some of their loads and are thus able to devote more attention towards production.
* Less wastage of material, men and machine hours.
* Quality of product is improved.
* There is no confusion as exists in functional organisation.

Disadvantages:

* Product cost is increased because of high salaries of staff executives.
* Line and staff organisation may get confusing in case functions are not clear.
* Friction and jealousies if developed between line and staff executives may cause harm to the enterprise
* Line executives if they start depending too much on staff executives may lose their initiative

Applications: Line and staff organisation is very common among the medium and large enterprises.

Project organisation:

When an already existing organisation finds it difficult to cope up with the new situations, it decides to launch a project organisation.

- In order to accomplish the project goals, a separate division is created for each project, project organisation is created when the project is big in size and subject to high standards of performance.

- Project organisation is solely responsive to the planning design, development, production, evaluation and support of a single system or product.

- A project organisation is time limited, directly oriented to the life cycle of that system, and the commitment of the varied skills and resources required is purely for the purpose of accomplishing system goals.

- A project team is created consisting of specialists from different departments of the existing organisation. The specialist of each department gets the services and support of its members as and when required. The activities of the project team are co-ordinated by the project Manager.

- In brief, the project structure is a vehicle for bringing specialised people together in flexible groups for as long as a particular need exists, but no longer. The project structure reduces the inflexibility and inefficiency of traditional organisation structures in which permanent departments tend to remain even after they have outlived their utility.

Need for project organisation:

Running enterprises go for project organisation if:

(1) project is a one time task with well defined specific actions and the firm wants to continue to concentrate on its regular activities.

(2) The project presents a unique or unfamiliar challenge.

(3) successful completion of the project is critical for the enterprise/organisation.

(4) The project is to be completed within the given time limit.

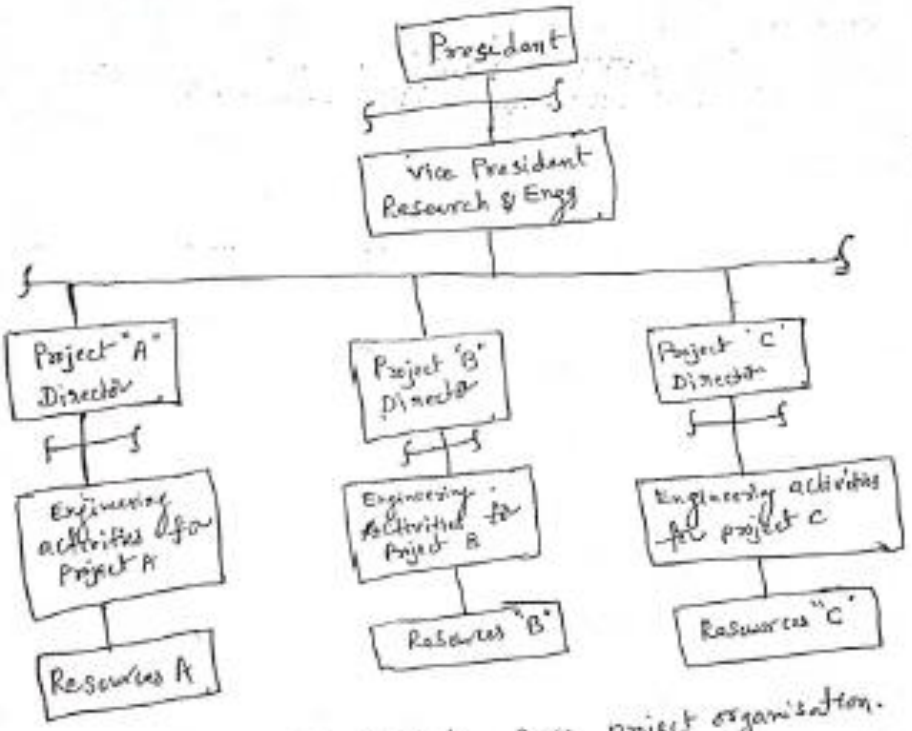


Fig: A simplified pure project organisation.

Advantages of project organisation:

(i) It does not interfere with the existing organisation.

(ii) It provides concentrated attention that a complex project demands.

(iii) It allows maximum use of specialists available in the enterprise.

Limitations of Project organisation.

(i) Project manager has to deal with persons of varied nature and interest.

(ii) Every one working in the existing organisation is attended to the projects.

(iii) Since work differs from project to project, experience gained in one project may not be relevant to other projects.

(iv) Project work being temporary, there is quite uncertainty and insecurity of job - for specialists hire from outside.

(v) Decision-making is very difficult because there are unusual pressures from specialists from diverse fields.

(vi) There may be conflicts among the specialists.

5. Matrix organisation:

* Matrix organisation is used when an organisation has to handle a variety of projects, ranging from small to large.
* When a pure project structure is superimposed on a functional structure, the result is a matrix structure.
* Matrix organisation is a project organisation plus a functional organisation.

The project structure provides a horizontal lateral dimension to the traditional vertical orientation of the functional organisation structure.

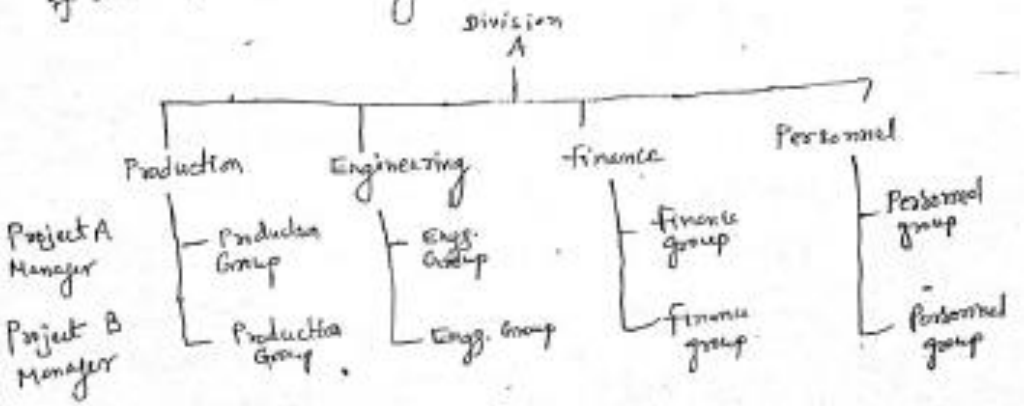


Fig. Matrix organisation.

Matrix organisation is created by merging pure project organisation and functional organisation.

* The project teams are persons composed of persons drawn from the functional departments for the duration of the project. When their assignment is over, they return to their respective departments.
* During continuation of the project, such persons have two bosses — one, from the functional department and second of the concerned project manager.

Advantages of matrix organisation:

* Services of specialists are better utilized.
* Professional identification is maintained.
* It is oriented towards end results.
* Pinpoints Product/project - profit responsibility.
* It is more flexible than a traditional functional hierarchy.

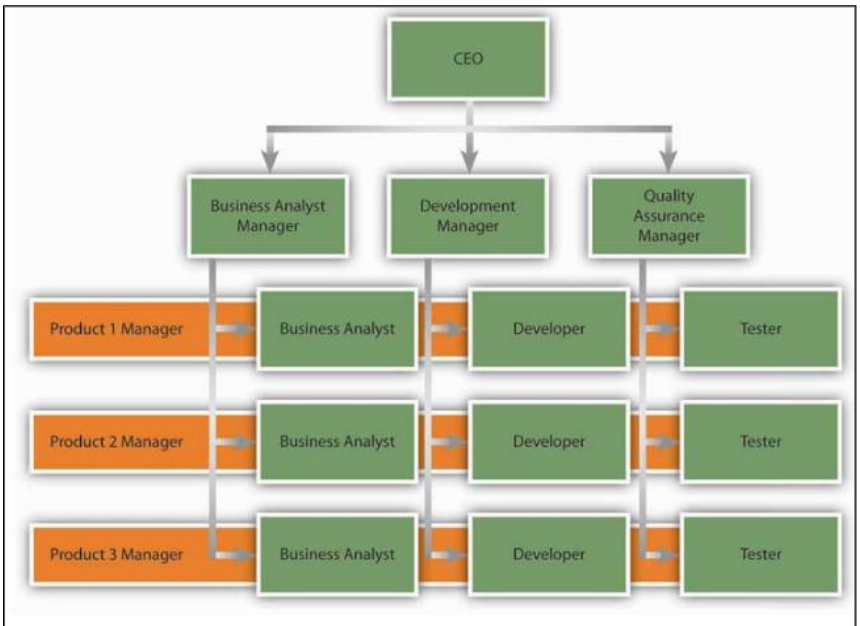
Disadvantages

(1) Matrix organisation violates the principle of unity of command as a person works under two bosses (Project manager and functional manager)
(2) Conflict in organisation authority exists.
(3) Requires manager effective in human relations.
(4) Possibility of disunity of command exists.
(5) Since persons are drawn temporarily from different departments, project manager does not have line authority over them.
(6) Project group is heterogeneous and due to which morale of the personnel may be low.
(7) organisation relationships are more complex and they create problems of coordination.

Use of matrix organisation: It is used in the following industries:
Electronics, Aerospace, Banking, Hospitals, Chemicals

Matrix Organizations:

Matrix organizations have a design that combines a traditional functional structure with a product structure. Instead of completely switching from a product based structure, a company may use a matrix structure to balance the benefits of product based and traditional functional structures. Specifically, employees reporting to department managers are also pooled together to form project or product teams. As a result, each person reports to a department manager as well as a project or product manager. In a matrix structure, product managers have control and say over product related matters, while department managers have authority over matters related to company policy. Matrix structures are created in response to uncertainty and dynamism of the environment and the need to give particular attention to specific products or projects. Using the matrix structure as opposed to product departments may increase communication and cooperation among departments because project managers will need to coordinate their actions with those of department managers. In fact, research shows that matrix structure increases the frequency of informal and formal communication within the organization. Matrix structures also have the benefit of providing quick responses to technical problems and customer demands. The existence of a project manager keeps the focus on the product or service provided.



An example of a matrix structure at a software development company. Business analysts, developers, and testers each report to a functional department manager and to a project manager simultaneously.

Despite these potential benefits, matrix structures are not without costs. In a matrix, each employee reports to two or more managers. This situation is ripe for conflict. Because multiple managers are in charge of guiding the behaviors of each employee, there may be power struggles or turf wars among managers. As managers are more interdependent compared to a traditional or product - based structure, they will need to spend more effort coordinating their work. From the employee's perspective, there is

potential for interpersonal conflict with team members as well as with leaders. The presence of multiple leaders may create role ambiguity or, worse, role conflict — being given instructions or objectives that cannot all be met because they are mutually exclusive. The necessity to work with a team consisting of employees with different functional backgrounds increases the potential for task conflict at work. Solving these problems requires a great level of patience and proactivity on the part of the employee.

The matrix structure is used in many information technology companies engaged in software development. Sportswear manufacturer Nike is another company that uses the matrix organization successfully. New product introduction is a task shared by regional managers and product managers. While product managers are in charge of deciding how to launch a product, regional managers are allowed to make modifications based on the region.

6. COMMITTEE ORGANIZATION:

Committee can be defined as a group of organisational members who discuss and develop solutions to problems. It can be either line or staff and can be established on a standing (permanent) or an ad hoc basis. In business enterprises, the board of directors constitutes the committee at the highest level. The purpose of such committees is to discuss various problems and recommend solutions to the management. It is generally found to co-exist with line and staff type of organisation. The Board of Directors of a company is an example of a committee organisation. Other examples are Executive Committee, Finance Committee, Recruitment Committee, Problem Solving Committee, Research and Development Committee, Procurement Committee. This form of organisation is suitable for taking decisions on policy matters or laying down broad objective for the enterprise.

- A number of persons may come together to take a decision, decide a course of action, advise line officers on some matters, it is a committee form of organization.
- A committee is not a separated type of organization as such. But it is a method of attaching persons or groups to line departments for advice and guidance in business planning and execution. A group of competent and interested persons pool their thoughts for facilitating decision making process.
- Sometimes there is a need to get opinion of other persons for taking important decisions. The thinking of varied persons is pooled together through deliberations and discussions and common decisions are reached. Because of collective information and analysis, committees are more likely to come up with solutions to complex problems. With the growth of organization the need for committee is more.

Types of committees:

- **A standing or permanent committee:** is needed in a complex organization experiencing multifaceted problems almost all times.
- **A temporary committee:** is formed to face and solve problems arising occasionally.

- **The committee in control:** has full powers to act and may assume a position that could be manned by one individual.
- **The coordination and discussion committee:** discusses problems and gives its advice. It has no power to act.
- **The advisory committee:** explores various aspects of a problem and suggests courses of action to the concerned executive, thereby helping him to reach the decisions for which he is held responsible. The committee does not have power to act. This committee is extensively used in business.
- **The educational committee:** aids in getting information about company problems, policies and projects to major individuals concerned.
- **Executive committee:** to take decisions example – board of directors

Principles of Committee Type of Organization:

1. Principle of Minimum Number of Member: The number of members of the committee should depend on the need and be optimum minimum. The maximum members are five -ten , so that the committee can be properly managed.
2. Principle of Inclusion of Concerned Members: Members of the committee must be those persons who are concerned and interested with the assigned jobs.
3. Principles of Regular Meeting of Committee: The meetings of committee must be regularly called in proper manner. Every member of the committee must be duly notified of the meetings being called for.
4. Principles of Rights and Duties of Members: It is necessary that the rights and duties of the member of the committee must be clearly defined.
5. Principle of Liabilities of Members: The liabilities of the committee members must only be limited to the rights and authorities delegated to them.
6. Principles of Agenda of the Committee: All meetings being called for must have predetermined agenda to avoid wasting so much time.
7. Principle of Mutual Trust: Mutual trust and feeling among members of the committee shall promote cooperation.
8. Principle of Membership Retirement: Members of committee must be liable to retire by rotation to have rigor and continuity.
9. The recommendations made by the committee should be published and circulated to interested and concerned persons.
10. Committee must be dissolved after its purpose is over.

Merits or advantages:

The committee form of organization offers following advantages:

- A committee often performs worthwhile tasks since two experts are better than one.
- A committee reduces the work load of management.
- Committee are good at innovation or brain storming.
- A committee helps securing cooperation of various personnel.
- Committee meeting may be called to train younger executives and to give them a keener insight into the operation of the business .
- Sometimes problems are so complex or of inter-departmental nature that they are best solved by committees composed of concerned executives.

- It is able to serve as a mechanism of participative decision making. By participating in discussions or decision, a member feels motivated in accepting a situation or implementing a decision.
- Committee form of decision making is a democratic process. It provides for participative decision-making.
- It is extremely useful in coordinating plans as well as in facilitating their execution.

Demerits or Disadvantages or weaknesses or limitations:

1. Delay: The main drawback of committee form of organization is delay in taking decisions. A number of persons express their view points in meetings and a lot of time is taken on reaching a decision. The fixing of committee meetings is also time consuming. An agenda is issued and a convenience date is fixed for the meeting. The decision making process is very slow and many business opportunities may be lost due to delayed decisions.

2. Compromise: Generally, efforts are made to reach consensus decisions. The view point of the majority is taken as a unanimous decision of the committee. The thinking of the minority may be valid but it may not be pursued for singled out. They may accept less than an optimal solution, because of a fear that if their solution proves wrong then they will be blamed for it.

3. No Accountability: No individual accountability to be fixed if these decisions are bad. Every member of the committee tries to defend himself by saying that he solves a different solution. If accountability is not fixed then it is the weakness of the organization.

4. Domination by Some Members: Some members try to dominate in the committee meetings. They try to thrust their view point on others. The aggressiveness of some members helps them to take majority with them and minority view is ignored. This type of decision making is not in the interest to the organization.

5. Strained Relations: Sometimes relations among committee members or with others become strained. If some members take divergent stands on certain issues, some may feel offended. In case some issue concerning other persons is discussed in a committee and members taking stand not liked by those persons may offend them. The discussions in the meetings are generally leaked to other employees. Some unpleasant decisions may not be liked by those who are adversely affected. It affects relations of employees not only on the job but at personal level also.

6. Lack of Effectiveness: The role of committees is not effective in all areas. The committees may be useful where grievance redressal or inter personal departmental matters are concerned. Committees may not be effective where policies are to be framed and quick decisions are required. Individual initiative will be more effective in these cases. So committees have a limited role to play.

7. Lack of secrecy

Flat and tall organization:

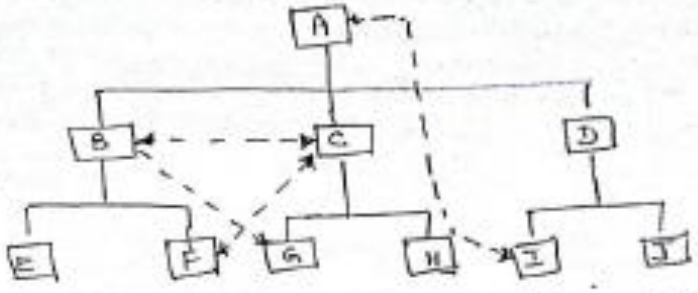
The structure of business organizations can be described as either tall or flat, which refers to the levels of management in the organization's hierarchy and the

corresponding distance between front-line or entry-level employees and top management. Whether a business has a tall or a flat structure can have important impacts on a variety of elements within the organizational culture. Differences between tall and flat organization are given below.

Sl. No	Factor	Tall organization	Flat organization
1	No. of management levels	more	Less or few
2	Span of control	Narrow	wide
3	Subordinates	Few	Many
4	Relationship	Informal	Formal
5	Management Cost	High	Low
6	Communication	Distorted and comlex	Faster & effective
7	Decision making	Delayed	Fast
8	Internal growth	Clear progression and promotion	Reduced opportunities
9	Control of subordinates	Close supervision	Loose control
10	Coordination	Good	Not good
11	Discipline	good	Indiscipline exist

Informal Organisation:

* The following fig shows informal relationship (shown dotted) on top of a formal organisation chart. In every organisation, a set of informal relationships exists through which the employees attempt to fill needs which are largely personal in nature.



Informal organisation (shown dotted).

* Informal relationships are developed due to a number of reasons.
  - Some persons are natural leaders and other persons go to them for advice regardless of the position they occupy in the formal organisation.
  - Informal groups may form by their common interest. Such groups take tea and lunch together, they meet one another after working hours
  - Social activities are probably the largest cause of informal relationship.

Advantages:

* Assists in accomplishing the work faster
* provides an additional channel of communication.
* provide emotional support for employees.

Disadvantages:

* Confidential matter/information may leak from a top level executive to a comparatively much lower level employee and then spread among many other employees.
* May work against the purpose of formal organisation.
* Rumours may spread very fast in the organisation.

Departmentation:

Departmentation is the process of classifying and grouping all the activities of an enterprise into different units and sub-units. The aim is to facilitate the carrying out of the activities efficiently for achieving overall results.

The management of the enterprise is made more effective by departmentation. It would have been a very difficult and complicated task to manage a large undertaking without divisionalisation.

Types of departmentation or bases for departmentation:

The basis are:

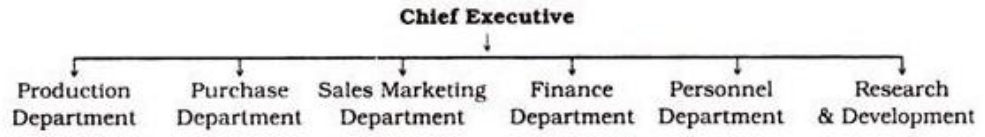
- Departmentation by Function
- Departmentation by Products
- Departmentation by Customers
- Departmentation by Territory/Geographic Departmentation
- Departmentation by Process
- Departmentation by Time
- Combined Base.

Departmentation by function:

In functional departmentalization, departments are segregated i.e. separated from each other based on functions or tasks they perform.

Examples of functional departmentalization include; production department, finance department, marketing department, human resource (HR) department, etc. Here, all activities, which are directly or indirectly connected with production are grouped together to make a production department.

Departmentalization based on function is depicted in the image given below.



Merits of Departmentation by Function:

- It suits well the small enterprises for creating major departments.
- It promotes specialization.
- It economizes operations and makes possible the adoption of logical and comprehensible structure.
- It facilitates inter-departmental co-ordination.
- It suits well for those organisations which have single product line.
- It generates a high degree of centralisation at the level of chief executive.

Demerits of Departmentation by Function:

- It may lead to excessive centralization.

- Decision making process is delayed.
- It is rather difficult to set up specific accountability and profit centres within functional departments so the performance is not accurately measured.
- It hinders human development in all the areas.
- It is unsuitable where emphasis lies on products more than the functions.

Departmentation by Product:

In a multiproduct organisation the departmentation by product most suits. Here the activities are grouped on the basis of produce or product lines. All functions related to particular product are bought together under the umbrella of product manager.

Merits of Departmentation by Product:

- Each product division can be taken as a viable profit centre for accountability purposes. The performance of individual products can be easily accessed to distinguish between profitable and unprofitable products.
- A new line of products can be introduced without any difficulty
- Top management is relieved of operating task responsibility and can concentrate on such centralized activities as finance, research etc.
- It facilitates decentralization.
- Attention is given to product lines, which is good for further diversification and expansion.

Demerits of Departmentation by Product:

- Duplication of staff and facilities will be there
- It increases the number of personnel which in turn increases the cost of operation
- Equipment in each product department may not be used fully.
- High cost of operation prevents the small & medium sized concerns from adopting this basis of classification, particularly for creating major units.

Departmentation by Territory or regions or geographical bases:

When several production or marketing units of an organization are geographically dispersed in various locations, it is logical to departmentalize those units on geographic bases. It is suitable for organisations having wide geographical market such as pharmaceuticals, banking, consumer goods, insurance, railways etc.

Example: Food Corporation of India has geographical organization with several zonal officers at different places and a head office in New Delhi.

Merits of Departmentation by Territory:

- It provides an opportunity to a regional manager to gain broad experience as he looks after the complete operation in a particular territory
- It facilitates the expansion of business to different regions.
- Motivates each regional head to achieve high performance
- It enables organization to compare regional performance and invest more resources in profitable regions and withdraw from unprofitable ones.

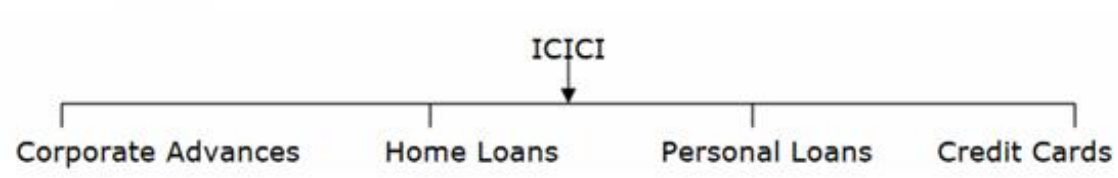
Demerits of Departmentation by Territory:

- It gives duplication of various activities
- Duplication of work may cause under utilization of resources
- Increases problem of top management control.
- Requires more persons with general manager abilities.

Departmentation by customers:

An enterprise may be divided into a number of departments on the basis of customers it serves, viz., large and small customers; industries and ultimate buyers; government and other customers.

The peculiar advantage of customer wise departmentation is that it ensures full attention to different types of customer and their different needs, tastes and requirements can be read effectively. However, it may not be possible to group all activities of an enterprise on the basis of customers. In fact, the activities may be classified or grouped on such basis. But there may be problems of co-ordination with other departments. There may not be enough work, at times, in case of certain types of Customers. This may lead to idle capacity. Example for departmentation by customer is given below.



Advantages:

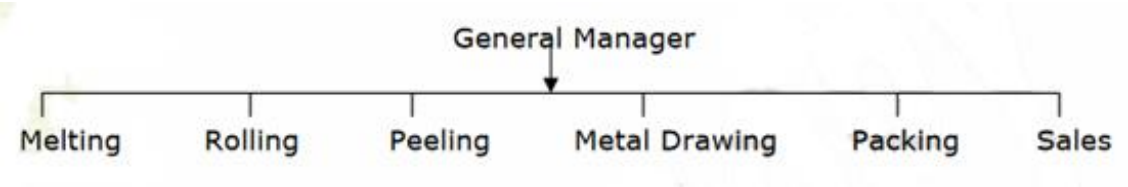
- It fulfills the expectations and needs of customers
- It develops specialization among the organizational staff.
- Out of fashion products can be dispensed with
- Each section of customers gets better services.

Disadvantages:

- Duplication of activities.
- Achievement of coordination is very difficult
- Wastage of available of resources and facilities.

Departmentation by process:

Departmentation is here done on the basis of several discrete stages on the process or technologies involved in the manufacture of a product. Example is given below.



Advantages:

- Costlier machines can be used effectively.
- Economy of operation
- No duplication of activities
- Principle of specialization and division of labour is followed
- It helps top management to have effective performance control
- This is more suitable for a product manufacturing passes through more processes.

Disadvantages:

- Heavy cost of operation
- More specialists are essential to each process
- Lack of overall development of managerial talents.

Departmentation by Time:

In departmentation by time, activities are grouped on the basis of timing of their performance.

Examples: shifts in companies.

Disadvantages:

- Accidental occurrences such as machinery breakdown when carried over from one shift to another affect the product of the following shifts also.
- Workers of one shift generally develop a tendency to pass on some portion of their incomplete work to the workers of the following shift.

Departmentation by combined base:

In this form of organization (also called as grid or lattice pattern) two types of departmentalization (i.e., functional and product) exists simultaneously.

Delegation of Authority:

A manager in an enterprise can not himself do all the tasks necessary for the accomplishment of group goals.

Clearly, his capacity to do work and to take decisions is limited. He, therefore, assigns some part of his work to his subordinates and also gives them necessary authority to make decisions within the area of their assigned duties.

This downward pushing of authority to make decisions is known as delegation of authority.

Advantages of effective delegation:

* It relieves the manager of his heavy workload.
* It leads to better decision.
* It speeds up decision making.
* It helps to train subordinates and builds morale.

Barriers to effective delegation:

* Fear of loss of power
* "I can do it Better my self" fallacy.
* Lack of confidence in subordinates
* Fear of Being exposed (inefficient managers afraid of their subordinates)
* Difficulty in Briefing.

Decentralisation of authority:

* The delegation of authority by an individual manager is closely related to an organisation's decentralisation of authority.

* Every organisation has to decide as to how much decision making authority should be centralised in hands of chief executive and how much should be distributed among the managers of lower levels.

* In a centralised setup, the decision making authority is concentrated in a few hands at the top and in a decentralised setup, it is delegated to the levels (lower levels) where the work is to be performed.

Advantages of Decentralisation:

* There is less burden on the top managers.
* The subordinates get a chance to decide and act independently which develops skills and capabilities
* There is a greater motivation and morale of the employees.
* Decentralisation Reduces the problem of Communication.
  - as organisation grows larger, it takes longer time for top managers to get the information necessary to make decisions.
* Decentralisation permits quicker and better decision making.
* Decentralisation leads to a competitive climate within the organisation.
* Decentralisation ensures the employee development.
* Decentralisation facilitates diversification of products, activities and markets.

Advantages of Centralisation:

* Coordination of activities of subordinates is better achieved.
* There is no duplication of efforts or resources
* Decisions take into account the interest of the entire organisation.
* Strong central leadership develops which may be required in crisis.

Authority:

Authority means right (to command) and power to act.

Responsibility:

Obligation (or contract) of a subordinate to obey the commands given by his superior. Thus, when a superior assigns some work to a subordinates it becomes his responsibility to perform it.

Differences between Formal and Informal organisation

Factor	Formal organisation	Informal organisation
Origin	is created deliberately and consciously by Management	not created by management.
purpose	is created to achieve the legitimate objective of the organisation	created by the members of the organisation for their social and psychological satisfaction
size	may be quite large in size	tend to be small
nature of group	formal groups are stable and may continue for a long period of time	quite unstable in nature.
Authority	Formal organisation is bound together by a hierarchical structure	all members are equal.
Behaviour of members	governed by rules and regulations	by beliefs and value of the group.
Communication	Prescribed chain of command	Pass through informal channels.
Abolition	Management can abolish at any time.	Management has no control over

Types of layouts

Facility design often determines how smooth work can flow, how people feel about their jobs, and how easily the organization can respond to changes in their product line or product mix. Well-designed facilities allow an organization to respond quickly to customers and hold down inventory and production cost.

Generally, there are four types of layouts. They are

a) Product layout

b) Process layout.

c) Fixed position or static layout.

d) Group layout.

1. ***Product layout***

This is also called line layout. This type of layout is suitable for continuous type of production requiring high production volume. The layout may have more than one line-arrangement of facilities.

In product layout, the equipment or assembly workstations are arranged in the order in which they are to be used to complete the product. That is, the workstations are arranged according to the progressive steps or sequence of operations by which the product is made.

Raw material enter at one end of the line and with out retracing its path anywhere comes out of the line as a finished product. Examples are: automobile assembly, food processing, furniture manufacturing, chemical industry, oil refineries etc.

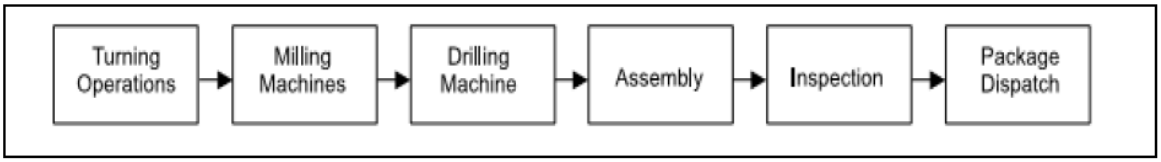


Fig: Product layout

Advantages

- The flow of product will be smooth and logical in flow lines.
- In-process inventory is less.
- Throughput time is less.
- Minimum material handling cost.
- Simplified production, planning and control systems are possible.
- Less space is occupied by work transit and for temporary storage.
- Reduced material handling cost due to mechanized handling systems and straight flow.
- Perfect line balancing which eliminates bottlenecks and idle capacity.
- Manufacturing cycle is short due to uninterrupted flow of materials.
- Small amount of work-in-process inventory.
- Unskilled workers can learn and manage the production.

Limitations

- ✓ A breakdown of one machine in a product line may cause stoppages of machines in the downstream of the line.
- ✓ A change in product design may require major alterations in the layout.
- ✓ The line output is decided by the bottleneck machine.
- ✓ Comparatively high investment in equipments is required.
- ✓ Lack of flexibility. A change in product may require the facility modification.

2. Process or functional layout

Process or functional layout is that in which the machines performing similar or same operations are placed in one section so that any product requiring this process is to be moved to that particular section. This type of layout is suitable in cases where:

1. Varieties of products manufactured are many.
2. Volume of production is small.
3. Products are of specific type and the demand is small or intermittent.
4. Adjustments to changes in design and style of products are frequently required.

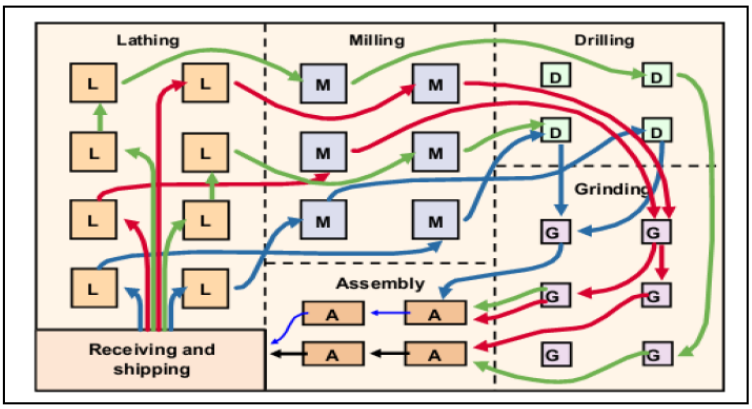


Fig: Process layout

Advantages

- In process layout machines are better utilized and fewer machines are required.
- Flexibility of equipment and personnel is possible in process layout.
- Lower investment on account of comparatively less number of machines and lower cost of general purpose machines.
- Higher utilization of production facilities.
- A high degree of flexibility with regards to work distribution to machineries and workers.
- The diversity of tasks and variety of job makes the job challenging and interesting.
- Supervisors will become highly knowledgeable about the functions under their department.

Limitations

- ✓ Backtracking and long movements may occur in the handling of materials thus, reducing material handling efficiency.
- ✓ Material handling cannot be mechanized which adds to cost.
- ✓ Process time is prolonged which reduce the inventory turnover and increases the in-process inventory.
- ✓ Lowered productivity due to number of set-ups.
- ✓ Throughput (time gap between in and out in the process) time is longer.
- ✓ Space and capital are tied up by work-in-process.

3. Fixed position layout or Static layout

When the product is too heavy to move, the required machines and equipments are to be moved to the location of the product to be produced. This layout is also known as fixed position layout. Examples: ship building

Advantages

The major advantages of this type of layout are:

- Helps in job enlargement and upgrades the skills of the operators.
- The workers identify themselves with a product in which they take interest and pride in doing the job.
- Greater flexibility with this type of layout.
- Layout capital investment is lower.

4. Group layout

In this layout the machines are grouped in to cells, each cell containing a number of machines (some of these machines may be of same type). In each cell all operations required on a family of components can be carried in an ideal situation. But in practice, inter cell movements become essential, which requires material handling costs to be analysed for layout design.

Differences between process layout and product layout

Process Layouts	Product Layouts
Able to produce a large number of different products.	Able to produce a small number of products efficiently.
Resources used are general purpose.	Resources used are specialized.
Facilities are more labor intensive.	Facilities are more capital intensive.
Greater flexibility relative to the market.	Low flexibility relative to the market.
Slower processing rates.	Processing rates are faster.
High material handling costs.	Lower material handling costs.
Higher space requirements.	Lower space requirements.

Flow pattern:

- Since the layout is designed to facilitate the flow of the product, from raw material to finished product, we are primarily concerned with the flow of materials
- In the facilities layout problem, the decision regarding placement of the machines is typically made. Depending on the application and availability of space, the machines are placed in one of the following pattern:

Types of flow pattern:

- We can classify flow patterns as being either horizontal or vertical
- There are at least five basic types of horizontal flow patterns
- A number of other flow patterns can be developed by combining these basic flow patterns.
- Straight line flow is the simplest form of flow
- L-shaped flow pattern is usually adopted when straight line cannot be accommodated in existing facility or construction costs do not permit straight line flow.
- U-shaped flow pattern is very popular, since it is simple to administer and facilitates a combination of receiving and shipping activities
- Circular flow is applicable when it is desired to terminate the flow very near the point where the flow originated
- The serpentine flow pattern is used when the production line is so long that zigzagging on the production floor is required

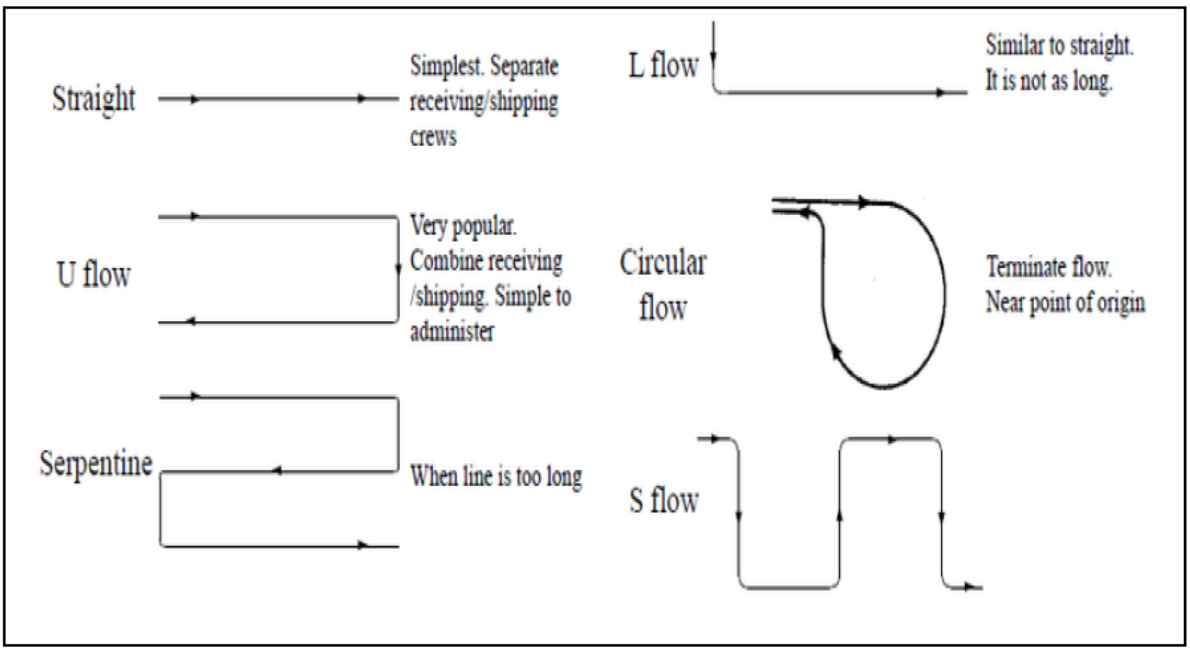


Fig: Flow between Departments (horizontal flow patterns)

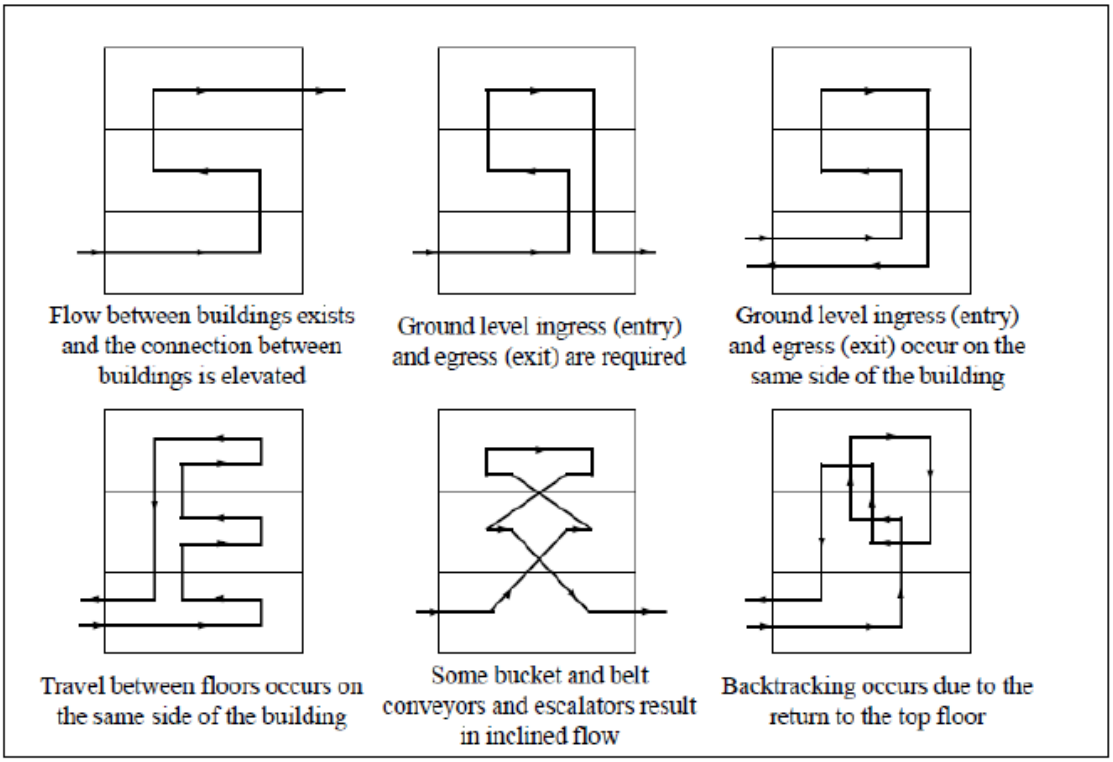


Fig:Vertical flow pattern

Production is the process or activity of manufacturing or producing something.

Productivity:

- A measure of the effective use of resources, usually expressed as the ratio of output to input.

Systematic layout planning procedure:

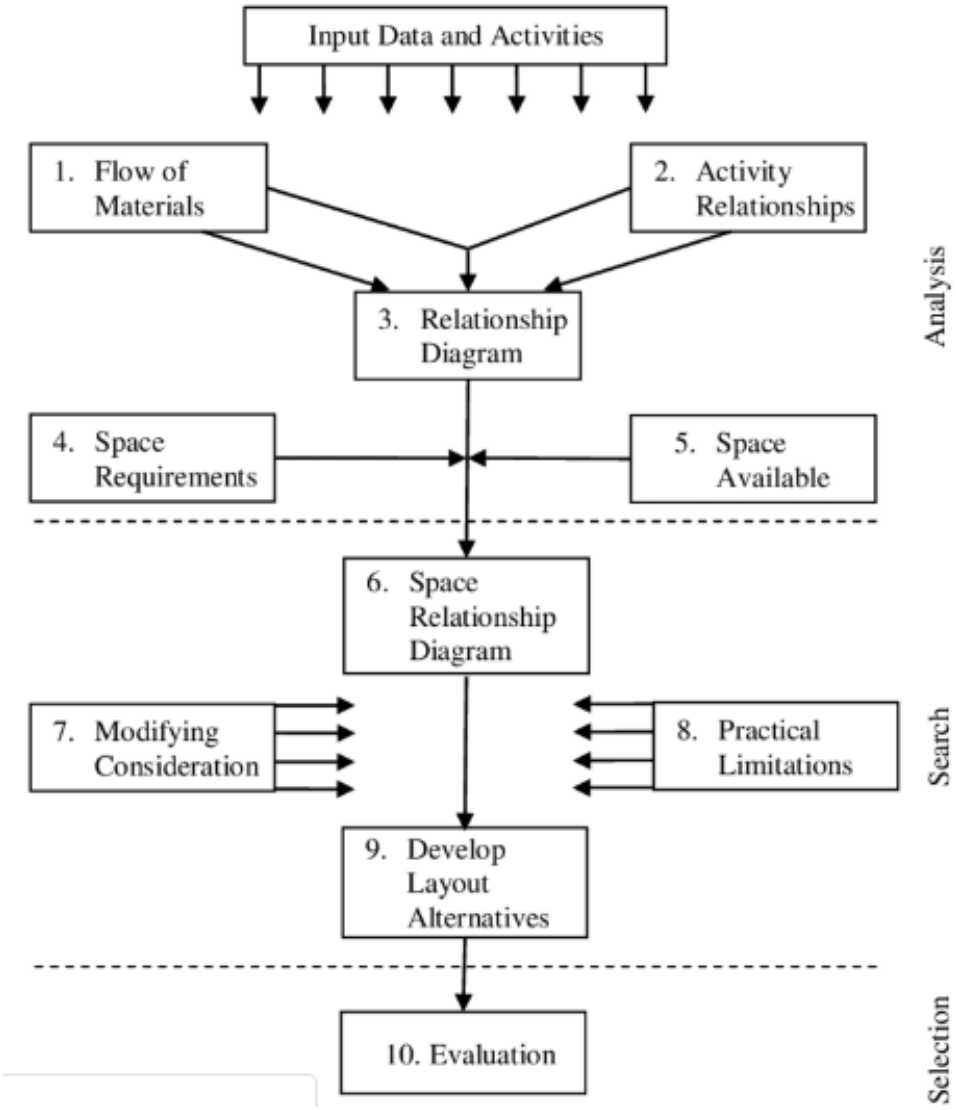


Fig: Systematic layout procedure

The Systematic Layout Planning Procedure:

1-Preparation phase: the following tools are used in the layout preparation phase:

- Graphic and schematic analysis: Perhaps the most common layout planning tools are templates—two dimensional cutouts of equipment drawn to scale.
- Operation Process Chart (OPC): operations, and inspections only
- Flow Process Chart (FPC): operations, inspections, transports, delays, and storage.

- Multiple-product Chart (MPC):
- From-To Chart (FTC) / or flow chart:

2. An ‘activity relationship diagram (ARD)’ shows the desired closeness of departments and areas within the plant. It reflects the fact that not all important relationships.

3. Step 3 consists of using the information generated in Steps 1 and 2 to prepare a string diagram showing near optimal placement of the facilities without considering the space constraints. The placement is done by trial and error. Usually, the areas with an A closeness are shown first and are connected with 4 straight lines, then E with 3 straight lines, and so on.

4. Step 4 may be called the ‘adjustment step’. Here the adjustment must be made for space needs as related to space availability; so, the space requirements have to be determined. This can be done through calculations, adjustments of past areas, intuition or estimates.

5. Once these space requirements are known, it is necessary to consider the space available. In some cases, since the layout must fit into the existing buildings, the space available is highly restricted.

Unit -3
Work study

Work study

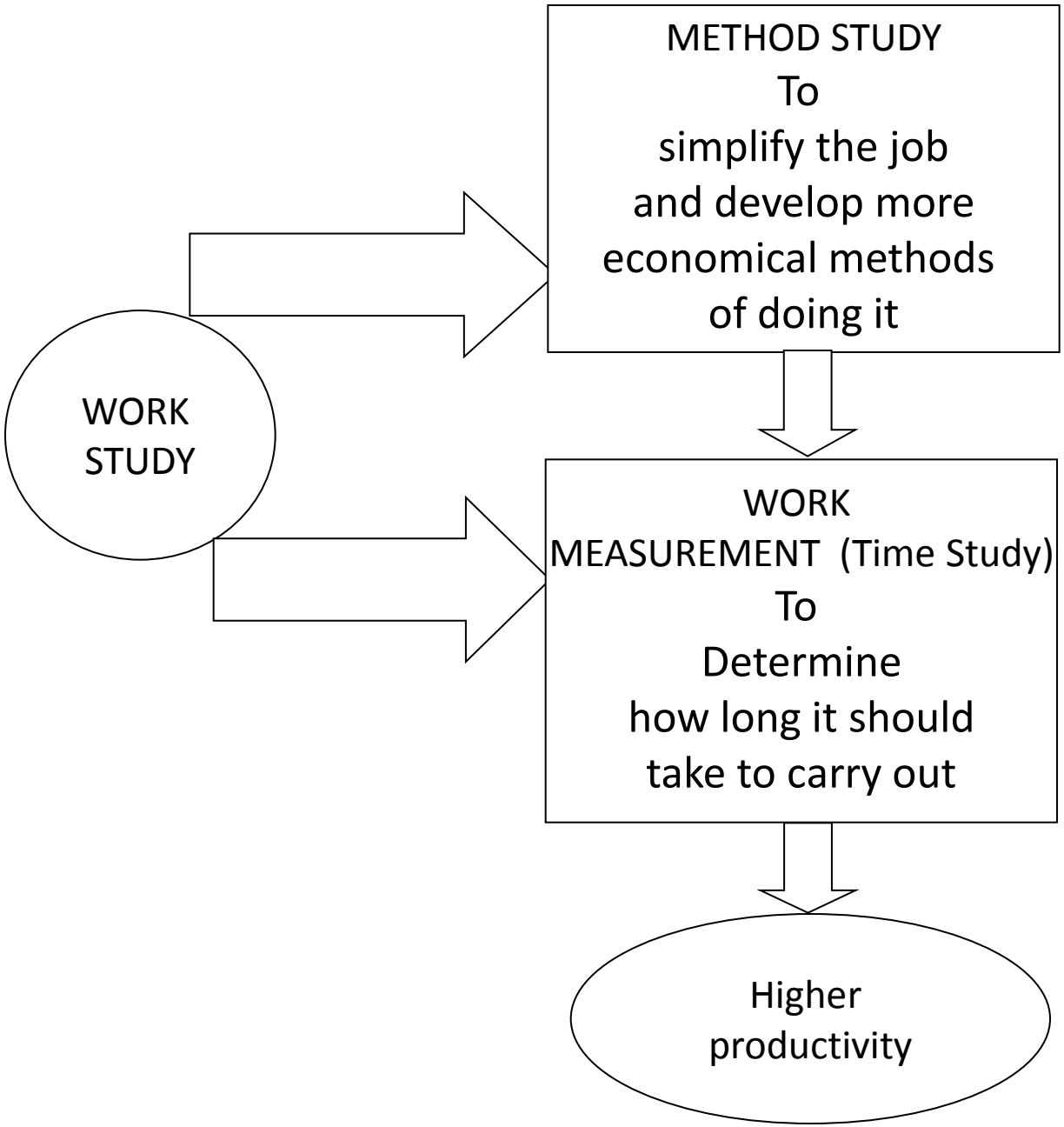
- Work study = Method study + Time study

Advantages of work study

- Uniform and improved production flow
- Higher productive efficiency
- Reduced manufacturing costs
- Fast and accurate delivery dates
- Better employee-employer relations
- Better service to customers
- Job security and job satisfaction to workers
- Better working and other conditions
- Higher wages to workers

Advantages of work study

- It helps to achieve the smooth production flow with minimum interruptions.
- It helps to reduce the cost of the product by eliminating waste and unnecessary operations.
- Better worker-management relations.
- Meets the delivery commitment.
- Reduction in rejections and scrap and higher utilization of resources of the organization.
- Helps to achieve better working conditions.
- Better workplace layout.
- Improves upon the existing process or methods and helps in standardization and simplification.
- Helps to establish the standard time for an operation or job which has got application in manpower planning, production planning.


METHOD STUDY
To
simplify the job
and develop more
economical methods
of doing it
WORK
STUDY
WORK
MEASUREMENT (Time Study)
To
Determine
how long it should
take to carry out
Higher
productivity

Basic Procedure of Work Study

- Select the job or process to be studied
- Record from direct observation everything that happens, using the most suitable of the recording technique
- Examine the recorded facts critically and challenge everything that is done
- Develop the most economic method, taking into account all the circumstances

Basic Procedure of Work Study

- Measure the quantity of the work involved in the method selected and calculate a standard time for doing it
- Define the new method and related time
- Install the new method as agreed standard practice
- Maintain the new standard practice by proper control procedures

Method study

- Method study: Method study can be defined as the procedure for systematic recording, analysis and critical examination of existing or proposed method of doing work for development and applications of easier and more effective method
- It`s objective is to identify the best method

Various steps in Method Study

1. Select a job for method study
2. Record the relevant facts (information) about the job
3. Examine the information critically
4. Develop the most practical , economical and effective method by considering real limitations of the situation
5. Define the new/improved method
6. Install the new method as standard practice
7. Maintain the standard practice by regular follow-up

Critical examination

- In method study, recording is always followed by critical examination of that recorded date. Examination should be critical but impartial. So examination is just a technique to check the significance of a process. But which activities to be examined first and how, are the points to be kept is mind while examination.
- There are two stages of examining or questioning the activities. They are primary Questions and secondary Questions. Primary questions are based on the purpose, Place, sequence, person and means.

Primary questions are as follows

- (1) What is done and what is its significance. (Purpose).
- (2) Where the process is carried out and why at that place? (Place).
- (3) In which sequence, it is done> (sequence)
- (4) Who is performing that process and why he is performing? (Person).
- (5) By what means, process is carried out and why? (Means).

Secondary questions

- the answers for the primary questions are further subjected to questions.
- 1) What should be done and what else we could have done (Purpose).
- (2) Where should the process be carried out and where else we could have performed it (Place).
- (3) Which sequence is perfect for this process and what else sequence is possible? (Sequence).
- (4) Who should perform it and who else might do it? (Person).
- (5) How should it be performed and how else might it be performed? (Means).

Method study: Objectives

- Improvement of process and procedures
- Improvement in the design or plant and equipment
- Improvement of plant layout
- Improvement in the use of men, materials and machines
- Improvement in safety standards
- Economy in human effort and reduction of unnecessary fatigue
- Method standardisation

Method study Recording Techniques

- Charts and diagrams are used to record the facts in method study
- Charts :
  - Outline process chart
  - Process chart or flow process chart
  - Two hand process chart
  - Travel chart
  - Multiple activity chart
  - SIMO (simultaneous motion) Chart

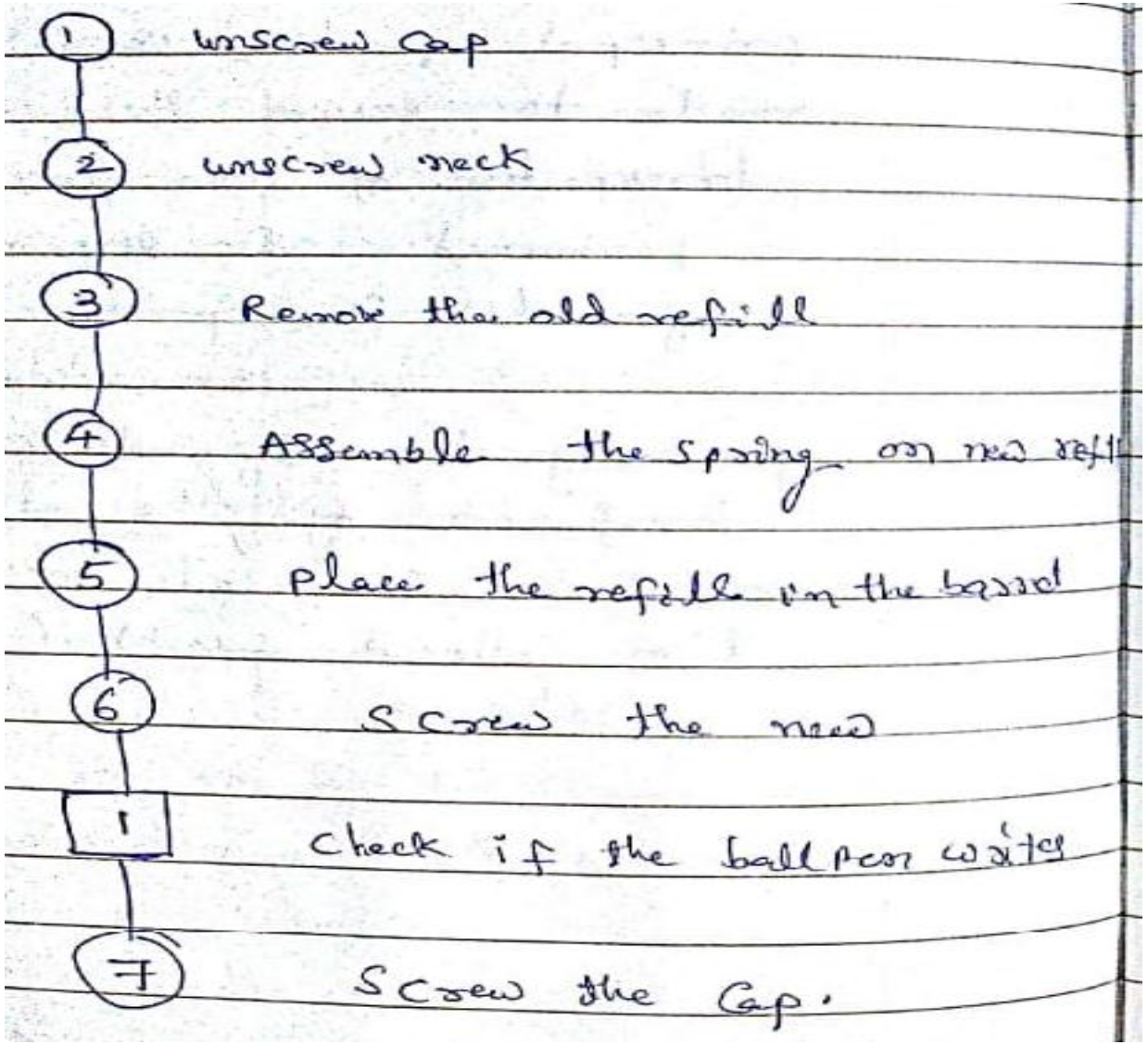
Method study Recording Techniques

- Diagrams:
  - flow diagram
  - String diagram
  - Cycle graph
  - Chrono-cycle graph

Out line process chart

- It is a chart which shows the birds eye-view of a whole process or activity.
- It shows only the sequence of main operations and inspections.
- Symbols used in outline process chart
  - Operation - 
  - Symbols - 

Outline process chart of changing refill of a ball point pen



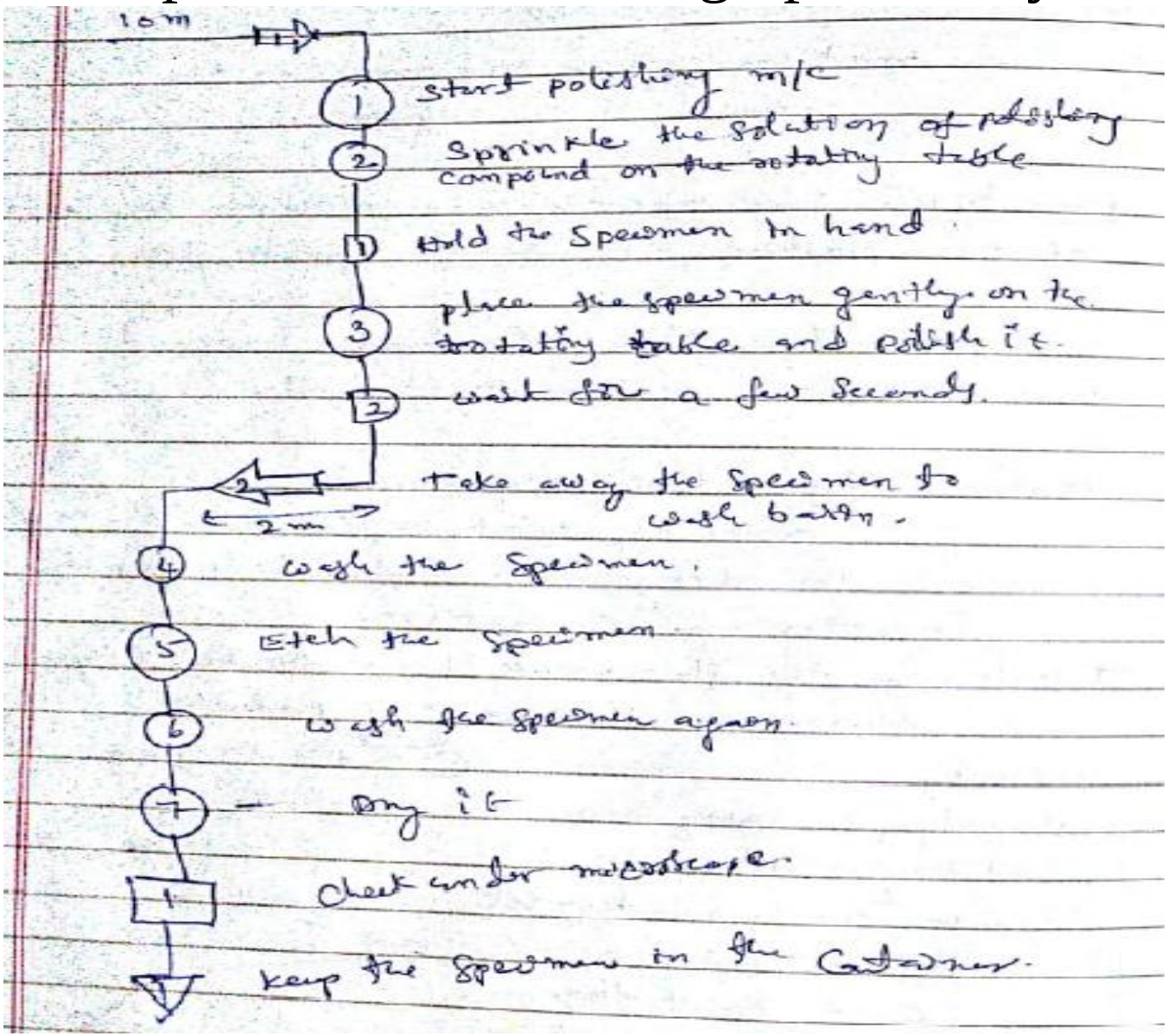
Process chart

- In this chart, we use five process chart symbols to record the facts or information of a process or job. It gives greater details of the process
- Process chart symbols:
  - Operation 
  - Inspection 
  - Transport 
  - Temporary delay 
  - Permanent storage 

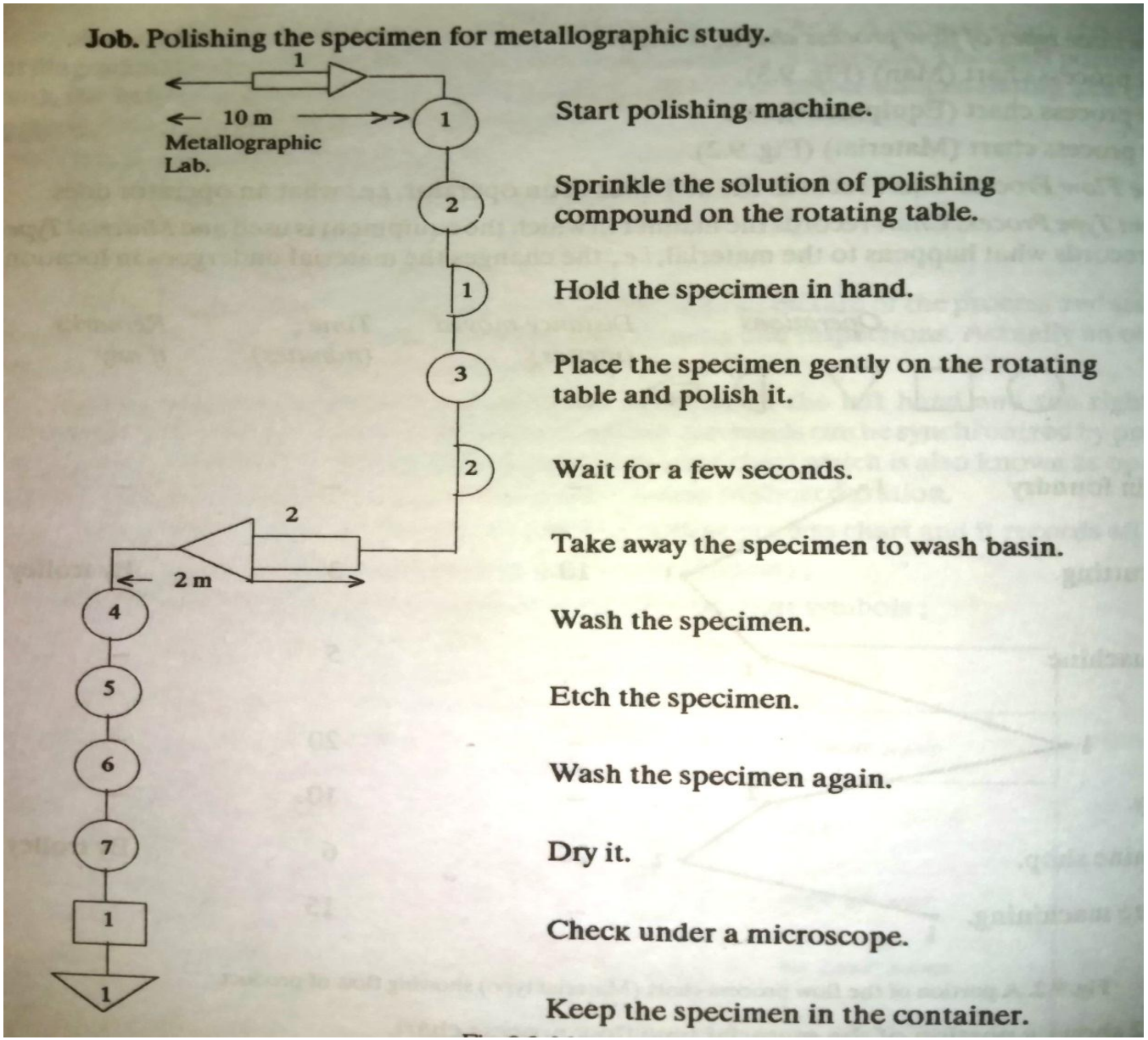
- Operation is the main step in the process. The product or part or material is modified or changed during the operation. Example: drill a hole,
- Inspection: indicates an inspection for quality and /or check for quantity.
- Transport : it indicates the movement of workers , materials or equipment from place to place. Example: material movement by truck

- Temporary storage or delay: indicates a delay in the sequence of events. Example: material in truck, work waiting between consecutive operations.
- Permanent storage: indicates a controlled storage in which material is received into or issued from a store under some form of authorization or an item is retained for reference purpose. Example: bulk storage of raw material or finished product

Man-type flow Process chart for Polishing the specimen for metallographic study



Man type flow process chart for metallographic study



Flow Process Chart Job : Requisition of petty cash	Analyst ABC	Page 1 of 2	Operation	Movement	Inspection	Delay	Storage	Distance
Details of method								
Requisition made out by department head			●	⇨	□	D	▽	
Put in "pick-up" flag			○	⇨	□	D	▽	
To accounting department			○	⇨	□	D	▽	10 m
Account and signature verified			○	⇨	□	D	▽	
Amount approved by treasurer			●	⇨	□	D	▽	
Amount counted by cashier			●	⇨	□	D	▽	
Amount recorded by bookkeeper			●	⇨	□	D	▽	
Petty cash sealed in envelope			●	⇨	□	D	▽	5 m
Petty cash carried to department			○	⇨	□	D	▽	
Petty cash checked against requisition			○	⇨	□	D	▽	
Receipt signed			●	⇨	□	D	▽	
Petty cash stored in a box			○	⇨	□	D	▽	

	Summary	Distance
Operations	6	
Inspections	2	
Transport	2	15 m
Delays	1	
Total	11	

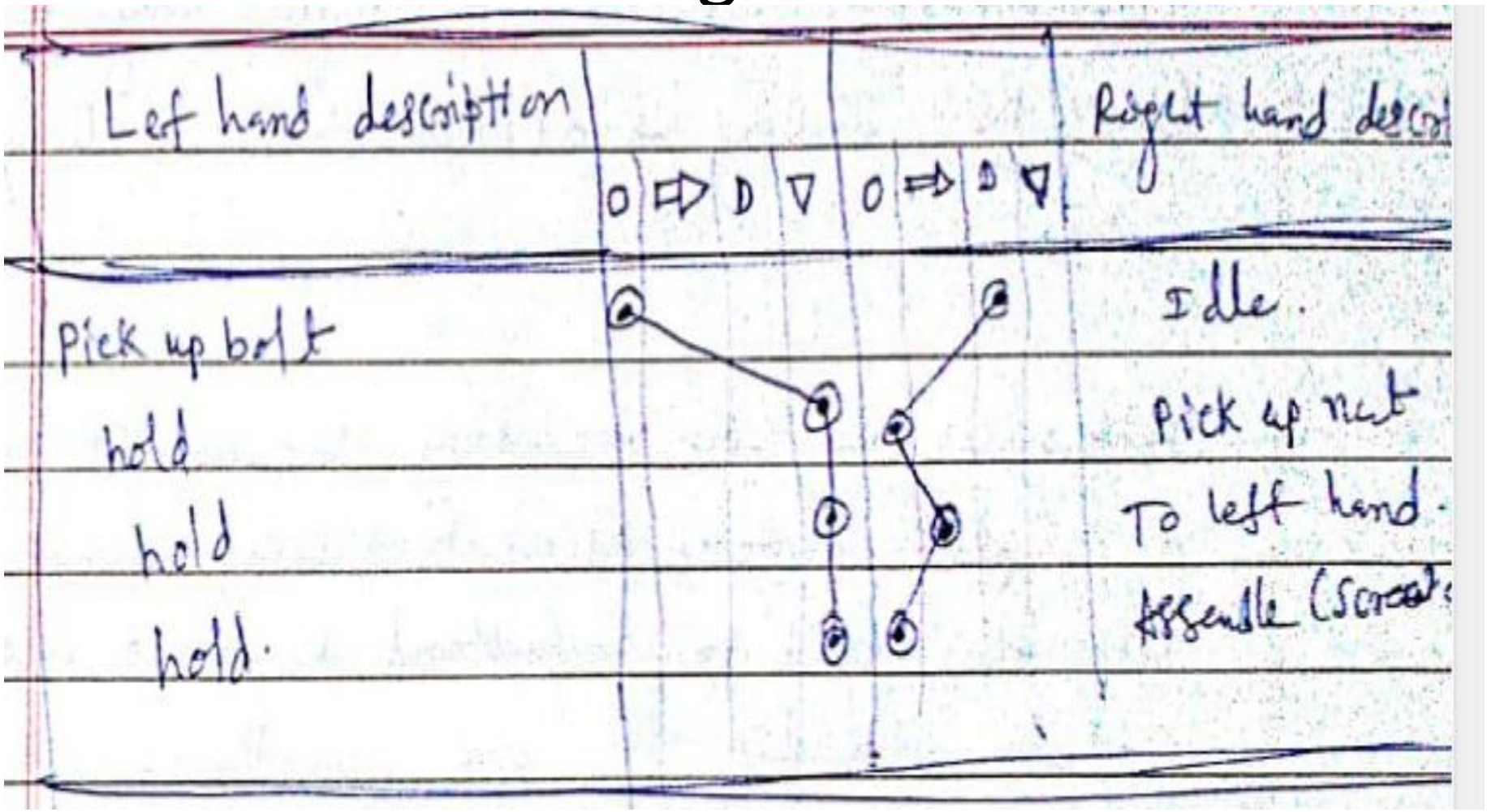
Flow process chart

Two-hand process chart

- It is a process chart in which the activities of a workers hands (or limbs) are recorded in their relationship to one another
- It is generally used for repetitive operations
- Recording is carried out in more detail than is on flow process chart
- Symbols used are same as in process chart but their meaning is slightly different

- Operation : it is used for the activities of grasp, position, use, release
- Transport: it is used to represent the movement of the hand to work or from the work
- Delay : is used to denote time during which the hand being charted is idle.
- Hold : it is used to represent the activity of holding the work/material/tool

Two – hand process chart for Assembling Nut & bolt



Multiple activity chart

- It is a chart on which the activities of more than one subject are recorded on a common time scale to show their interrelationships.
- It is made to

1. Study idle time of the man and machine
2. Determine number of machines handled by one operator
3. Determine number of operators required in team work to perform the given job

Multiple activity chart

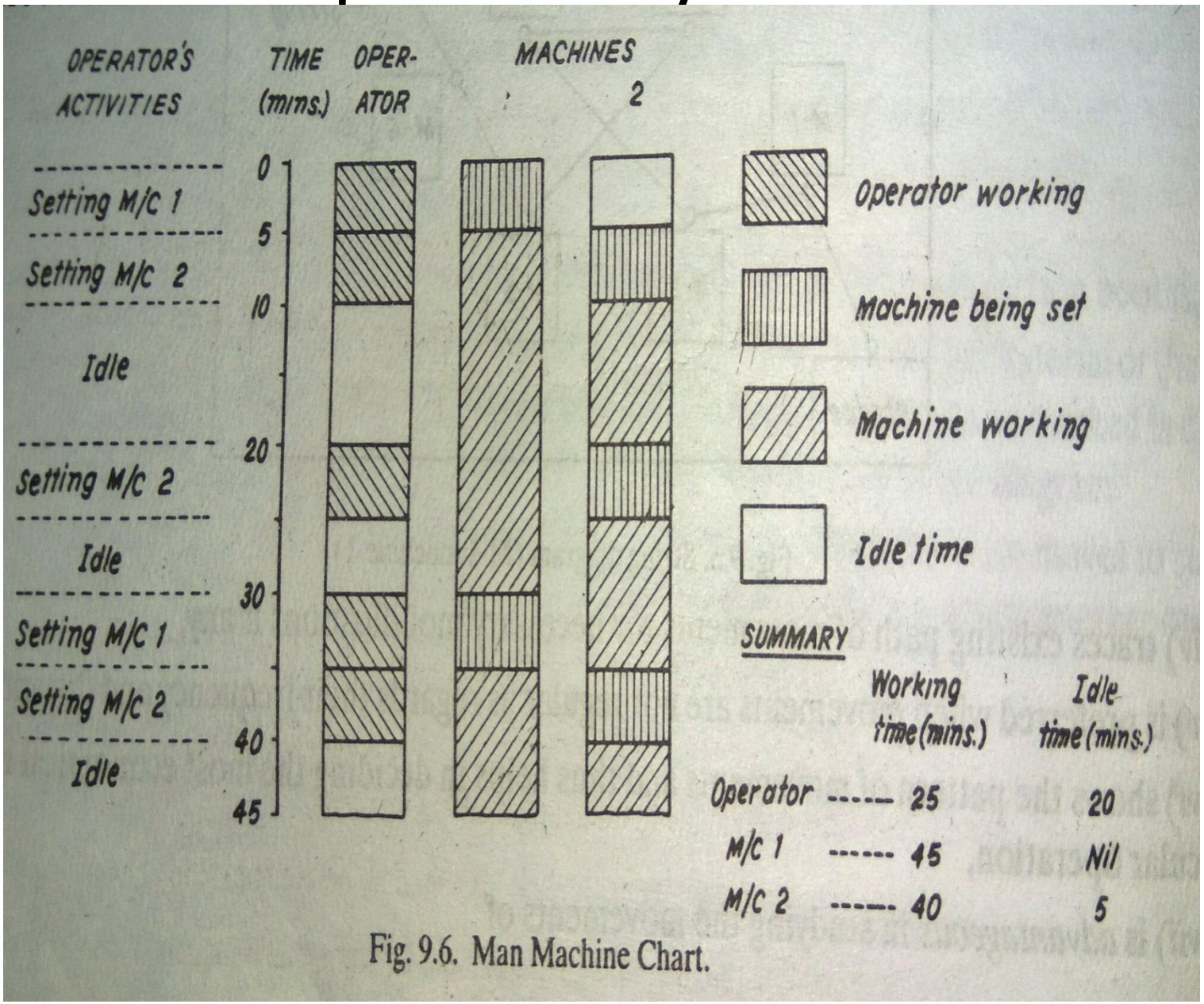
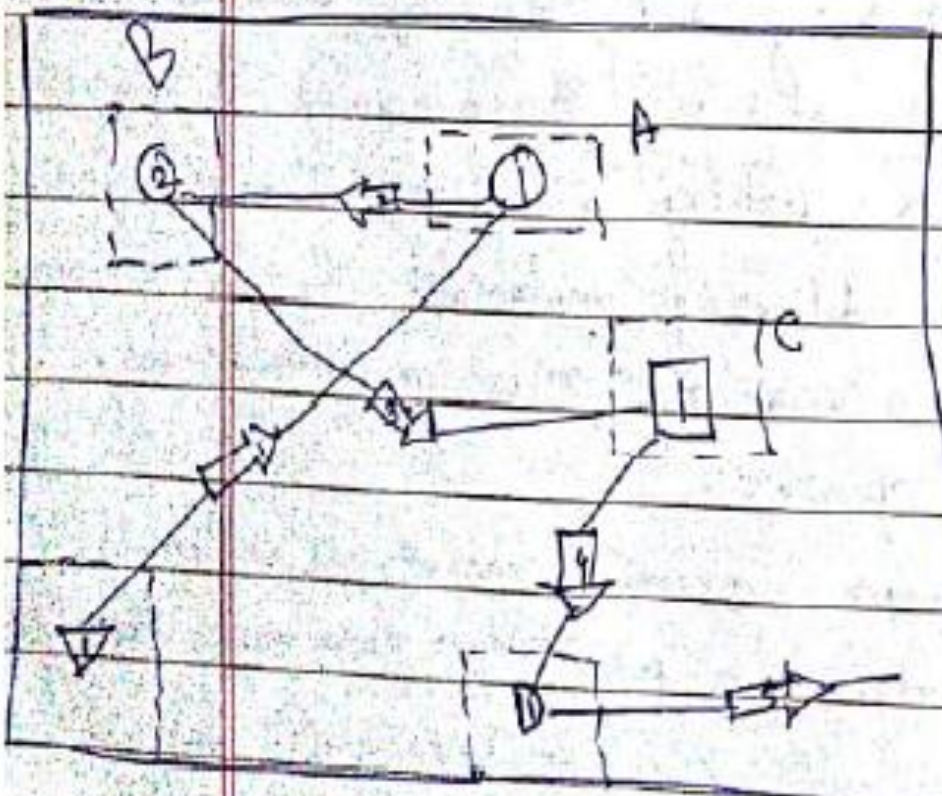


Fig. 9.6. Man Machine Chart.

Flow diagram

- It is a drawing or diagram which is drawn to scale. It shows the relative position of production machinery, jigs, fixtures, gang ways etc. and marks the path followed by man (worker) and materials.

The following fig. shows a simple flow diagram, in which raw material from the store moves to station A. where an operation is performed, the semi-finished product is sent to place B where another operation is carried out then it moves to place C for inspection, it is further sent to bench D where it halts for a short-while and ultimately goes out of the factory.



String diagram

- It is a special form of flow diagram in which a string or thread is used to measure the distances.
- Because of this it is necessary that the string diagram be drawn correctly to scale, where as the ordinary flow diagram will probably be drawn only approximately to scale with relevant distances marked on it.
- The flow process chart and string diagram together gives the closest possible picture of what is actually being done.

Travel chart

- A travel chart is a tabular record for presenting quantitative data about the movements of workers, materials or equipment between any number of places over any given period of time
- It is also known as from to chart
- It shows the number of products moved from one machine to another machine.

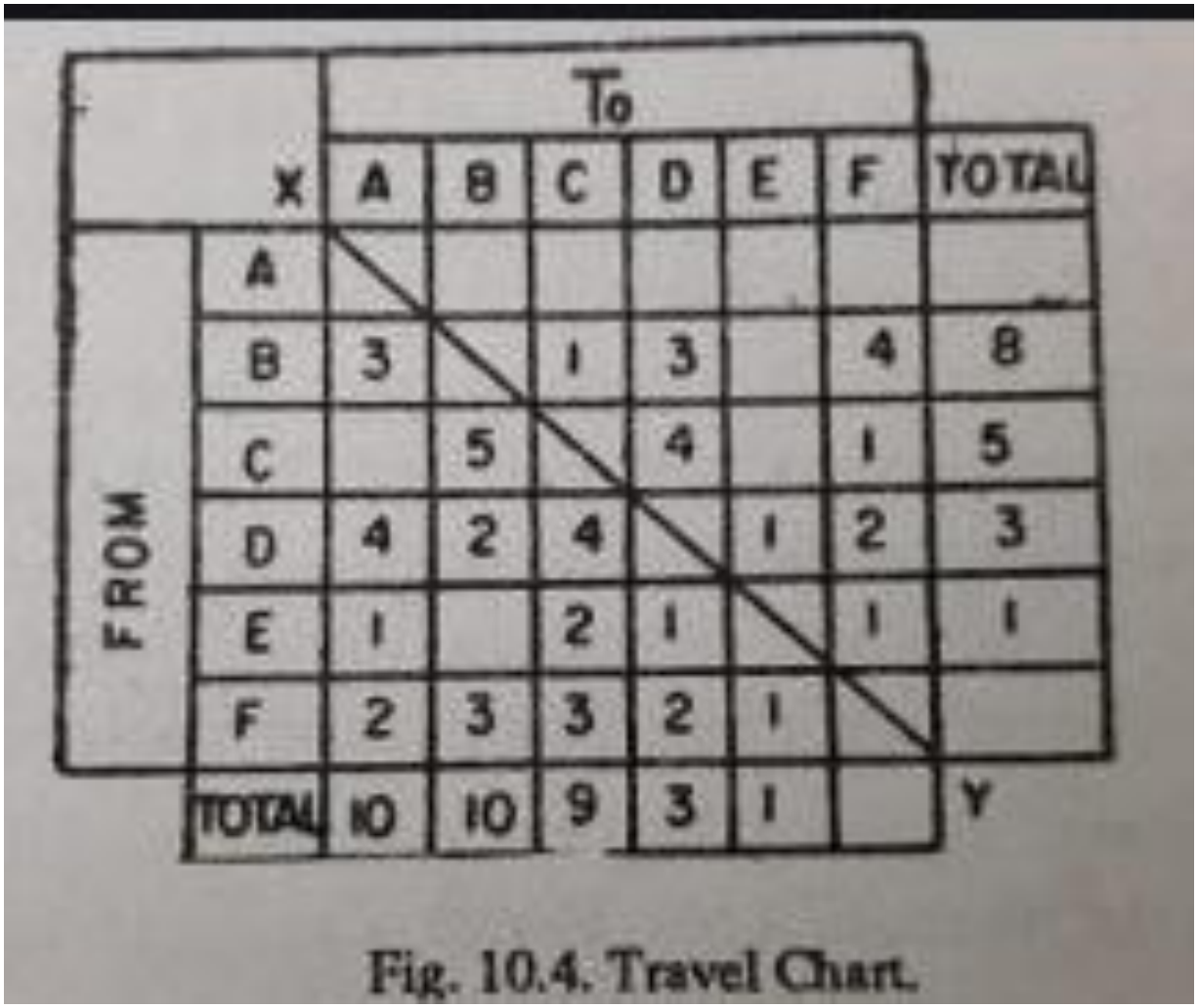


Fig. 10.4. Travel Chart.

SIMO Chart

- SIMO" stands for simultaneous-Motion Cycle chart.
- It records simultaneously the different therbligs performed by different parts of the body of one more operators on a common time scale.
- **Therbligs in the SIMO chart are critically examined to explore the possibility of:**
  - (i) Removing or eliminating the unproductive Therbligs such as find, select and avoidable delay etc.
  - (ii) Resequencing of the productive therbligs such as assemble and disassemble etc.
-

Therbligs

- Therblig represents the fundamentals motions of the human body.
- Gilbreth divided the fundamental motions in to 18.

Therbligs

1. Transport empty [unloaded] (TE): receiving an object with an empty hand. (Now called "Reach".)
2. Grasp (G): grasping an object with the active hand.
3. Transport loaded (TL): moving an object using a hand motion.
4. Hold (H): holding an object.
5. Release load (RL): releasing control of an object.
6. Preposition (PP): positioning and/or orienting an object for the next operation and relative to an approximation location.
7. Position (P): positioning and/or orienting an object in the defined location.
8. Use (U): manipulating a tool in the intended way during the course working.
9. Assemble (A): joining two parts together.

Therbligs

10. Disassemble (DA): separating multiple components that were joined.
11. Search (Sh): attempting to find an object using the eyes and hands.
12. Select (St): choosing among several objects in a group.
13. Plan (Pn): deciding on a course of action.
14. Inspect (I): determining the quality or the characteristics of an object using the eyes and/or other senses.
15. Unavoidable delay (UD): waiting due to factors beyond the worker's control and included in the work cycle.
16. Avoidable delay (AD): waiting within the worker's control which causes idleness that is not included in the regular work cycle.
17. Rest (R): resting to overcome a fatigue, consisting of a pause in the motions of the hands and/or body during the work cycles or between them.
18. Find (F): A momentary mental reaction at the end of the Search cycle.

Work Measurement (Time study)

- It is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance

Procedure of Time Study

1. Define the task to be studied
2. Divide the task into precise elements
3. Decide how many times to measure the task
4. Time and record element times and rating of performance

5. Compute average observed time

6. Determine performance rating and normal time

7. Add the normal times for each element to develop the total normal time for the task
8. Compute the standard time

$$\text{Standard time} = \frac{\text{Total Normal time}}{1 - \text{allowance factor}}$$

Rest Allowances

- Personal time allowance
  - 4% - 7% of total time for use of restroom, water fountain, etc.
- Delay allowance
  - Based upon actual delays that occur
- Fatigue allowance
  - Based on our knowledge of human energy expenditure

Rest Allowances

1. Constant allowance
   - (A) Personal allowance …….. 5
   - (B) Basic fatigue allowance …… 4
2. Variable allowances:
   - (A) Standing allowance …… 2
   - (B) Abnormal position
     - (i) Awkward (bending) …… 2
     - (ii) Very awkward (lying, stretching) …… 7

Rest Allowances

(C) Use of force or muscular energy in lifting, pulling, pushing

Weight lifted (pounds)

20 …… 3

40…… 9

60…… 17

(D) Bad light:

(i) Well below recommended…. 2

(ii) Quite inadequate……5

Rest Allowances

(E)	Atmospheric conditions (heat and humidity) ……	0-10
(F)	Close attention:	
	(i) Fine or exacting……..	2
	(ii) Very fine or very exacting……	5
(G)	Noise level:	
	(i) Intermittent—loud……..	2
	(ii) Intermittent—very loud or high-pitched……..	5

Figure S10.1

Rest Allowances

(H) Mental strain:

(i) Complex or wide span of attention..... 4

(ii) Very complex..... 8

(I) Tediousness:

(i) Tedious..... 2

(ii) Very tedious..... 5

Problems on Time Study

Average observed time = 4.0 minutes

Worker rating = 85%

Allowance factor = 13%

Normal time = (Average observed time) x (Rating factor)

= (4.0)(.85)

= 3.4 minutes

$$\text{Standard time} = \frac{\text{Total Normal time}}{1 - \text{allowance factor}} = \frac{3.4}{1 - 0.13} = 3.9 \text{ minutes}$$

Problems on Time Study

Allowance factor = 15%

Job Element	Cycle Observed (in minutes) 1	2	3	4	5	Performance Rating
(A) Compose and type letter	8	10	9	21*	11	120%
(B) Type envelope address	2	3	2	1	3	105%
(C) Stuff, stamp, seal, and sort envelopes	2	1	5*	2	1	110%

1. Delete unusual or nonrecurring observations (marked with *)
2. Compute average times for each element

   Average time for A = (8 + 10 + 9 + 11)/4 = 9.5 minutes

   Average time for B = (2 + 3 + 2 + 1 + 3)/5 = 2.2 minutes

   Average time for C = (2 + 1 + 2 + 1)/4 = 1.5 minutes

Problem on Time Study

3. Compute the normal time for each element

Normal time = (Average observed time) x (Rating)

Normal time for A = (9.5)(1.2) = 11.4 minutes
Normal time for B = (2.2)(1.05) = 2.31 minutes
Normal time for C = (1.5)(1.10) = 1.65 minutes

4. Add the normal times to find the total normal time

Total normal time = 11.40 + 2.31 + 1.65 = 15.36 minutes

5. Compute the standard time for the job

$$\text{Standard time} = \frac{\text{Total Normal time}}{1 - \text{allowance factor}} = \frac{15.36}{1 - 0.13} = 18.07 \text{ minutes}$$

Predetermined Time Standards (PMTS/PTS) method

- ☑ Divide manual work into small basic elements that have established times
- ☑ Can be done in a laboratory away from the actual production operation
- ☑ Can be set before the work is actually performed
- ☑ No performance ratings are necessary

Ergonomics

- Ergonomics is the process of designing or arranging workplaces, products and systems so that they fit the people who use them.
- It is Fitting a job to a person/worker.
- Ergonomics = ergo + nomos; ergo means work and nomos means laws.

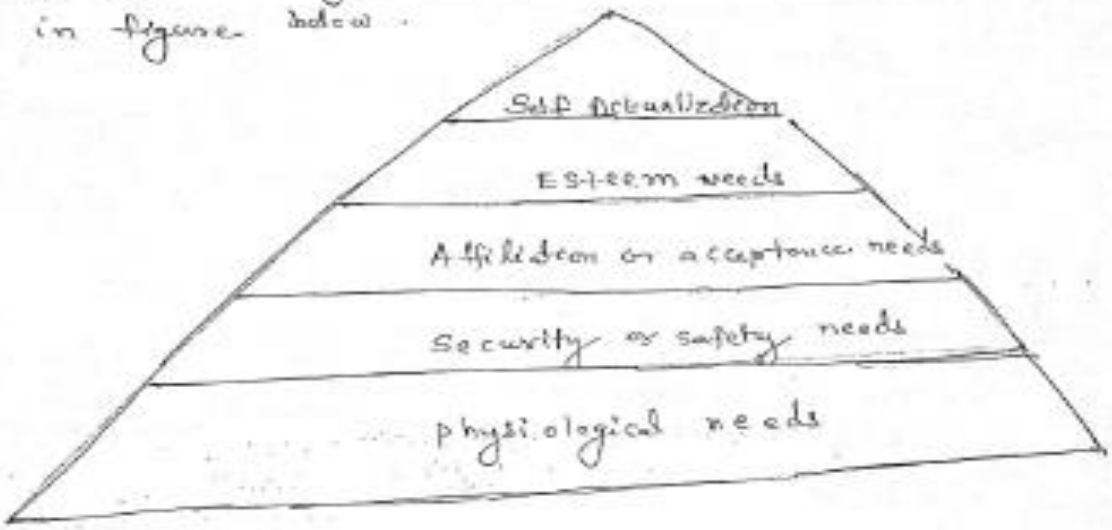
Motivational theories

Maslow's Hierarchy of Need Theory:

One of the most widely mentioned theories of motivation is the hierarchy of needs theory put forth by Psychologist Abraham Maslow. Maslow saw human needs in the form of a hierarchy, ascending from the lowest to the highest, and he concluded that when one set of needs is satisfied, this kind of need ceases to be a motivator.

The Needs Hierarchy:

The basic human needs placed by Maslow in an ascending order of importance and is shown in figure below.



1. physiological needs:

These are the basic needs for sustaining human life itself, such as food, water, warmth, shelter, and sleep. ~~Maslow~~ until these needs are satisfied to the degree necessary to maintain life, other needs will not motivate people.

2. Security or safety needs: These are the needs to be free of physical danger and fear of loss of a job, property, food or shelter.

3. Affiliation or acceptance needs:

Since people of social beings, they need to belong to be accepted by others.

4. Esteem needs:

Once the people begin to satisfy their need to belong, they want to be held in esteem both by themselves and by others. This kind of need produces such satisfaction as power, prestige, status and self confidence.

5. Need for Self Actualisation:

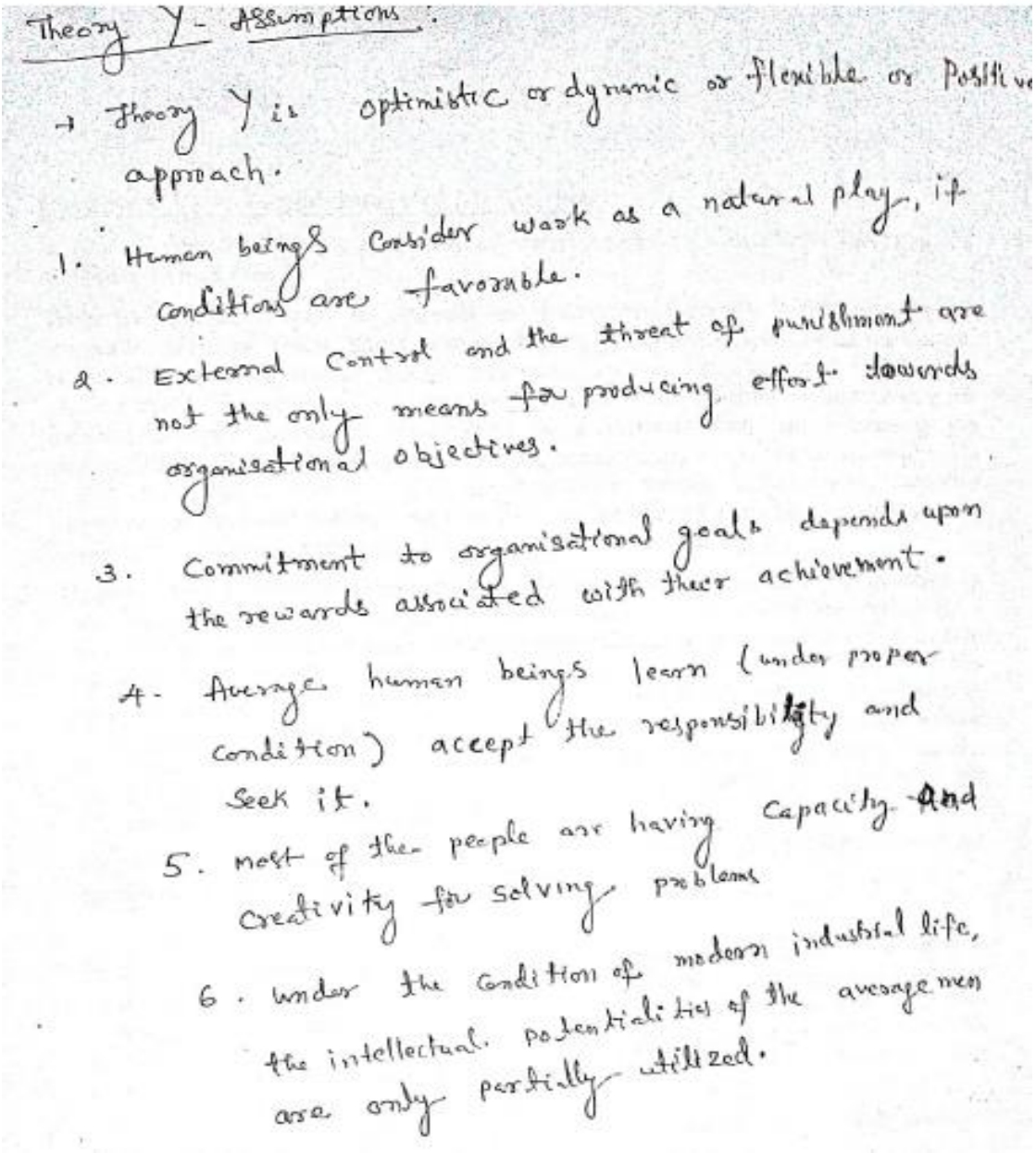
It is the desire to become what one is capable of becoming — to maximize one's potential and to accomplish something. Maslow regards this as the highest need in his hierarchy.

Douglas Mc-Gregor's Theory X and Theory Y:

The Traditional assumptions about the nature of people, according to McGregor are included in Theory X as follows

1. Average human beings have an inherent dislike of work and will avoid it if they can
2. Most people must be controlled, directed, and threatened with punishment.
3. Average human beings prefer to be directed, wish to avoid responsibility, have relatively little ambition and above all want security.

. Theory X is a pessimistic or static or rigid or negative approach.



Herzberg's two factor thoery of Motivation:

In 1959, Frederick Herzberg, a behavioural scientist proposed a two-factor theory or the motivator-hygiene theory.

To better understand employee attitudes and motivation, Frederick Herzberg performed studies to determine which factors in an employee's work environment caused satisfaction or dissatisfaction. The studies included interviews in which employees where asked what pleased and displeased them about their work. Herzberg found that the factors causing job satisfaction (and presumably motivation) were different from those causing job dissatisfaction. He developed the motivation-hygiene theory to explain these results. He called the satisfiers motivators and the dissatisfiers hygiene factors, using the term "hygiene" in the sense that they are considered maintenance factors that are necessary to avoid dissatisfaction but that by themselves do not provide satisfaction.

Hygiene factors- Hygiene factors are those job factors which are essential for existence of motivation at workplace. These do not lead to positive satisfaction for long-term. But if these

factors are absent / if these factors are non-existant at workplace, then they lead to dissatisfaction. In other words, hygiene factors are those factors which when adequate/reasonable in a job, pacify the employees and do not make them dissatisfied. These factors are **extrinsic to work.** Hygiene factors are also called as **dissatisfiers or maintenance factors** as they are required to avoid dissatisfaction. These factors describe the job environment/scenario. The hygiene factors symbolized the physiological needs which the individuals wanted and expected to be fulfilled.

Hygiene factors include: Company policy, Supervision, Relationship between Boss, Work conditions, Salary, Relationship between Peers.

Motivational factors- According to Herzberg, the hygiene factors cannot be regarded as motivators. The motivational factors yield positive satisfaction. These factors are inherent to work. These factors motivate the employees for a superior performance. These factors are called satisfiers. These are factors involved in performing the job. Employees find these factors **intrinsically** rewarding. The motivators symbolized the psychological needs that were perceived as an additional benefit.

Motivational factors include: Recognition, Sense of achievement, Growth and promotional opportunities, Responsibility, Meaningfulness of the work.

Unit 5: Inventory Management

- Inventory: stock of goods which are having some economical value
- Why inventory?
  - Uncertainty in customer demand
  - Supply uncertainties (quality, quantity, cost, delivery lead time)
  - In order to meet customer demand in small interval of time.
  - In order to perform business operations economically.

Types of Inventory

- Raw materials(R/M) – **inputs to production process, usually purchased from suppliers.**
- Work-in-process(WIP) – **partially completed products still in production process.**
- Finished goods(F/G) – **final product, ready for storage, distribution and sale.**
- MRO – **not part of final product**

INVENTORY COSTS

Purchase Cost

- It is the unit purchase price - from an **external source**
- It is unit production cost – produced internally
- Unit production cost includes **direct labour, direct material and factory overhead**

Order/Setup Cost

- Expense of issuing a purchase order to an outside supplier or from internal production setup costs
- Vary directly with number of orders or setups
- Order cost includes **transportation cost, and cost for requisition, analysing vendors, writing purchase orders, transportation cost to transport the order quantity, receiving materials, inspecting materials, following up orders** and doing the process necessary to complete the transaction

Holding Cost or Carrying Cost

- It is the cost associated with **investing in inventory and maintaining the physical investment in storage**
- It contains **capital costs, taxes, insurance, handling, storage, shrinkage, obsolescence, and deterioration**

Stockout Costs

- Economic consequence of an external or an internal shortage
- External shortage – when **customer's order is not filled**
- Internal Shortage – When an order of a group or **department is not filled**
- External shortages can incur **backorder cost, present profit loss and future profit loss**
- Internal shortage can result in **lost production and delay in completion date**

Economic Order Quantity (EOQ) – Single Item

EOQ **-** The order quantity that minimizes the total inventory cost

Notations Used

R – annual demand in units

P – purchase cost of an item

C – ordering cost per order

$H = PF$ – holding cost per unit per year

Q – lot size or order quantity in units

F – annual holding costs as a fraction of unit cost

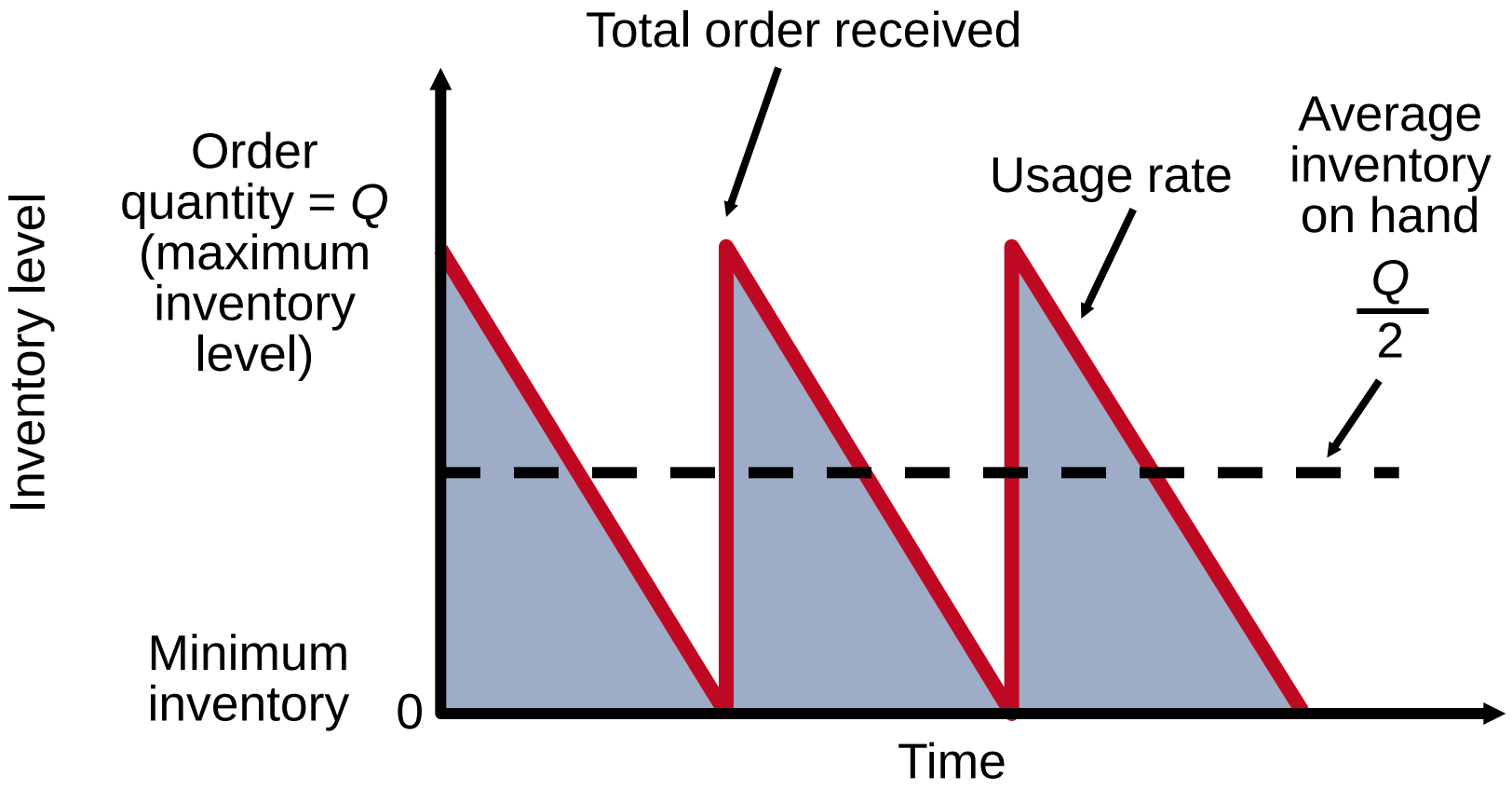
TC – total annual cost

Basic EOQ Model

Important assumptions

1. Demand is known, constant, continuous and independent
2. Lead time is known and constant
3. Receipt of inventory(entire lot) is instantaneous and complete
4. Quantity discounts are not possible
5. Only variable costs are setup (or ordering) and holding
6. Stockouts can be completely avoided.
7. There is sufficient space and capital to procure the desired quantity
8. The item is a single product; it does not interact with any other inventory item

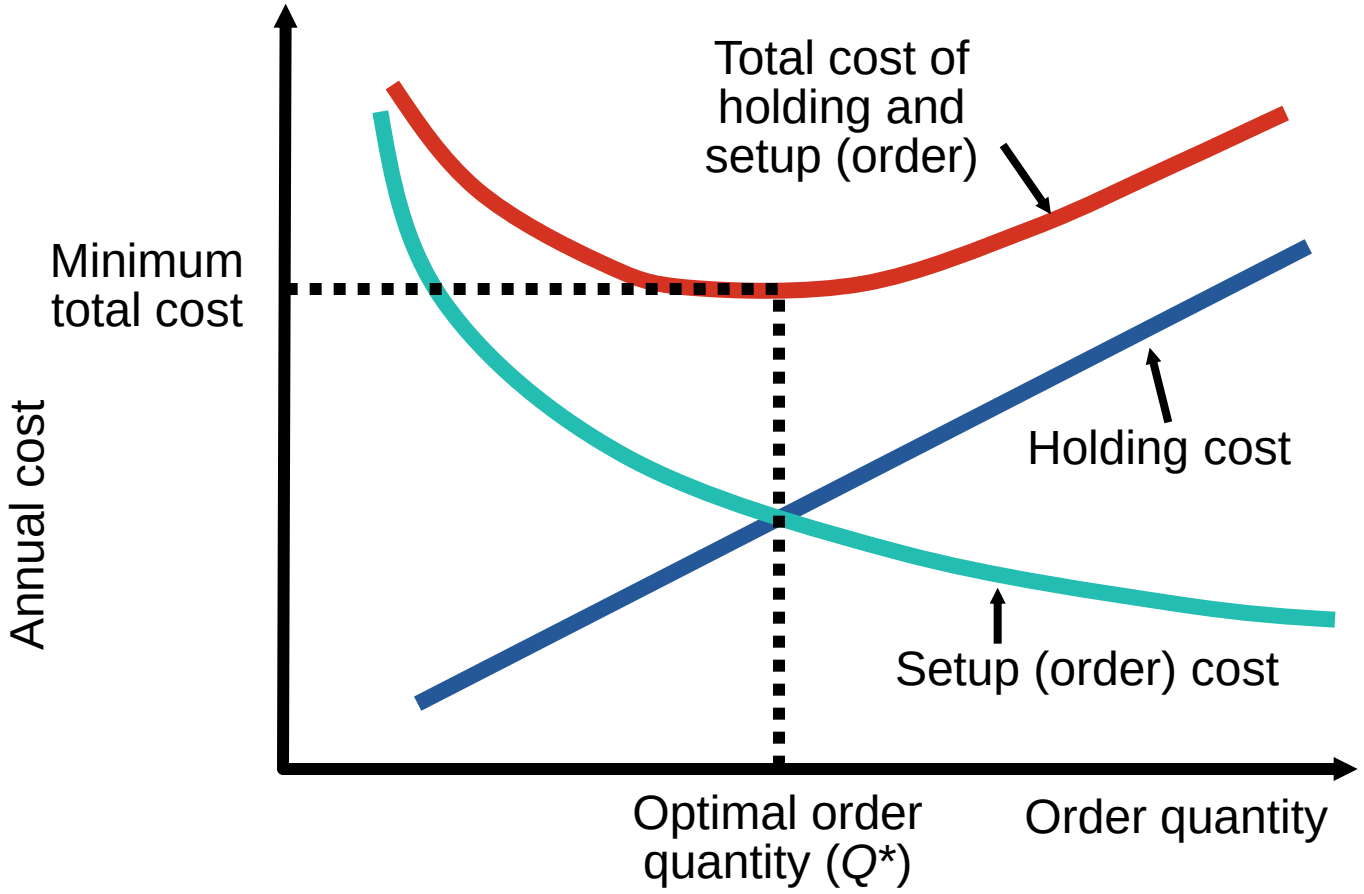
Inventory Usage Over Time



Classical Inventory model

Minimizing Costs

Objective is to minimize total costs



Total annual cost = purchase cost + order cost + holding cost

$$Q_0 = \sqrt{\frac{2CR}{H}} = \sqrt{\frac{2CR}{PF}}$$

$$\text{Number of order per year} = m = \frac{R}{Q_0} = \sqrt{\frac{HR}{2C}}$$

$$\text{Order interval} = T = \frac{1}{m} = \frac{Q_0}{R} = \sqrt{\frac{2C}{HR}}$$

$$\text{Reorder level} = B = \frac{RL}{12}$$

Replenishment order arrives just as the last item leaves the inventory which restores the inventory level to the amount ordered

BATCH-TYPE PRODUCTION SYSTEMS

Economic Production Quantity (EPQ) – Single items

- Finite replenishment rate or no instantaneous supply
- Production cost
- Setup cost
- Size of production run (order) to be determined
- Production run that minimizes the total inventory cost is the economic production quantity

Notations

R – annual demand in units

P – unit production cost

Q – size of production run

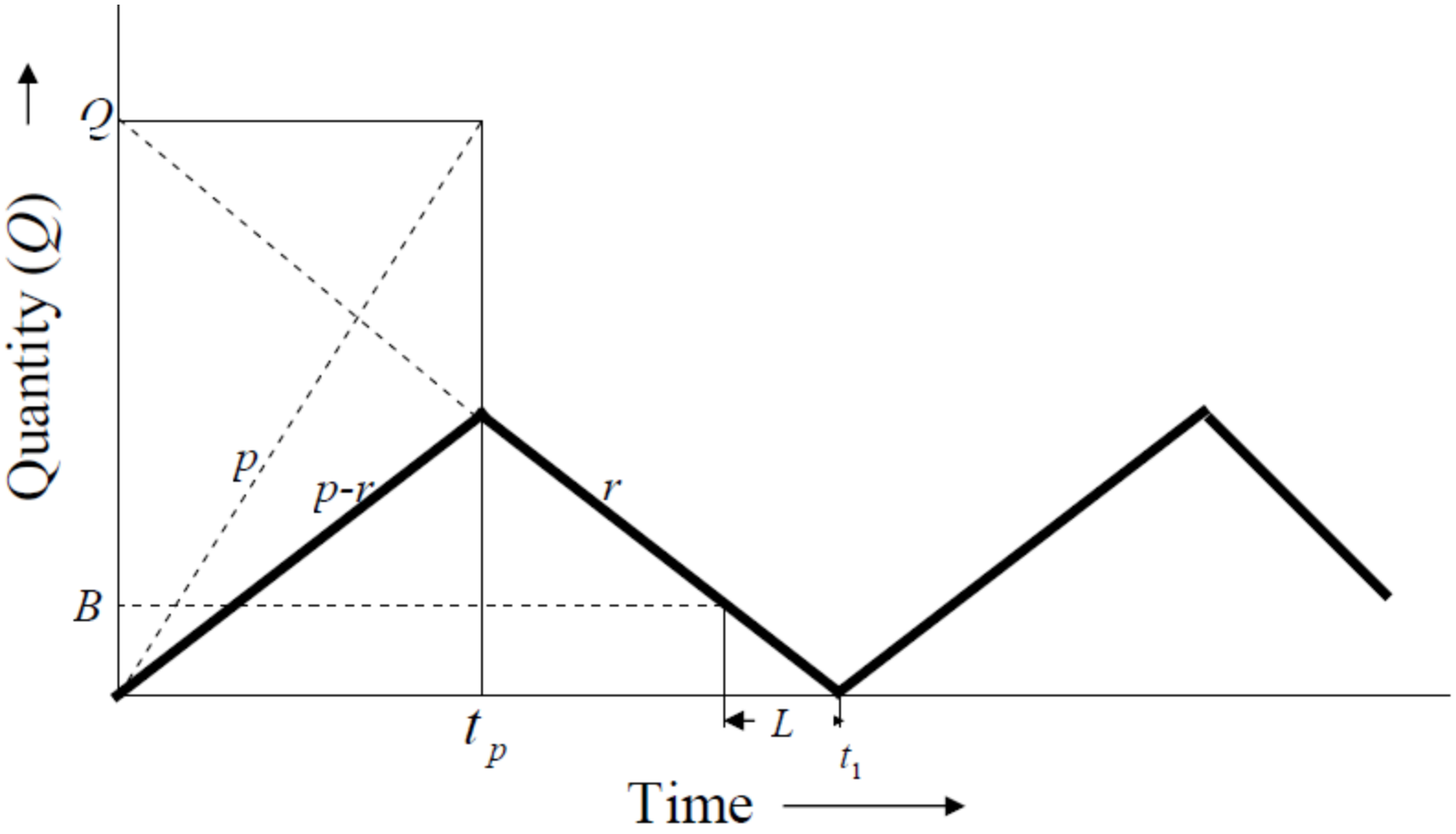
p – production rate

r – demand rate

C – setup cost per production run

H – holding cost per unit per year

B – Reorder level



Inventory variation for finite replenishment rate – Economic production quantity

Maximum inventory $= (p - r)t_p$

$$t_p = \frac{Q}{p}$$

Average inventory $= \dfrac{(p - r)Q}{2p}$

$$TC(Q) = PR + \frac{CR}{Q} + \frac{HQ(p - r)}{2p}$$

On minimization

$$Q_0 = \sqrt{\frac{2CRp}{H(p - r)}}$$

Optimum length of production run $= \dfrac{Q_0}{p}$

SELECTIVE INVENTORY CONTROL

- To identify items, which bring significant benefit by proper management from among hundreds and thousands of items managed by an organisation
- Determine the importance of items and thus allows different levels of control based on the relative importance of items

ABC Analysis

- Classifies items based on the annual usage value (AUV)
- Identify a small percentage of items which account for most of the total inventory value
- **Basic Principle**
- 20/80 - Rule
- Pareto's Law – Vilfredo Pareto – Italian Economist "Few are vital' and 'many are trivial'
- AUV = Annual demand × Price

Pareto's law applied to inventories

- The relationship between the percentage of items and the percentage of AUV follows a pattern
- A – about 20 % of items account for about 80 % of the AUV B - about 30 % of items account for about 15 % of the AUV C - about 50 % of items account for about 5 % of the AUV
- **Steps in Making an ABC Analysis**
  - Determine the annual usage for each item
  - Calculate the AUV of each item
  - List the items according to their AUV (descending order)
  - Calculate the cumulative AUV and the cumulative percentage of items
  - Examine the annual usage distribution and group the items into A, B, C based on percentage of AUV

Different Controls used with different classes

- A Items: High priority – Tight control including complete accurate records, regular and frequent review by management, frequent review of demand forecast and close follow-up and expediting to reduce lead time
- B Items: Medium priority – Normal Control
- C Items: Lowest priority – Simplest possible control. Perhaps use a two-bin system or periodic review system. Order larger quantities and carry sufficient safety stock

An example:

A small firm inventories only ten items, but decide to setup an ABC inventory system with

20 % A items, 30 % B items, and 50 % C items. The company records provide the information shown below.

Part No.	1	2	3	4	5	6	7	8	9	10	
Unit Usage	1100	600	100	1300	100	10	100	1500	200	500	5510
Unit Cost	20	400	40	10	600	250	20	20	20	10	
AUV	22000	240000	4000	13000	60000	2500	2000	30000	4000	5000	382500

ABC SOLUTION

Part No.	AUV in Descending order	Cumulative AUV	Cumulative % AUV	Cumulative % of items	Class
2	240000	240000	62.75	10	A
5	60000	300000	78.43	20	A
8	30000	330000	86.27	30	B
1	22000	352000	92.03	40	B
4	13000	365000	95.42	50	B
10	5000	370000	96.73	60	C
3	4000	374000	97.77	70	C
9	4000	378000	98.82	80	C
6	2500	380500	99.48	90	C
7	2000	382500	100	100	C

References

- Richard J **Tersine**, **Principles of Inventory and Materials Management**, PTR Prentice-Hall.

Unit: 4 Production planning and control

Production is the process or activity of manufacturing or producing something.

- **Continuous production system** involves a continuous or almost continuous physical flow of materials. The examples are petrochemical, cement, steel, sugar and fertilizer industries, etc. Continuous production is a flow production method used to manufacture, produce or process materials without interruption.
- **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 common practice is use the same production and produce different types of goods.
✓ The practice of stopping and restarting a production line happens in response to market conditions.

Productivity:

- A measure of the effective use of resources, usually expressed as the ratio of output to input

Schedule: A schedule is a plan that gives a list of events or tasks and the times at which each one should happen or be done.

Scheduling is the determination of time and date when each operation is to be commenced or completed. The time and date of manufacturing each component is fixed in such a way that assembling for final product is not delayed in any way.

Scheduling types :

1. ***Forward scheduling:*** is commonly used in job shops where customers place their orders on "needed as soon as possible" basis. Forward scheduling determines start and finish times of next priority job by assigning it the earliest available time slot and from that time, determines when the job will be finished in that work centre. Since the job and its components start as early as possible, they will typically be completed before they are due at the subsequent work centers in the routing. The forward method generates in the process inventory that are needed at subsequent work centers and higher inventory cost. Forward scheduling is simple to use and it gets jobs done in shorter lead times, compared to backward scheduling.

Forward (Front) Scheduling

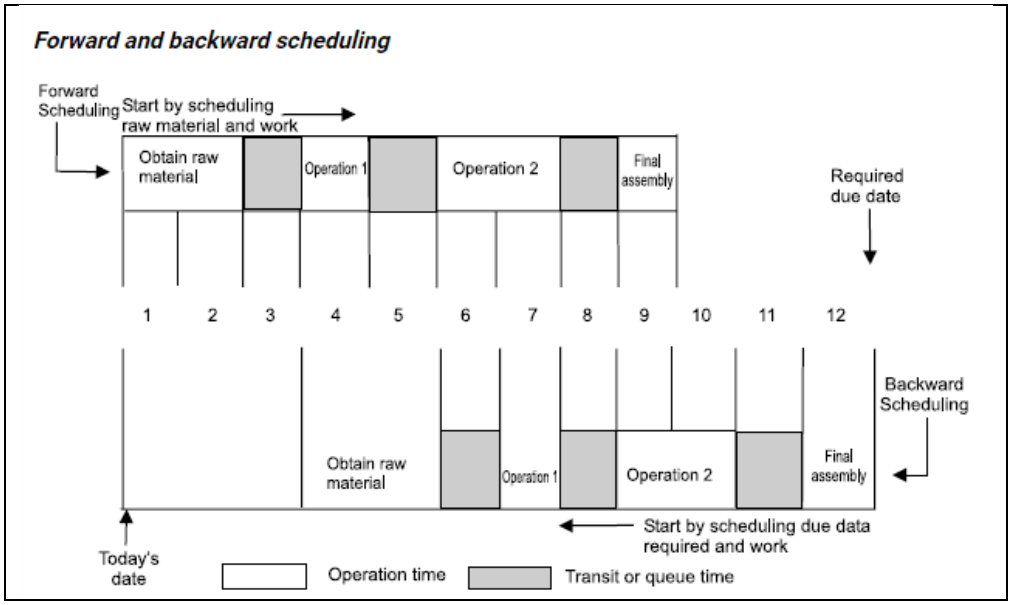
- Processing of all parts starts as soon as possible
- Lead to unnecessary work-in-process inventories
- Lead-time differences are ignored

- Scheduling starts from the current time and build the schedule forward in time
- Forward schedule can tell the earliest date that an order can be completed

2. ***Backward scheduling:*** is often used in assembly type industries and commit in advance to specific delivery dates. Backward scheduling determines the start and finish times for waiting jobs by assigning them to the latest available time slot that will enable each job to be completed just when it is due, but done before. By assigning jobs as late as possible, backward scheduling minimizes inventories since a job is not completed until it must go directly to the next work centre on its routing. Forward and backward scheduling methods are shown in the following figure.

Backward (Back) Scheduling:

- Processing of all parts starts as late as possible
- Work-in-process is less and it considers lead-time difference
- Scheduling starts from the due date of each job and schedules backward in time
- It tells when are order must be started in order to be done by a specific date



Loading :

Loading is the execution of the scheduled plan as per the route chalked out. It includes the assignment of the work to the operators at their machines or work places. So loading determines who will do the work

- Loading determines the work centres to receive the jobs
- loading assigns jobs to the work centres, but it does not necessarily specify the order in which jobs will be performed

Load chart or system:

- Result is a set of start and finish dates for each operation at each work centre
- The output is the start times and completion times for each job at each work Centre

Commonly used types of loading are horizontal and vertical loading

Horizontal Loading:

- The entire shop order or job is loaded for all its operations and then takes the next job Process
- Begins with the highest priority job and schedules it through all work centres
- Then next highest priority job is scheduled through all work centres
- This process repeats until all jobs have been scheduled
- If a lower priority job can be scheduled ahead of a higher priority job at some machine, without delaying the start of higher priority job, the system will do so
- At times a machine is to sit idle, even if a job is available, because a more important job is coming

Vertical Loading

- Fills a work centre job-by-job
- It is consistent with how most job shop scheduling research is conducted, as well as with the priority scheduling viewpoint
- The system looks at a work centre and decide which set of jobs to load next

Table: Set-up and Processing Times for Finite Loading Example

Job	Priority	Machines			Routes
		A	B	C	
1	Second	2	5	4	A-B-C
2	First	6	3	7	A-B-C
3	Third	--	4	7	B-C

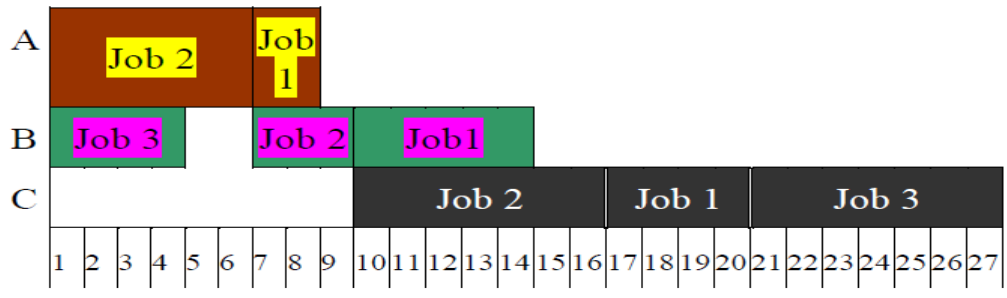


Fig. An Example of Horizontal Loading (Forward scheduling)

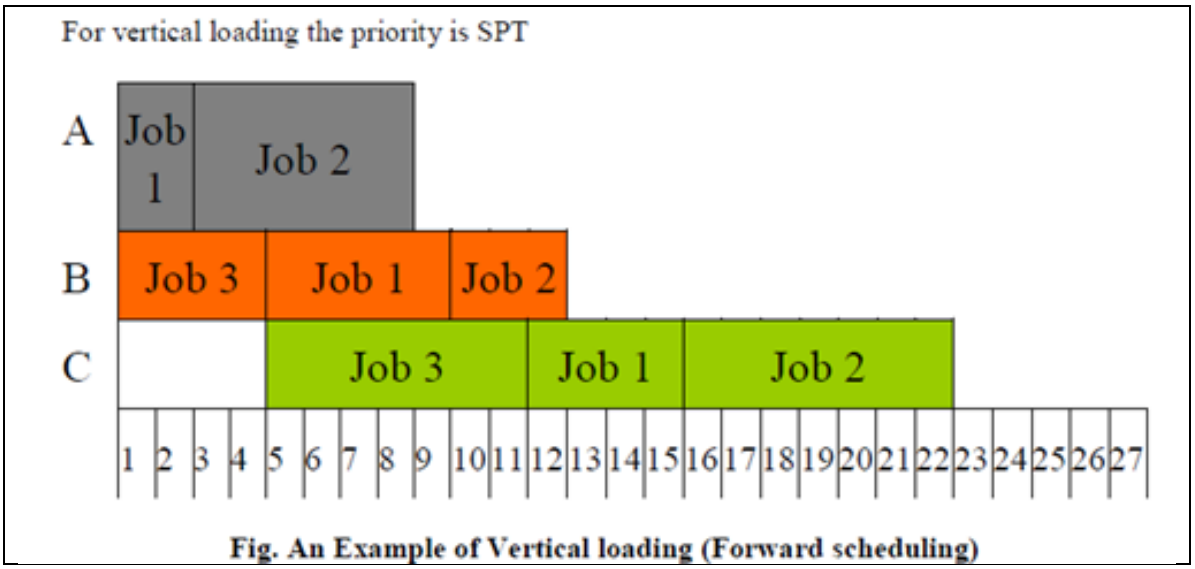


Fig. An Example of Vertical loading (Forward scheduling)

Routing may be defined as the selection of path which each part of the product will follow while being transformed from raw materials to finished products. Path of the product will also give sequence of operation to be adopted while being manufactured. In other way, routing means determination of most advantageous path to be followed from department to department and machine to machine till raw material gets its final shape, which involves the following steps:

- Type of work to be done on product or its parts.
- Operation required to do the work.
- Sequence of operation required.
- Where the work will be done.
- A proper classification about the personnel required and the machine for doing the work.

Dispatching :

Dispatching refers to the process of actually ordering the work to be done. It involves putting the plan into effect by issuing orders. It is concerned with starting the process an operation on the basis of route sheets and schedule charts.

Forecasting:

- Is a process of predicting a future event.

Forecasting methods: qualitative methods and quantitative methods

Qualitative methods:

- Jury of executive opinion (Opinion of experts)
- Delphi method
- Sales force composite

- Consumer Market Survey

Quantitative methods:

- Naïve approach
- Moving average method
- Weighted moving average method
- Simple exponential smoothing method

Naïve approach:

In this method, last period demand will become the forecasted demand for next period.

Month	demand	Forecasted demand
1	650	
2	700	650
3	810	700
4		810

3-period moving average method:

In this method, average value of last three periods demand will become the forecasted demand for fourth period.

$$F_t = \frac{D_{t-1} + D_{t-2} + D_{t-3}}{3}$$

An Example

Month	Demand	3-month Moving Average
1	650	
2	700	
3	810	
4	800	(650+700+810)/3 = 720
5	900	(700+810+800)/3 = 770
6	700	(810+800+900)/3 = 837
7		(800+900+700)/3 = 800

Weighted moving Average method:

In weighted moving average method, we assign some weights to the last three periods to predict the fourth period demand.

An Example

Month	Demand	3-month Moving Average	3-month Wt. Moving Average (weights: 0.2, 0.3, 0.5)
1	650		
2	700		
3	810		
4	800	(650+700+810)/3 = 720	0.2*650+0.3*700+0.5*810 = 745
5	900	(700+810+800)/3 = 770	0.2*700+0.3*810+0.5*800 = 783
6	700	(810+800+900)/3 = 837	0.2*810+0.3*800+0.5*900 = 852
7		(800+900+700)/3 = 800	0.2*800+0.3*900+0.5*700 = 780

Simple exponential smoothing method:

$$\text{New Period Forecast} = \text{Last period`s forecast} + \text{smoothing constant}\left(\text{Last Period`s Actual Demand} - \text{Last Period`s forecast}\right)$$

$$F_t = F_{t-1} + \alpha\left(D_{t-1} - F_{t-1}\right)$$

$$F_t = \alpha D_{t-1} + (1-\alpha)F_{t-1}$$

Alpha (α): is smoothing constant. Its value lies between 0 and 1.

An Example

Month	Demand	3-month Moving Average	3-month Wt. Moving Average (weights: 0.2, 0.3, 0.5)	Exponential Smoothing (alpha = 0.1)
1	650			
2	700			0.1*650+0.9*650 = 650
3	810			0.1*700+0.9*650 = 655
4	800	(650+700+810)/3 = 720	0.2*650+0.3*700+0.5*810 = 745	0.1*810+0.9*655 = 670.5
5	900	(700+810+800)/3 = 770	0.2*700+0.3*810+0.5*800 = 783	0.1*800+0.9*670.5 = 683.5
6	700	(810+800+900)/3 = 837	0.2*810+0.3*800+0.5*900 = 852	0.1*900+0.9*683.5 = 705.2
7		(800+900+700)/3 = 800	0.2*800+0.3*900+0.5*700 = 780	0.1*700+0.9*705.2 = 704.7

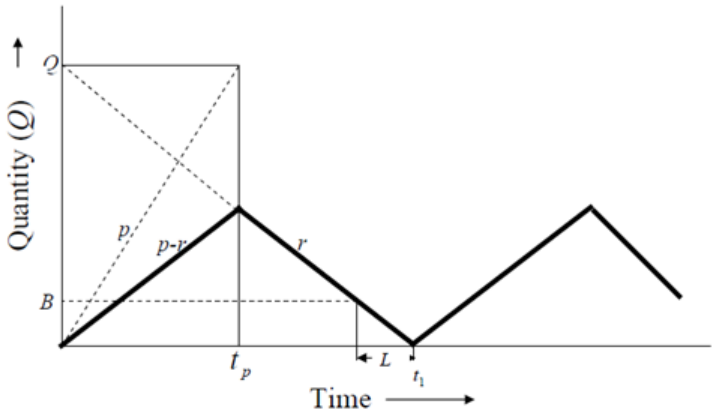
Economic Batch Quantity (EBQ), or Economic production quantity (EPQ)
Economic production quantity is the order size of a production batch that minimizes the total cost.

Economic Production Quantity (EPQ) derivation:

- Finite replenishment rate or no instantaneous supply
- Production cost and Setup costs are involved
- Production run that minimizes the total inventory cost is the economic production quantity

Notations
R – annual demand in units
P – unit production cost
Q – size of production run
p – production rate
r – demand rate
C – setup cost per production run
H – holding cost per unit
B – Reorder level

The following figure shows a typical cycle where production starts at time zero and ends at time t_p. During the time period t_p to t_1 , no production occurs and inventory stock is depleted. At time t_1 a new production run is started.



Inventory variation for finite replenishment rate – Economic production quantity

Maximum inventory = $(p-r)t_p$

$$t_p = \frac{Q}{P}$$

Average inventory $= \frac{(p-r)Q}{2p}$

$$Total\ inventory\ \cos t,\ TC = \Pr oduction\ Cost + Set\ up\ \ Cost + Inventory\ \ \ Carrying\ \ \ Cost$$

$$TC = PR + \frac{CR}{Q} + \frac{HQ(p-r)}{2p}$$

$$\frac{d(TC)}{dQ} = 0$$

On minimization

$$Q_0 = \sqrt{\frac{2CRp}{H(p-r)}}$$

Optimum length of production run $= \frac{Q_0}{p}$

Problem : Demand for an item is constant at 1800 units a year. The item can be made at a constant rate of 3500 units a year. Unit cost is Rs 50, batch setup cost is Rs 650 and holding cost is 30% of value a year. What is the optimum batch size for the item , optimum production run and time between cycles?.

Solution :

Given data

D = 1800 units a year

P = 3500 units a year

C = 50 a unit

S = 650 a batch
H = 0.3X50 = a unit a year

$$Q = \sqrt{\frac{2DS}{H}\left(\frac{P}{P-D}\right)}$$

$$Q = \sqrt{\frac{2\times 1800\times 650}{15}\left(\frac{3500}{3500-1800}\right)}$$

Q = 566.7

Optimum production time $t_p = \frac{Q}{P} = \frac{566.7}{3500} = 0.16 years = 8.4 weeks$

Time b/n production runs or Optimum cycle length $= \frac{Q}{D} = \frac{566.7}{1800} = 0.31 years = 16.1 weeks$

Process Planning

A process is described as a set of steps that result in a specific outcome. It converts input into output. Process planning is also called manufacturing planning, material processing, process engineering, and machine routing. It is the act of preparing detailed work instructions to produce a part. It is a complete description of specific stages in the production process. Process planning determines how the product will be produced or service will be provided. Process planning converts design information into the process steps and instructions to powerfully and effectively manufacture products. As the design process is supported by many computer-aided tools, computer-aided process planning (CAPP) has evolved to make simpler and improve process planning and realize more effectual use of manufacturing resources.

In companies, planning processes can result in increased output, higher precision, and faster turnaround for vital business tasks.

It has been documented that process planning is required for new product and services. It is the base for designing factory buildings, facility layout and selecting production equipment. It also affects the job design and quality control.

Objective of Process Planning: Process planning is planned to renovate design specification into manufacturing instructions and to make products within the function and quality specification at the least possible costs. This will result in reduced costs, due to fewer staff required to complete the same process, higher competence, by eradicating process steps such as loops and bottlenecks, greater precision, by including checkpoints and success measures to make sure process steps are completed precisely, better understanding by all employees to fulfil their department objectives. Process planning deals with the selection of the processes and the determination of conditions of the processes. The particular operations and conditions have to be realised in order to change raw material into a specified shape. All the specifications and conditions of operations are included in the process plan. The process plan is a certificate such as

engineering drawing. Both the engineering drawing and the process plan present the fundamental document for the manufacturing of products. Process planning influences time to market and productions cost. Consequently the planning activities have immense importance for competitive advantage.

References:

https://www.civilserviceindia.com/subject/Management/notes/process-planning.html