

**BHUBANANANDA ODISHA SCHOOL OF ENGINEERING,
CUTTACK**

DEPARTMENT OF CIVIL ENGINEERING



LECTURE NOTE ON: CONSTRUCTION MANAGEMENT

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BOSE, CUTTACK

Construction management

Introduction to construction management

- Aims and objectives of construction management
- Functions of construction management
- The construction team components: owner, engineer, architect, contractor-their functions and interrelationship and jurisdiction
- Resources for construction management-men, machines, materials, money

Concept of management

The term management has different senses of use. Sometimes it is used in the sense of an organisation in which different class of people work together to provide qualitative and economical product by the use of human beings and other resources like machine, money and material.

Or sometimes it may be defined as the process consisting of planning, organising, activating and controlling the performance to determine and accomplish the objective by the use of men, machines, materials and money.

Basically management is the art of securing maximum results with the minimum effort.

Significance of Construction Management

In India, construction industry is the second largest economic activity and also the Gross National Product (GNP) of India from construction activities is about 10%. Thus it plays a major role in the development of the national economy. On an average about 50% of the total expenditure of the five year plans is invested in construction works. So, new methods and new techniques must be devised and used to increase the speed and safety in construction.

Necessity of Construction Management

Construction management is necessary for the following causes.

- By adopting the new technologies of construction and supervision, the economy is affected.
- There can be proper co-ordination between agencies and categories of persons using the modern techniques of management.
- The working quality & speed of work can be improved by using modern equipment of construction.
- The completion of work can be done in the minimum possible time duration.

Aim and Objectives of Construction Management

The following are the main objectives of the construction management.

- The work should be completed within estimated budget and specified time.
- There should be the motivation to working people to give their level best within their capacities to complete the work.
- There should be qualified and trained staff to supervise the work properly.
- The execution of work should be done as per specification.
- The execution of work should be done as most economically.
- The working quality and workmanship should be good.
- There should be a proper plan of work and it should be organised properly.
- There should be an awareness of creating an organisation that works as a team.
- The workers should have been provided with safe and satisfactory working condition.

Functions of Construction Management

The following are the functions of construction management

- (i) Planning
- (ii) Organizing
- (iii) Staffing
- (iv) Directing
- (v) Controlling
- (vi) Co-ordinating
- (vii) Communicating

Planning:

Planning is a basic managerial function. Planning helps in determining the course of action to be followed for achieving various organizational objectives.

- It is done in the office.
- Planning is a process which involves “Thinking before doing”.
- Time needed to complete the whole construction project.
- Type, quantity and exact time for delivery of materials of construction.
- Type, number and duration of use of different machines and equipments.
- Category of staff i.e., Managers, skilled and unskilled workers required.
- Type of uncertainties likely to cause delays such as weather conditions, shortage of supply, labour unrest and sub-judice land matter etc.

It is a decision in advance which mainly focusses on

- WHAT TO DO
- WHEN TO DO
- HOW TO DO

➤ WHO TO DO

Organising

There is a requirement of a number of persons in every business enterprise to look after on different aspects. It is the responsibility of a manager to set up the objectives or goals to achieve by its personnel and also to define the responsibility of each individual employee in the organisation. The function of organising is to arrange, guide, co-ordinate, direct and control the activities of other factors of production such as men, material, money and machines.

Organising is the part of management that involves establishing the intentional structure of roles for the people in an enterprise. The organisation provides the necessary framework within which people associate for the attainment of business objectives.

The process of organisation involves the following steps.

- to identify the work to be performed
- to classify or group the work
- to assign these group of activities or work to individuals
- to delegate authority and fix responsibility
- to co-ordinate these authority-responsibility relationships of various activities.

However, the organisation structure should be simple and flexible. The character and type of organisation depends upon the size and nature of the enterprise.

Staffing

This function of management involves managing the positions created by organisation process.

- Staffing is filling the positions in the organisation structure through defining requirements.
- It is a very important responsibility to select right persons for right jobs in a construction organisation.
- This function of management includes not only the proper selection of staff in requisite number but also includes their training to handle fresh accomplishments.

Every manager in an organisation has to perform the staffing function in one form or the other in order to get things done through others. But it is a difficult managerial function as the behaviour and actions of human beings can't be predicted.

Directing

Directing is concerned with carrying out the desired plans. Direction is called as management in action. It initiates organized and planned action and ensures effective performance by the

subordinates towards the organisation of group activities. This function of management ensures that each employee knows what exactly he is supposed to do and how and when to do it. This function is performed at every level of organisation from top managers to employees. The planned programmes may be in the form of bar charts, or network diagram, drawing, other estimates, detailed specification and other details of the work.

Directing is concerned with the manner in which a manager influences the action of subordinates. This function of management involves

- Motivation and encouraging
- Guidance
- Supervision
- Communication
- Leading the employees of the organisation.

Controlling

After the other elements are in place, a manager's job is not finished. He needs to continuously check results against goals and take any corrective actions necessary to make sure that his area's plans remain on track. Controlling is the process which enables the management to get its policies implemented and take corrective action.

- If planning is the beginning of the management process, then controlling may be said to be the final stage of the management.
- Controlling is an important action for ensuring effective and efficient working.
- It reviews the work plan to check and rectify the deviations through appropriate corrective measures.
- It also checks the quality of work so that it is completed as per scheduled/specified time.
- It also keeps control on avoiding the wastage on the use of machines and material and labour output for each item of work.
- It also controls the expenditure on each item of work as per cost estimate.
- A control system should be economical, effective and assure corrective action.
- The main purpose of control is to see that the activities achieve the desired results.

Co-ordinating

Co-ordination is much wider term than co-operation. Co-operation indicates the willingness of individuals to help each other. Co-ordination, on the other hand, is a conscious managerial effort which is the result of a deliberate action. Co-ordination harmonises the approaches and actions of various employees or group of employees to achieve a common objective. In a construction organisation it is essential to carry out a large number of inter related and inter

dependent activities simultaneously. In a large organisation, the work is divided into different departments. So there is a great importance for good co-ordination. Also good co-ordination is necessary between various agencies working together on the project so that the work of any one of them should not hinder the work of the other. Co-ordination requires an efficient system of communication so that each department and section is aware of their role. Proper co-ordination can be done by regular meetings of departmental/sectional heads with top management and this is the fundamental to proper co-ordination. As a result, variance or deviation problems are sorted out and their corrective remedies are determined for their best solution.

Communicating

- Communication is the process of transmitting, receiving and understanding the ideas by others for the purpose of effecting desired results.
- There may be numerous methods of communication like verbal, written orders, reports, instructions etc.
- The effectiveness of communication largely depends upon the proper understanding of what is being communicated and what is being received and then responded.
- Ineffective communication leads to confusion, misunderstanding, dissatisfaction and sometimes even workers unrest.

Construction Team Components

Any project can't be completed by a single individual. There is a requirement of group of person's specific duties to be performed by each member. The construction team consists of engineer/architects and contractor. The requirement of this team is to cooperatively plan, design and execute a particular project. The main objective of this team is to execute the project in the best and most economical manner within a limited scheduled. As an owner takes up any project, he then employs an engineer/architect to prepare the plan for the project and the engineer designs the project at the lowest possible cost which satisfies the most of the needs of the owner. After this step, the owner engages contractor for the completion of the project.

Owner

- The owner of a construction project may be an individual, group of individuals, private or public body.
- The owner finances the project and also recognises the need for a project.
- In view of all aspects the owner has the power to take major decisions regarding managerial, financial and administrative aspects.

Engineers & Architects

Structural engineers are to prepare structural design of structures. Mechanical engineers are to design and preparation of working drawings for all mechanical services associated with the construction project. Also electrical engineers are to design & prepare working drawing for electrical power & distribution system during & after construction.

An architect is to assess the Client's fundamental requirements, Architect/engineer being a professional man.

- He supervises the construction of the project.
- He first does the preliminary investigation for the proposed project.
- He then prepares plans and designs the project for the owner.
- He specifies for the construction.
- He then works as an adviser & helps in solving problems which arise during the progress of work.
- He deals with the contractor on behalf of the owner.
- He estimates the cost of work to be done and quantity surveys.
- He prepares the cash-flow statements during construction.
- He prepares the bill of quantity & tender documents before tendering. (xi) He prepares the final account on completion of the project.

Contractor

The contractor may be an individual for small contracts or large construction company for projects. There is the need of a qualified engineer to every contractor whether small or big. The contractor executes various types of works and also makes necessary arrangements for labour, machinery, materials, in order to complete the project in the limited scheduled time. In some projects, the contractor may appoint sub-contractor. There is a rate or bid between Contractor & owner before starting any project. When the bid or rate is agreed, then the contractor constructs the projects.

Resources for Construction Management

The following are main resources which are needed for the construction industry.

Money

- Money is first and foremost requirement for any project and it should be arranged before starting any construction project for smooth implementation of a project.
- There should be regular supply of money to keep the project moving progressively.
- If the financial resources are insufficient, then the project will not be completed within the limited scheduled time period.

- Then there will be wastage of energy & time and also the organizational goal will not be achieved.

So money is an important factor for construction management should and be planned with special care before starting any project.

Materials

Sufficient quantity of materials is required for the completion of any project, and also should be available at the site. These materials required for the project are estimated before starting the project. The materials required for any project is accounted for upto 60% of the total cost at the project, So, it is essential for regular supply of material. If the regular supply of material is not done properly, the work may be stopped. The materials required for a construction project are bricks, cement, stones, shuttering, timber, water supply, electrical fittings etc., and these materials should be arranged with proper care.

Machines

Different types of machineries and equipment are required for any construction work. The machinery are required depending on the type and nature of a construction work. It is economical to use machines for heavy & large works.

Though initially, the cost of machinery is high but it works continuously under any adverse situation and it also reduces the high requirement of man power.

The various equipment and tools required for construction are mixers, tractors, cranes, pumps, generators, excavators, etc. These equipments are needed to be properly maintained for any construction activity.

Man power

For the successful completion of any project, man power is an important factor. It may be both skilled and unskilled. There is a requirement of all manpower to start a project from an unskilled labour to supervisory staff according to the planning. Also technical and managerial personnel such as engineers, architects, surveyors, supervisors, technicians are essential for efficient use of human resources. So that it will helpful to achieve project completion within estimated time and budget.

Construction Planning

Topics to be covered

- Importance of Construction Planning
- Developing work breakdown structure for construction work
- Construction planning stages - Pre-tender stage, Post-tender stage.
- Construction scheduling by Bar charts-preparation of Bar Charts for simple construction works.
- Preparation of schedules for labour materials, machinery, finance for small works
- Limitation of Bar charts
- Construction scheduling by network techniques-definition of terms PERT and CPM techniques, advantages and disadvantages of two techniques, network analysis, estimation of time and critical path, application of PERT and CPM techniques in sample construction works.

Importance of Construction Planning

Importance of construction planning are as follows.

- The work may be completed within the scheduled time.
- The work may be executed most economically.
- The work will be both qualitatively & quantitatively of optimum standards.
- There shall be minimum wastage during construction work.
- The work should be completed as per specifications.
- There will be a minimum cost of maintenance of machinery & equipment.
- There will be optimum use of available resources.
- Controlling of construction activities can be possible.

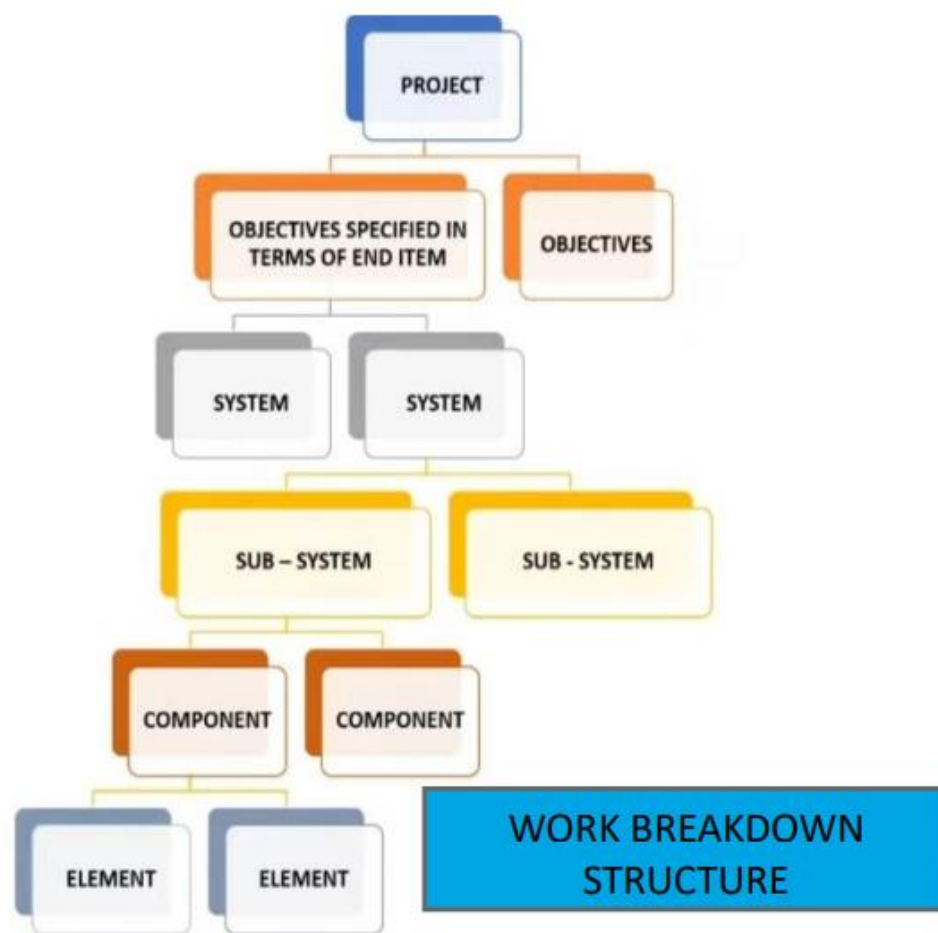
Developing work breakdown structure for construction work

It is the preliminary diagram which shows the breaking down of a project into subsystems and each subsystems into major components and discrete activities.

In WBS, top-down approach to planning is adopted. Such an approach ensures that the total project is fully planned and all derivative plans contribute directly to the desired end objectives.

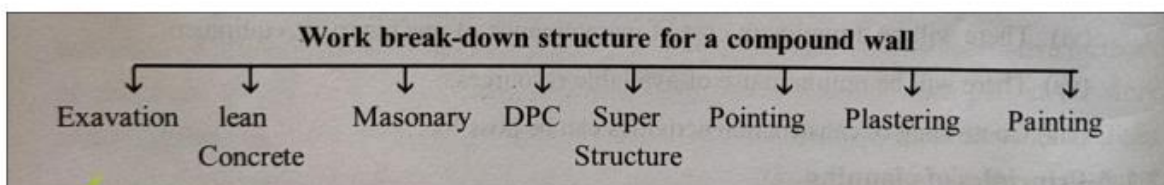
WBS aids in the identification of objectives and allows the planner to see the total picture of the project.

WBS is developed by considering the end objective and breaking it into smaller manageable units on the basis of size, duration and responsibility.

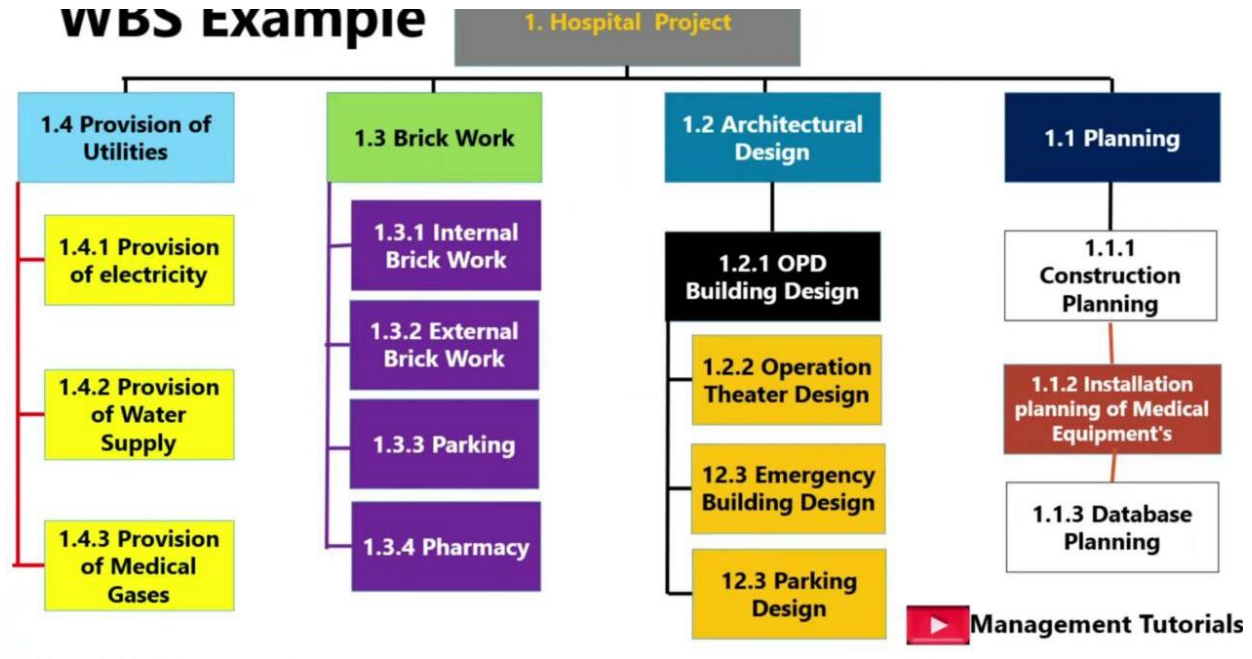


In this system, the major project is first identified in terms of the end activities, then activities are broken into sub activities, components & elements.

For example the construction of a compound wall and a hospital project may be broken down as shown in the figures below.



WBS Example



Construction planning stages-Pre-tender stage, Post-tender stage

Planning is a very essential activity for efficient implementation of a project at various stages.

Construction planning can be divided in the following two stages.

- Pre-tender stage
- Contract stage / Post-tender stage

Pre-tender stage Planning

- The pre-tender planning is carried out by the contractor after the receipt of tender notice and before submitting the tender paper.
- In this stage, the contractor plans his best method of construction for the future contract & also makes plans & programmes for carrying out the work.
- This is an important stage for a contractor to see whether the contract is profitable or not.
- The first part of pre-tender planning is to visit to the site before a contract is undertaken.
- The pre-tender planning report is made after visiting to the site of construction works because it shows total information about the site such as geography of the area, local weather records & availability of resources.

Steps involved in pre tendering stage

- At the first Step, there should be a careful study of tender documents, drawings & specifications to identify the amount of work.
- Also there should be a careful study of tender document about the time limit, i.e. the project should be completed within the stipulated period of time.
- There should be a site investigation & market survey to determine the rates and availability of materials, man power & machinery.
- The availability of required materials near the site of work should be determined and if not, also how these can be procured economically.
- The selection of the most suitable & economical method out of the alternative methods should be carefully determined for executing the work.
- The quantities of different items should be estimated.
- The overheads and the margin of profit should be decided and the tender price finalized for the completion of the work within the stipulated period of time.

Contract stage / Post tender stage Planning

- This stage is otherwise called as contract stage. This stage starts after the acceptance of the tender and extends till the completion of the contract.
- At this stage, contractor fully utilizes the pre-tender stage planning to organize the various activities of construction work so that the work may be completed within the scheduled time economically without delay & difficulties.
- Improper & inadequate planning at this stage may cause heavy loss of money & time.

Steps involved in post tendering stage

- The selection of most suitable & economical method out of all the alternative methods considered at pre-tender stage should be carefully executed at this stage of the work.
- The quantities of materials required at each stage of the work, locating sources of their supplies, their comparative cost from different sources should be worked out properly.
- Inter-relationship of various parts of work should be studied and the proper sequence of operations is finalized.
- The acquirement of construction labour, supervisory & managerial staffs should be finalized and their selection & recruitment should be arranged.
- Total number of requirement of machinery & equipments at various stages of work should be worked out & arranged.

- Also repairing & maintenance of machinery & equipment should be properly arranged.
- Accommodation for labour & staff along with the facilities required for them, temporary camp office, temporary roads etc. should be planned and arranged properly.
- The work programme of each work should be decided and its starting & completing date also be finalized.
- A good communication system between the members of the construction team should be established for the smooth running of project work.

Construction Scheduling

- Scheduling of a project is done after it is properly planned.
- A schedule for construction activity is a graphical representation which determines the time of starting and completing date of each activity in order to complete the whole construction project.
- In other words scheduling is the time table for executing each and every activity with its fixed starting and finishing date.

Preparation of construction schedule

- At first the whole project is divided into a small number of operations.
- Then the inter-dependence among or between the operations are carefully studied and their sequence is decided.
- The quantity of work is to be determined which is to be done in each operation.
- The total time to complete each operation & total project is determined.

Classification of Scheduling

Schedules can be classified into various groups such as;

- Material Schedule
- Labour Schedule
- Equipment Schedule
- Financial Schedule

Material Schedule

- This type of schedule is prepared for moving and storing of material in advance before starting of construction schedule acts as a guide for preparing materials schedule.
- This schedule is done to avoid delay in the execution of the work.

- The materials should be delivered at site at least one week before its use.
- The materials at site should not remain unused for long.
- If the materials stored at site long before its use, it is likely to deteriorate in quality.

For example cement losses strength by 50% if stored for 6 months and steel may be attacked by corrosion due to long storage at site.

Labour Schedule

- The labour schedule is prepared for deciding the actual number of skilled and unskilled labour which is required for the construction work.
- With the help of this schedule required labour can be arranged in time.
- It helps in reducing labour cost.
- Labour schedule is important as it is difficult and costly to arrange skilled labour as and when required.

Equipment Schedule

- This type of schedule is prepared to decide the type and quantity of equipments and also on which date the equipment will be needed. So that they can be arranged when requirement.
- When equipment are decided certain aspects are considered such as Cost of equipment, efficiency of equipment, expenditure required for its repairing, Maximum duration for use of the equipment, quality of fuel consumed by the equipment and servicing of the equipment.
- The aim of this schedule is to derive maximum advantage of the equipment when it is required and remove it from the site when the job is over.

Financial Schedule

- Financial schedule is prepared to estimate the amount of money that owner or contractor has to spend as finance for the project work.
- In maximum construction project the owner will pay a stated percentage of the value to the contractor for the completion of work in each month. It is about 90% of the cost at the completion of the work & rest 10% is retained.

Finance for small works:

- The estimated amount of money, which the owner or contractor has to provide to finance the project can be obtained from construction schedule.
- In most of the cases of construction contracts, it is specified that the owner will pay about 90% cost of the completed work during each month for each job to the contractor.

Methods of Scheduling

- Bar chart or Gantt chart
- Network Analysis.

BAR CHARTS

Bar chart is a graphical representation of various activities, their duration, start and period of a project. When a project is sub-divided into various activities, bar-chart shows the completion of various activities graphically. This method was developed by Henry-Gantt around 1900.

In bar chart, there are two co-ordinate axes. One is x-axis & another is Y-axis. Along x- axis time required for the completion of work is represented and along Y-axis, the activities are represented.

In a bar chart, the activities are represented by thick crossed horizontal bars. Here time required for completion of the activity may be represented in days or in weeks. This chart is known as Bar chart because the activities are represented by number of parallel bars in it. The length of each bar indicates the duration of time required to complete a particular activity. The bar chart or the Gantt chart represents the schedule of a project. Also bar chart represent the actual progress of the work by thick dark bars.

A daily record should be maintained by the supervisor about the progress of the work and handed over it to the sectional officer who in turn will handover it to chief-supervisor or engineer for finalizing it, so that the progress of work can be completed within a particular period of time.

So a bar-chart gives a clearer picture of the progress of work without studying any detailed report.

Symbols of Bar chart

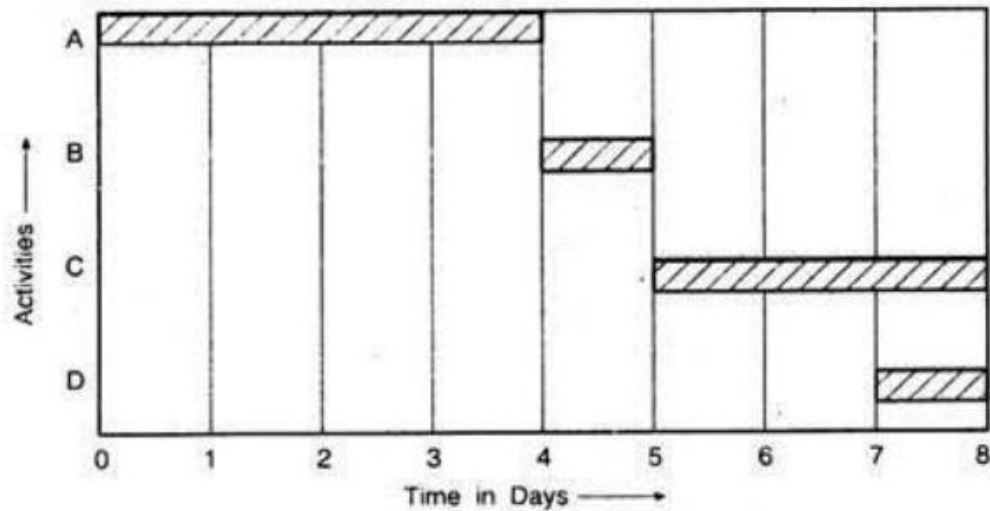
Following symbols are used in a bar chart.

- In bar chart, various activities are shown by thick crossed horizontal bars.
- The planned programme is represented by a thick line.
- The length of bar chart shows the time required to complete the work.

- So the starting and finishing of an activity are represented by a small vertical line.
- Actual progress of work is represented by a hatched line.
- In bar charts, float is represented by dotted horizontal lines which represents the flexibility range of an activity with which starting and finishing time can fluctuate.
- The vertical dotted line represents the dependency of one activity on another activity.

Steps in Preparing of bar chart

- The following steps are involved in preparing a bar chart.
- In preparing a construction schedule by bar chart, at first the project is sub-divided into various activities
- Name the various activities in a list.
- Determine their inter-relationship among the activities.
- Arranging the activities in a systematic manner one after another.
- Determine the quantity of work & requirement of time to complete the work.
- Then draw the bar chart.

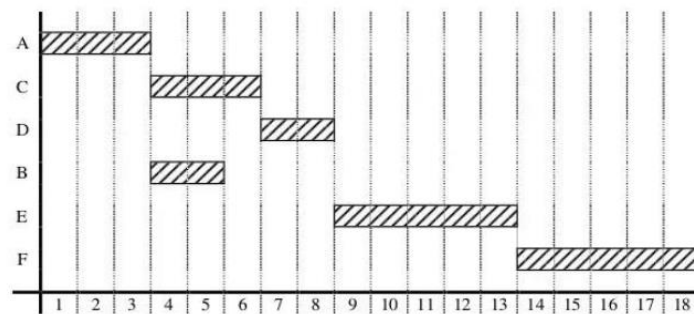


Bar Chart of a Residential Building

- Example:

Activity ID	Activity Description	Dependency	Duration
A	Excavation	—	3
C	Foundation	A	3
D	Column	B, C	2
B	Moving the soil out	A	2
E	Wall	C, D	5
F	Roof	E, D	5

Solution



Advantages of Bar Chart

- Very graphical therefore easy to understand.
- Most widely used method.
- There is no requirement of trained or skilled persons to draw this chart

Disadvantages of Bar Chart

- Difficult to update.
- Difficult to find the critical path.
- Difficult to setup and maintain a large project because it is essentially a manual graphical procedure.

Limitations of Bar Chart

- If the time schedule is changed, then it is difficult to readjust the length & position of the bar.
- Bar chart can only be applicable for small projects but not suitable for large projects.
- The bar chart doesn't show clearly the inter-dependence among the various activities.
- The bar chart doesn't show the actual progress of the work as it only represents the estimate time. So the actual progress of the work cannot be monitored.
- The critical activities of the project is not shown in bar chart.
- The bar chart does not reflect the uncertainties of time in activity duration.
- The bar chart gives no idea about the financial aspects.
- It is difficult to find out the alternative course of action to complete the work in time in case of variation from planned programme.
- As the bar chart is a static representation, it doesn't indicate the dynamic happenings on the projects.
- The bar chart does not help the work of controlling, monitoring and updating the project.

These above limitations of bar chart may be further discussed elaborately under the following heads.

Inability to show interdependency of activities

The bar charts fails to indicate clearly the interdependencies among such activities of course, simply drawing the bars of activities, parallel to each other, does not provide complete idea whether they are related/independent or completely independent. Interdependency means one work cannot be started before completing the previous work.

Inability to indicate the project progress

A bar chart cannot be used as a control device since, it does not indicate the progress of the project.

Inability to accommodate uncertainties

This is the most important limitation of bar chart because it cannot effect the uncertainties or tolerance in the time schedule of various activities of the project.

Example: Research work

NETWORK ANALYSIS (CPM, PERT)

Network

A symbolic representation of essential characteristic of a project. In other words, the phase diagram or sequential arrangement of various events and activities.

CPM (Critical Path Method)

CPM is an activity oriented network i.e. based on deterministic approach. Usually suitable for repetitive type projects like those of construction, manufacturing & maintenance. With the help of CPM, a planning engineer comes to know the sequence to various activities of the project.

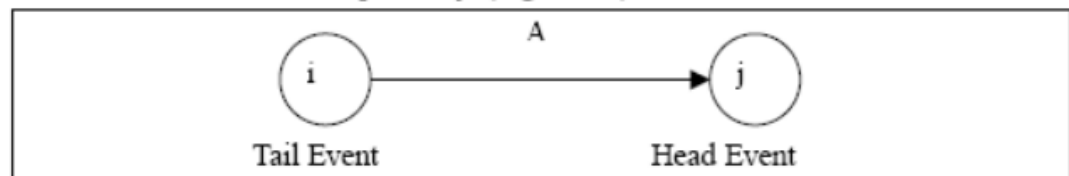
Example:

- Manufacturing of a new car
- Build a new bridge over a river
- Construction of a multi-storey building

Different terms used in CPM

EVENT

- An event is either start or completion of an activity.
- It doesn't require time or resources.
- It is represented by node usually circle.
- In the figure given below I is tail event and J is head event



Tail Event - The starting point of an activity is called a tail event because it is connected to the tail of an activity. In a network, tail event is represented by symbol "i".

Head Event - The finishing (or terminal) point of an activity is called a head event because it is connected to the head of an activity.

Merge and Burst Events

One or more activities can start and end simultaneously at an event .



ACTIVITY

- It is actual performance of a task required for completion of the project.
- It consumes time and resources.
- It is represented by an arrow on the network
- The tail of the arrow indicating the start of the activities & head indicating the end of the activity.

Predecessor activity

Activities that must be completed immediately prior to the start of another activity are called predecessor activities.

Successor activity

Activities that cannot be started until one or more of other activities are completed but immediately succeed them are called successor activities.

Concurrent activity

Activities which can be accomplished concurrently are known as concurrent activities. It may be noted that an activity can be a predecessor or a successor to an event or it may be concurrent with one or more of other activities.

Dummy Activity

This activity neither uses any resource nor any time for its completion but is required in the logical sequence of network is called a dummy activity.

It may be represented by a dotted arrow or solid arrow with zero time duration.

The dummy activity is inserted in the network to clarify the activity pattern in the following two situations

- To make activities with common starting and finishing points distinguishable
- To identify and maintain the proper precedence relationship between activities that is not connected by events.

For example, consider a situation where A and B are concurrent activities. C is dependent on A and D is dependent on A and B both. Such a situation can be handled by using a dummy activity as shown in the figure.

RULES IN CONSTRUCTING A NETWORK

1. No single activity can be represented more than once in a network. The length of an arrow has no significance.
2. The event numbered 1 is the start event and an event with highest number is the end event. Before an activity can be undertaken, all activities preceding it must be completed. That is, the activities must follow a logical sequence (or – interrelationship) between activities.
3. In assigning numbers to events, there should not be any duplication of event numbers in a network.
4. Dummy activities must be used only if it is necessary to reduce the complexity of a network.
5. A network should have only one start event and one end event.

ERRORS TO BE AVOIDED IN CONSTRUCTING A NETWORK

a. Two activities starting from a tail event must not have a same end event. To ensure this, it is absolutely necessary to introduce a dummy activity, as shown in Figure .

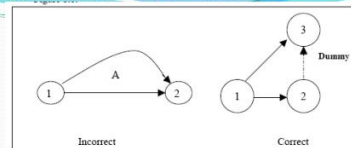


Figure 8.6: Correct and Incorrect Activities

b. Looping error should not be formed in a network, as it represents performance of activities repeatedly in a cyclic manner, as shown below in Figure .

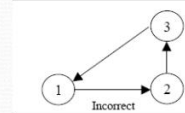


Figure 8.7: Looping Error

c. In a network, there should be only one start event and one ending event as shown below, in Figure .

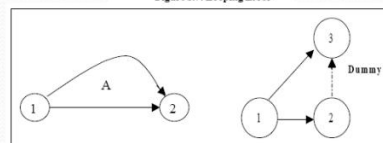


Figure 8.8: Only One Start and End Event

d. The direction of arrows should flow from left to right avoiding mixing of direction as shown in Figure .

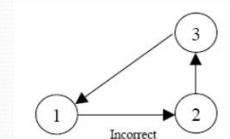
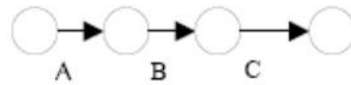


Figure 8.9: Wrong Direction of Arrows

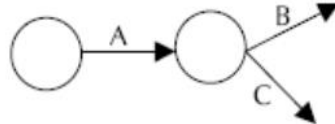
Some conventions of network diagram are shown in Figure (a), (b), (c), (d) below:

(a)



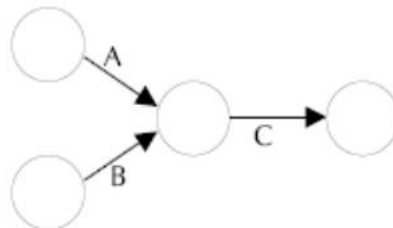
Activity B can be performed only after completing activity A, and activity C can be performed only after completing activity B.

(b)



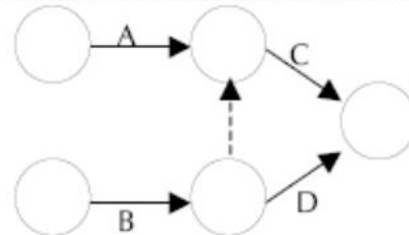
Activities B and C can start simultaneously only after completing A.

(c)



Activities A and B must be completed before start of activity C.

(d)



Activity C must start only after completing activities A and B. But activity D can start after completion of activity B.

Early Start Time (EST)

The earliest possible time at which an activity may start is called its early start time.

Early Finish Time (EFT)

It is the sum of EST of an activity and time required for its completion i.e. $EFT = EST + t$

Late Start Time (LST)

The maximum late possible time at which any activity may start without delaying the date of the project.

Late Finish Time (LFT)

The sum of LFT of an activity and the time required for its completion i.e. $LFT = LST + t$.

Critical Activities

The activities with zero float are called critical activities, which are required to be completed on schedule.

Critical Events

The start and end points of critical activities.

Critical Path

The path of network joining the critical events along with no float is called critical path of network.

Total Float

Total float is the amount of time a scheduled activity can be delayed without delaying the overall project completion date. In other words it can be said that it is the duration of time by which an activity can be start late, without disturbing the total project schedule. To calculate total float, we can use the following formula:

Total float = Late finish - Early finish Or Late Start – Early Start.

Free Float

The duration of time by which the completion of time of an activity can be delayed without affecting the start of the succeeding activity. Free float is the amount of time an activity can be delayed without delaying the start of its successor activity. To calculate free float, you can use the following formula:

Free float = Early start of the successor activity - Early finish of the current activity or early start of the successor activity – duration of current activity – early start of the current activity.

Independent Float

It is defined as the amount of time an activity's start time can be delayed without affecting the earliest start time of any successors. It is that portion of the total float within which an activity can be delayed for start without affecting the float of the preceding activities. It does not affect the start of the succeeding activity and also is not concerned about the late finish of the preceding activities. It only affects the concerned activity. Mathematically, we can use the formula:

Independent Float = (early start of succeeding activity) – (duration of the concerned activity) – (late start of the concerned activity or late finish of the preceding activity).

Interfering Float

Interfering float is that part of the total float which causes a reduction in the float of the successor activities. It is the difference between the latest finish time of the activity in question and the earliest starting time of the following activity or zero, whichever is larger.

Mathematically we can use the formula:

Interfering float = total float – free float.

Programme Evaluation and Review Technique (Pert)

- It is an event oriented network, developed by U.S. Navy in 1958.
- It is more accurate than CPM.
- It is preferred for projects that are non-repetitive and in which time for various activities cannot be precisely pre-determined.
- It is a probabilistic model.
- It follows non deterministic approach.

Example:-

- Launching of a satellite.
- Research & Development of a new project.

Different terms used in PERT:-

Optimistic time

The minimum possible time which an activity requires for its completion under ideal condition is called optimistic time.

It does not include any type of delay at any stage.

It is denoted by “to”.

Pessimistic time

The maximum time that may be taken by an activity if there is delay at every stage except natural calamities like earthquake, flood etc. is called pessimistic time.

It is denoted by “tp”.

Most likely time

The most realistic estimate of time which an activity may take for its completion under normal condition is called most likely time.

It is denoted by “tm”

Expected time:-

It is taken as the weighted average of the time estimates i.e optimistic time, pessimistic time and most likely time.

It is denoted by “te”.

$$te = (to + 4tm + tp) / 6$$

Earliest expected time(TE)

The earliest expected completion time of event is equal to the sum of the expected times of the preceding activities.

Latest allowable time(TL)

The latest possible time an event can take without delaying the final completion date of the project is called latest allowable time.

Slack time

Slack time is the total time that you can delay a task without delaying the project. More slack time means that project scheduling is more flexible.

$$\text{Slack} = \text{TL} - \text{TE}.$$

Length of the Project

The sum of the expected times of all the activities along the critical path of the network of a project.

Variance

The level of volatility of the time required to carry an activity from the average time is termed as variance in PERT analysis.

$$Vt = (tp - to / 6)^2$$

Standard deviation of an activity

In Statistics and Probability Theory, Standard Deviation (SD) measures the amount of Variation from Average or Mean. In current context Average or Mean is represented by Weighted Average calculated using PERT formula. A low value of SD indicates that data points are very close to the Mean.

$$\text{Mathematically, SD of an activity} = (tp - to / 6)$$

Variance of the project

The sum of the variances of all the activities along the critical path is called the variance of the project.

Standard deviation of the project

The square root of the total variance of a project which is calculated along the critical path of its network is called standard deviation of the project.

Advantages of Critical Path Method (CPM):

It has the following advantages:

- It figures out the activities which can run parallel to each other.
- It helps the project manager in identifying the most critical elements of the project.
- It gives a practical and disciplined base which helps in determining how to reach the objectives.
- CPM is effective in new project management.
- CPM can strengthen a team perception if it is applied properly.
- CPM provides demonstration of dependencies which helps in the scheduling of individual activities.
- It shows the activities and their outcomes as a network diagram.
- It gives a fair and concise procedure of documenting of project.
- It helps in determining the slack time.
- An explicit and clear approach of communicating project plans, schedules, time and cost performance is developed.
- It is extensively used in industry.
- It helps in optimization by determining the project duration.

Disadvantages of Critical Path Method (CPM):

It has the following disadvantages:

- The scheduling of personnel is not handled by the CPM.
- For bigger projects, CPM networks can be complicated too.
- It also does not handle the scheduling of the resource allocation.
- In CPM, critical path needs to be calculated precisely.

Advantages of pert

Analyses activities: To successfully manage a project, it's helpful for the project manager to understand the steps involved in making sure the team members complete the tasks on time and within budget. It's also important that you understand how each job fits into the project. This often means viewing information from PERT activities and events independently or together depending upon specific

requirements, especially when looking at various points throughout implementation phases like hardware installation or programming.

Improves decision making and planning: Combining data from multiple sources can provide you with a more thorough understanding of projects and how they affect different departments. This insight helps with decision-making for those working on current projects and planning future initiatives. An advantage of a PERT chart is it helps to identify and track project activity. In addition, it reveals interdepartmental dependency, giving managers insight into how their department works in relation to other areas of responsibility. This information can help the company's development process plan.

Allows for unforeseen analysis: Sequencing a project using the PERT charting technique makes it easier to determine which tasks require more time and attention. It helps you identify the possibilities and uncertainties related to your project activities. You can try different combinations of actions to minimise unexpected challenges while highlighting risks that require careful monitoring for a more successful outcome.

Makes tracking easy: PERT charts have many advantages including being a great way to evaluate the time and resources necessary for managing projects. They allow managers to track assets during the project execution stage and the overall progress of the project. This helps them determine the timeframe for team members to complete tasks.

Encourages the sharing of departmental responsibilities: The PERT analysis can also provide benefits to the whole company as it helps gather data from multiple departments in a company, making it easy for planning and decision-making. It also allows managers to communicate on projects that are relevant to their strategic positioning. Furthermore, it encourages the effective sharing of information throughout an organization.

Disadvantages of pert

Only focusses on time: PERT is useful for many projects and project managers, but perhaps not all. One disadvantage of PERT charts is they specify the time required to complete each project activity and the order in which to complete each task. They rarely consider other factors such as cost or resource distribution requirements, which might require another management technique depending on your specific needs.

Resource intensive: Project managers can find this process challenging to use due to its labour-intensive nature. As a result, some may opt not to use it, especially if they are very busy. It can help develop an accurate budget and determine the resources the project may use to complete all necessary work on time.

Labour intensive: PERT analysis is labour-intensive in nature. Large and complex networks form as a result of the possibility of a rise in project activities and the emergence of various task dependencies. This method won't work well for the project if two tasks share resources.

Differences between CPM and PERT

Sl.no	Pert	Cpm
1	Its full form is Project Evaluation and Review Technique.	Its full form is Critical Path Method.
2	PERT is that technique of project management which is used to manage uncertain (i.e., time is not known) activities of any project.	CPM is that technique of project management which is used to manage only certain (i.e., time is known) activities of any project.
3	It is event oriented technique which means that network is constructed on the basis of event.	It is activity oriented technique which means that network is constructed on the basis of activities.
4	It is a probabilistic model.	It is a deterministic model.
5	It has Non-repetitive nature of job.	It has repetitive nature of job.
6	There is no chance of crashing as there is no certainty of time.	There may be crashing because of certain time boundary.
7	It doesn't use any dummy activities.	It uses dummy activities for representing sequence of activities.
8	It is suitable for projects which required research and development.	It is suitable for construction projects.
9	Based upon 3 time estimates to complete an activity.	Based upon 3 time estimates to complete an activity.

Materials and store management

- Introduction and Objective
- Classification of store-storage of stock
- Issue of materials (indent, invoice , bin card)
- Stores accounting procedures
- Inspection of stores
- Procedure of write off

Introduction

For the execution of different kinds of works in public work department, different types of material and equipment are required. It is necessary to maintain a store of various types of construction material at one or more place in a division so that the execution of work will be efficient. Before start of any work material should be arranged well in time. The safe custody and proper distribution of store materials are the responsibility of its Divisional Officer. So Store and material management is an integral function of different sections of the organization.

- It deals with the supply of material and other related activities and aims at minimum expenditure on materials.
- Material management deals with the overall activities of materials such as type, amount, movement, purchase, location, and timing of various materials which are used in an organization.

Objective of material management

- To select the right quality
- To meet the production requirements
- Selection of suppliers
- Limit the Wastages
- Product enhancement
- Forecasting
- Standardization Process Objective of material management

Function of Material Management

These are the main functions of material management.

- Material planning.
- Material Purchasing.
- Store and store administration.
- Inventory control.

Classification of stores

Stores can be divided into four categories according to public work department.

- Stock
- Tool and plants
- Road metals
- Material charged directly to works.

Stock

- The stock is the store which is required for general work and kept under suspense head and finally issued for the work.
- The items which are in common use in the construction activity for the execution of different works are kept in stores.
- Such materials of general use such as cement, timber , bricks ,aggregates, steels, paints etc are kept in store are called as stock.

Reserve stock limit

- The maximum amount of materials that can be kept in a stock in a division is fixed and is known as the reserve stock limit.
- The limit is fixed by the Government keeping into consideration the normal requirements of stock in the division.
- The reserve stock limit can be increased during the period of special urgency, This increased limit is termed as temporary reserve limit.

Note

'Stock' is a suspense head of account. When an item of stock is purchased, its cost is debited to the suspense head 'Stock'. When the item is issued for use in a work, the cost of the item issued is credited to the suspense, head 'Stock' and debited to the final head of the work concerned.

Subhead of stocks

The various materials of similar nature grouped under different heads to facilitate the proper maintenance of stock account are known as sub-head of stock.

The following are some of various sub heads of stocks

- Small stores (like nails, screws, hinges, bolts, etc.).
- Building materials (like cement, aggregates, bricks, lime, etc.).
- Timber (like deodar, chir, plywood, hardboard, etc.).
- Metals (like mild steel bars, rolled steel sections etc)
- Fuel (like kerosene, coal, etc.).
- Painter's stores (like paints, varnishes, etc.).
- House fittings (like bathroom fittings, pelmets, etc.).
- Miscellaneous stores (like cord, wood preservatives, fertilisers, etc.)
- Lands, kilns, etc. (like road metal quarries),
- Manufacture (i.e. manufacture in Government workshops).
- Storage (i.e. charges incurred on the storage of articles, such as rent of go-downs, payment to work charged store establishment.

Issue of materials

- The store keeper can issue the materials to different departments upon the receipt of a withdrawal form with proper authority and it is called as material issue requisition form.
- Depending upon the nature and amount of material to be withdrawn from stores the material requisition is prepared in duplicate by the manager.
- Both the copies are sent to the store keeper who issues and records the materials distributed.

Indent and Invoice

- The material from the stores is procured by the process of indenting.
- Materials received from the stock on demand in a proper form called indent form.
- Indent form consist in triplicate of counter foil, indent and invoice.
- The counter foil and indent part of the indent form filled by the Indent officer.
- Then this form with blank invoice is sent to the issuing officer in charge of the stock.
- Invoice is an indent having list of articles actually should and giving price and particulars of the articles.
- Then the issuing officer corrects the indent and fills up the invoice.
- Then the issuing officer sends it back to the indenting officer to sign the invoice and they return it to him as an acknowledgement.

Rules for preparing indent and invoice

- There should be description of unit of supply and quantity of material indented written clearly.
- The cost of materials of the head of account should be specified.
- The name of work should be given when the material is issued.
- Full details of department , division and any other person for which the material is issued should be given.

Bin Card

- Bin Card is a card which maintains the details of quantities of each type of material received issued and on hand each day.
- The material and other items are kept in appropriate bins, drawers etc. The store keeper maintains the record on a Bin Card.
- A bin or shelf is attached to each bin card.
- Bin cards are made in duplicate
- One is attached to the bin and another is for the store keeper.

Company Name							
Bin Card							
Bin No.....				Minimum Level.....			
Description.....				Reorder Level.....			
Code No.....				Reorder Quantity.....			
Stores Ledger Folio.....							
Date	Receipts		Issue		Balance	Stock Verification	
	Ref. no.	Quantity	Ref. no.	Quantity	Quantity	Date	Initials

Material Issue Requisition form							
Material Requisition				No.			
Material requisition for.....							
Department..... Date							
Sl. No.	Description	Code No.	Quantity		Rate	Amount	Entered on store register Page No.
			Demanded	Supplied			
Requisitioned by		Approved by		Material Issued by		Received by	
.....							

Procedure for store accounting

Final head

The cost of acquisition of stores is debited to the particular work for which they are required. This is known as final head of account.

Suspense head

Suspense head includes the temporary booking of transaction. Expenditure incurred for the purchasing of materials or for the execution of work is debited to the final head of the expenditure. If the final head of the expenditure is not known then the expenditure is debited to the minor head i.e. suspense expenditure till the final head is known.

- The procedure for store accounting is done separately for various classes of stores such as stock, tools and plants, road metals and other miscellaneous material.
- When the stock is placed then the store is debited to suspense head .When the stock material is issued for the execution of a particular work then it is debited to the final head.
- The supply of tools and plants in the division and its expenditure is debited to the minor head sometimes for general use special items of tools and plants are not required but for a specific work they are debited to that work.
- For certain road the road metal is required for the construction its cost is debited to the estimate of that road construction and once the road metal is required for the maintenance of the road it is debited to the sub head under minor head.
- Similarly for other materials if the materials are purchased for general requirement then the cost is debited to the suspense head.
- The initial account of all receipt and issues is maintained by the section officer.
- After closing the monthly account section officer forwards it's to the sub divisional office.

Physical Verification and Inspection of stores Necessity

Inspection of stores and its physical verification is essential for fulfilment of following:-

- To ensure the correctness of stock held by comparing them with the balance shown in the store ledger or bin cards.
- To avoid shortage of materials in the stock.
- To check losses in inventory due to pilferage, improper storage or misplacement, deterioration etc.
- To correct and update store records.

- To calculate the values of the stock carried for the balance sheet and profit and loss account.
- To calculate the rate of turn-over of an item.
- To ensure maximum economy in stock carrying.
- To effect insurance covers.

Disadvantages of physical verification/ physical stock taking

The following are disadvantages of physical stock taking such as:-

- Loss in production or decrease in efficiency of manpower and machines.
- Labour overtime or labour overstress.
- Extra expenses.

However, disadvantage of physical stock taking is almost negligible compared to advantages achieved.

Method of Physical Stock Verification

- Annual physical Verification
- Perpetual Inventory and Continuous Stock Taking System

Annual physical verification

The following procedure is adopted for carrying out the annual physical verification.

- By the end of the year, the stores are closed for a few days; no material etc. is issued to any project work/shop in the plant. In case it leads to plant shut down, the activities such as repair and over hauling of equipment and machineries are resorted to.
- A team of stores inspectors or stores verifying officers physically check and count each and every item lying in the entire store. It is tallied with the quantities marked on bin cards and store ledgers.
- Step (ii) above may lead to the formation of a list of surplus and short items. Damaged and obsolete items may also be traced and recorded.
- Inspectors check a number of items every day as per a preplanned schedule and finish the complete work within a few days.

- In this method all the items are checked at one time, so there is no confusion about any item being left unchecked.

Perpetual inventory and continuous stock taking

Perpetual inventory and continuous stock taking system is a more appropriated method for large plant with huge inventories which records store balances after every receipt and issue and facilitates regular checking.

- Under this system, store items are checked continuously throughout the year; a number of items are counted daily or at frequent intervals and compared with the bin cards and stores ledger.
- Discrepancies found if any, owing to incorrect entries, breakage, pilferage, over issue, placing of items in the wrong bin etc. are investigated and corrected accordingly.
- This method is less costly
- In this method only few items are required to check every day as compared to annual physical verification.

Advantages of perpetual inventory and continuous stock taking over annual physical verification

- It is not necessary to close down the plant or shop production for stock taking.
- This method is less costly, less tiring, less cumbersome and hence more accurate because only a few items are to be checked every day as compared to the annual physical verification.
- Discrepancies and incipient defects in the stores system are readily discovered and can be rectified before much damage through loss or irregular practices has occurred.
- Slow moving stocks can be noted and where necessary, action may be taken to prevent their accumulation.
- The audit extends to comparing the actual stock with the maximum and minimum level and thus ensures that stocks are kept within the limits specified.
- Since, the stock is kept within the specified limits, the capital invested in the store- items cannot exceed the amount arranged and prescribed for the same.

Procedure for write off

- The articles of tools and plants get worn out by continuous use and become unserviceable. They can be written off only with the approval of the competent authority. A survey report of all the unserviceable articles is prepared on D.F.R. (P.W.)-15 giving full particulars of their value, date of purchase and reasons for their becoming unserviceable.
- DFR- Document Filing and Retrieval Form
- The survey report is submitted to the competent authority for approval. As a general practice, the articles which are written off are destroyed in presence of a gazette officer.
- As regards the articles of stock, which get deteriorated, an estimate for the loss of stock is prepared. The tools and plants articles are written off after preparation of survey report.

Example

Prepare a Write off in respect of following Articles of tools and plants.

- Name of the sub division- Killamaidan
- Name of the Division and Circle-Cuttack
- 10 nos, of metallic tapes 30m purchased on 6.5.2004 for Rs. 5000/ • 04 nos. of brass pad locks 7.5cm size purchased on 2.6.1999 for Rs. 1200/
- 1 time piece (Ajanta Make) purchased for rest house OMP square on 3.10.2006 400/
- These articles became unserviceable through fair wear and tear.

Construction Site Management

- Job Lay out-Objectives, Review plans, specifications
- Principle of storing material at site.
- Location of equipment, Lay out of equipments
- Organizing labour at site.
- Job lay out for different construction sites.

Job Lay out- Objectives, Review plans, specifications.

Job layout

Job layout is drawing the prepared plan of construction site by the site engineer in-charge of the project. The arrangements made at the construction site for different camps and the area around it is known as job layout.

Or

Job layout is a scaled diagram of the proposed construction site showing all the relevant features such as, Entry point, Exit point, Storage areas of materials, Temporary services like Contractor's site office, Areas for keeping equipment such as mixers Bar, bending area, Labour Housing etc.

Objectives of preparing job layout

Following are the objective of job layout.

- It saves time in delivering the construction materials at the site.
 - The best method of working may be adopted.
 - It helps to complete the work within the minimum use of equipment.
 - The maximum output from labour and machines can be taken.
 - It provides safety to the workers.
 - It helps to avoid damage to the nearby properties due to construction work.
 - It plans for the construction materials to be placed as near as possible to the work
- Following are the objective of job layout.
- It saves time in delivering the construction materials at the site.
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- It helps to avoid damage to the nearby properties due to construction work.
- It plans for the construction materials to be placed as near as possible to the work.

REVIEW PLAN

Before preparing a job layout the details of different plans for the execution of the work should be studied carefully such as its:-

- Site plan
- Working drawing
- Specification

Site plan

The site plan shows

- The boundaries of the site.
- The adjacent areas of the boundaries of the construction site belonging to the owner
- It indicates the name & width of the adjacent road in relation to the position of the site.
- Location of any existing building standing near site.
- Space left around the building, to secure ventilation or free air condition.
- Space left around the building for cleaning and admission of light.
- The site plan also shows the North line direction relative to the building plan.
- The existing building's size and location which are proposed to be demolished.
- It also shows the position of any existing water mains, sewers, electric lines.
- Position of any natural drains, rivers, wells located near the site.
- Indicating the distance of building work from the road adjacent to the building.
- Any other information which are considered to be necessary.

Working drawing

The working drawing consists of the building plans and other works to be constructed at the site. The working drawings include;

- Floor plans of the building with covered area, size of the room, openings of doors& windows, structural members, stair-cases, ramps and lift if any.
- Elevation of all sides are shown.

- Indication of direction of North line in the plan of buildings.
- Indication of terrace plan which includes the drainage & slope of the roof
- Indication of projected portions beyond the permissible building line,
- Locating exactly of the essential services like water-closet, sink, bath etc.
- Showing the sectional details, drawings of footings, and thickness of basement wall construction, floor slabs, roof slabs with their materials.
- Indicating the height of building, rooms & also the height of the parapet.

Specifications

Specification indicates the details of the type and grade of the materials to be used in construction work, which was signed duly by the authority at the working place before start of any work. An engineer and shall be available. Construction specification can be defined as the details of construction work in the form of written instruction to be undertaken in the construction work. Specification is an important document in the construction industry which helps the designer to communicate his thoughts & ideas to the other construction team members, Specification serves to guide the supervisor, guide to bidder & are written to supplement information shown on drawings.

Types of Specifications

The specifications can be classified into five categories.

- Standard Specification
- Outline Specification
- Project Specification
- Guide Specification
- Manufacturer's Specification

Standard Specification: - The specification prepared for the general use of trade e.g. Indian standard specification.

Outline Specification: - These are the specifications used at the time of bidding & prepared usually to accompany the preliminary drawings of the work. It provides the basic information about the type & grade of the materials to be used for the construction work.

Project specification: - These are the specifications which are prepared for a particular project taking into account for the special requirement.

Guide specification: - These are the specifications prepared to guide the specification which is prepared the project originally.

Manufacturer's specification: - These are the specifications which are prepared by the manufactures to specify the quality of the products manufactured by them.

Use of Specification:-

- To prepare the estimate for submission of tender.
- It is useful for the contractor to order the materials for executing the work.
- It is a contract document between owner and the contractor.

Factors affecting selection, design & layout at construction site:-

- Nature of project
- Location of project
- Services
- Availability of material & equipment
- Availability of manpower
- Medical facility
- Availability of space
- Other miscellaneous factors

Nature of the project: - The nature of the project plays an important role in its layout process. The camp layout depends on the nature and types of project. For example the layout of camp for a highway construction project will differ from that of a building.

Location of project: - Location of the project also plays an important role in job layout plans the location project should be properly chosen such that there will be no difficulty for any type of climatic situation and transportation. So transportation facility to the construction site is an important factor for job layout.

Services:- There should be proper service of water supply ,sanitation and electricity. If these services are not available then it will be badly affect the job layout.

Availability of Material & Equipment: - There should be sufficient availability of materials and equipment at the construction site. If the materials and equipment are not available locally then it will create problem in storage which will affect the shape of job layout.

Availability of man power: - Man power is an important resource in any construction site. The arrangement of manpower at construction site should be made locally

otherwise it will be a great difficulty for their shelter. So labour should be arranged locally.

Medical facility: - If the project is for a long time it is essential to have a field medical aid facility for the workers.

Availability of Space: - If less space available at the construction site, then it will be difficult for job layout because the storage should have to be located nearest the regular supply of material & equipment. Urgent availability of material may not possible as required

Other miscellaneous factors: - There should be availability of education facilities like schooling for the children of labours and staff, daily necessities of life and other welfare facilities for the workers. If these facilities are not available then it will also tend to change the layout of the project.

Principles of storing materials at site.

The materials should be stored in proper manner at the construction site. The following are important principles which are to be considered for storing of materials at site.

- Materials should be stored at the construction site so as to prevent mixing of foreign matter.
- Materials should be stored in such a manner as to protect it from any weathering agent like rain, sun and wind.
- Materials which are suspected to get fire easily should be prevented from fire hazards i.e. the products like petroleum and explosives should be stored properly.
- Precast beams pieces of timber and slabs which are likely to be affected by the soil or support should be stored with properly adopted measures.
- Materials like cement bags which are easily affected by the contact of the moisture are to be stored with special precautions.
- The material regularly used is to be placed relatively nearer to the place of use.
- There should be proper arrangement of fire extinguisher and fire buckets wherever necessary for the safety measure.

Location of equipment

As there is an increased cost of labour, the use of more & more mechanical equipments becomes necessary for construction work very often the available manpower is not

sufficient for the completion of construction work within stipulated time, so it is essential to use mechanical equipments along with the available manpower for the construction activity.

So there should be a careful consideration for correct choosing of right equipment. For a construction project to be completed within the scheduled time economically, it is essential to choose the correct and well-operated equipments.

For the location of equipment following points are to be considered.

- Equipments should be nearer to the construction work.
- Equipment should be near to the materials.
- The owned equipments may be provided near the entrance so that there will be no requirement of any additional guard.
- The hired equipments should be placed in suitable places and the vacant place may be left where it can be accommodated.
- The maintenance, repairing and fuel filling of equipment should be arranged at the construction site.
- There should be adequate space available for parking of the transport vehicles like trucks tractors etc.
- Temporary sheds should be provided to safeguard the costly equipments from any type of weather condition.

Layout of Equipment

These are the some points which are to be considered at the time of preparing layout of equipment,

- The equipments should be placed as near as to the place of materials.
- The maintenance, repairing & fuel filling of equipments should be arranged at the construction site.
- There should be arrangement of security staff for the safety of machinery.
- For removal & shifting of equipments to the work place, there should be availability of sufficient space.
- There should be adequate space available for parking of transport vehicle.
- Temporary sheds should be provided as safe guard for the costly equipment from any type of weather condition.

- The main entrance of project work and the main office of the establishment should be nearer to each other, so that no visitors have to cross the work site.
- No material can pass out of the project work without the proper check by the security check posts.
- There should be provision of adequate safety measures and fire prevention equipment at the work site.

Organizing Labour at Site

Organizing labour properly at the working site is an important responsibility of the supervisory staffs. The labours are divided into different groups by the supervisor under the guidance of effective leader who has the quality to control the labours. Proper way of organising of labours results the completion of work within the stipulated time period. So it is very essential to organize the labours at the construction site.

For example Suppose 10 labours and one supervisor are put for beam casting the division of the labour may be.

- For bringing the aggregates, three labourers are put.
- For mixing the ingredients one labour is put.
- Four labourers are put on some other work.
- For compaction purposes two labours are put.

There are some points which are to be considered while organising labour at construction.

- Re-handling of material unnecessarily should be avoided.
- Supply of material should be sufficient as per requirement of labour.
- Labour supply should be uninterrupted.
- The materials should be taken once for the whole day from the go-down. It reduces the frequent movement of labour.
- There should be some permanent labours as it is economical.
- Increasing and decreasing of labour should be done as per necessity.
- To avoid wastage of time of labour, minimum facilities should be made available
- Also to save wastage of time of labourers, drinking water facility should be made available at the site.

- A record should be maintained about the progress of the labour.
- Record maintain once will help to compare the progress of work with the completion of work at right time at the site.

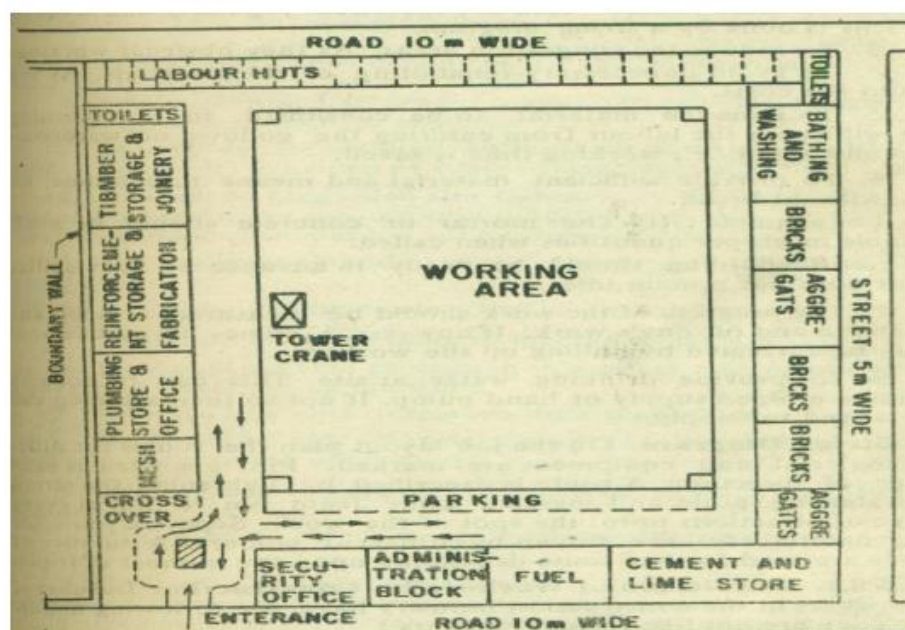
Job Layout for Different Construction Sites

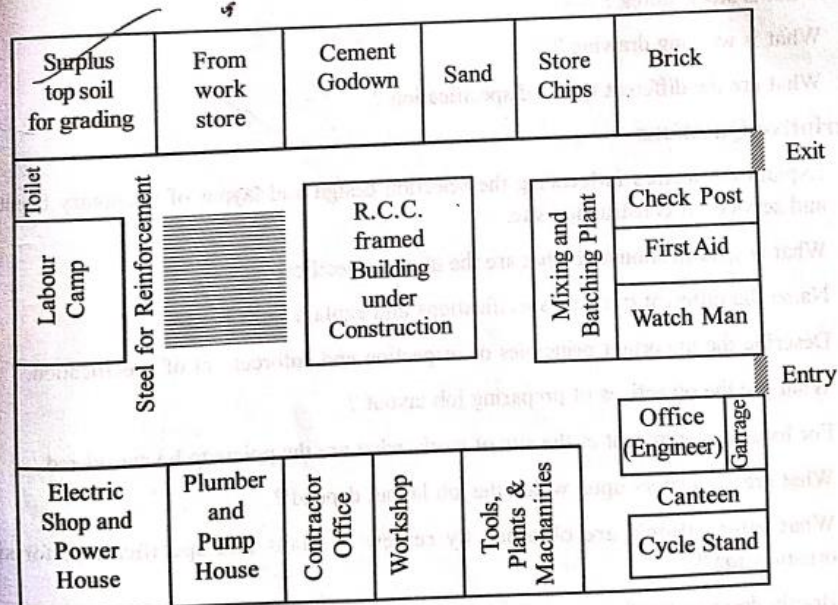
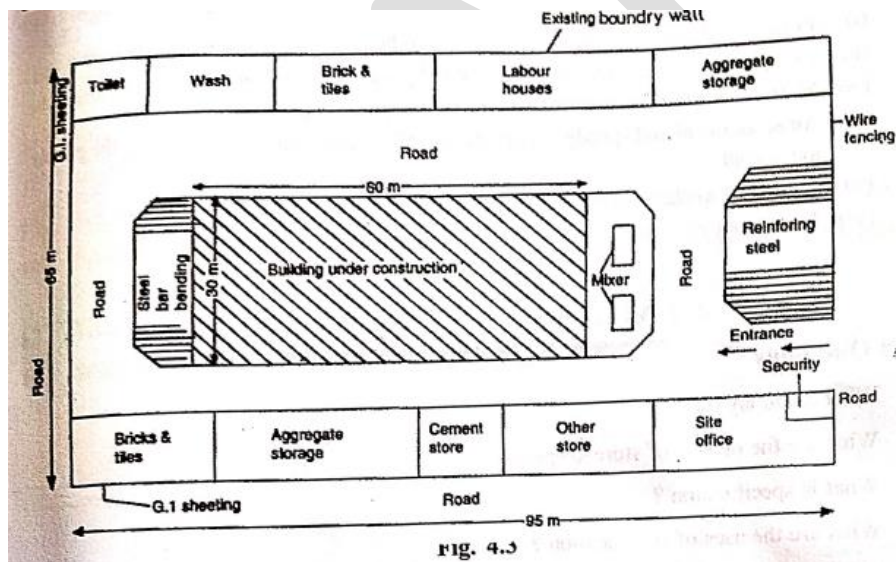
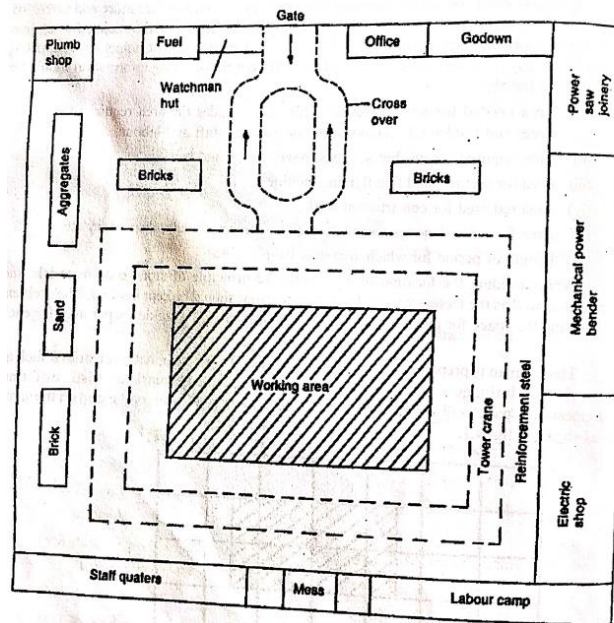
Preparation of job layout

- The construction plans, specifications, contract documents and other available material describing the job should be studied carefully in order to get the idea of the nature and extent of the work.
- A scaled drawing with a scale of 1 in 100 should be prepared showing the outline of the work or job to be constructed.
- Also the position of entry and exit points as well as the areas of temporary facilities should be marked on it.

Moreover following information should be collected from the above study

- Area needed for accommodation: This area includes the area required for office. Stores and residential accommodation for officers, staff and labour.
- Area required for machines, sheds, repair shops and workshops etc.
- Area for security and fire fighting facilities.
- Area required for construction work.
- Area for miscellaneous amenities such as canteen, toilets, dispensary etc.
- Length of period for which area may be available





Advantages of good job layout

- Proper safety of working in the project can be possible by a good job layout.
- Completion of project in time is possible by a good job layout.
- Material wastage and deterioration can be reduced by a good job layout.
- An economical and speedy transportation of materials can be possible by the proper job layout.
- The output of man & machinery can be increased by a good job layout. A smooth working of project can only be provided by a good job layout.



Construction Organization

Introduction – Characteristics, importance, Structure.

Organization types-line and staff, functions and their characteristics

Principles of organization- meaning and significance of terms- control, authority, responsibility, job & task.

Leadership-necessity, styles of leadership, role of leader

Human relations-relations with subordinates, peers, Supervisors, characteristics of group behavior, mob psychology, handling of grievances, absenteeism, labor welfare.

Conflicts in organization- genesis of conflicts, types-intrapersonal, interpersonal, intergroup, resolving conflicts.

Introduction – Characteristics, Structure, Importance

Organization

- For any successful business, a sound organization is highly essential.
- Better the organization, the more is the achievement of the common business objectives.
- Organization is the foundation upon which the business management is dependent.
- Organization is a large group human association united together for the attainment of business objective.
- Man, Material and Machinery so that are the three elements which have importance for every business.
- An organization maintains co-ordination between man, material and machinery so that maximum output is achieved.
- It is one of the major tasks of the chief executives to build an organization, and also to fit the right person in the right place so that it will help the organization to achieve the goal efficiently and economically.

- Administration, management and organization are the three factors which are needed for the executing a construction project.

Characteristics of Organization

- The organization should have a common business objective.
- It is a group of small or large number of people.
- It should be executed by a proper leadership manner.
- It should have a clear cut show of responsibilities and duties for the people associated with it.
- It maintains relationship between the administration and management.
- It should have a definite and fixed boundary of fixation of duties and responsibilities among employees.
- It should be flexible nature.
- The organizational structure should be clear to have coordination between different departments in it.
- Organization should have a central coordination system of imposing collective decisions.

Importance of organization

- For a successful business, a sound organization is highly important.
- Organization enables a large group of people working effectively together for a common goal.
- Only a sound and well-designed organization can maintain the co-ordination between the management and administration.
- Organizational diversification or expansion of organization can only be possible by a well-planned & well-designed organization.
- Effective use of man power can also be possible by a sound organization.
- A sound organization makes an optimum use of raw materials and resources.
- Wastage and expenditure is less in a sound organization.
- A sound organization always stimulates the people for better, creative and innovative ideas.

Structure of an organization

Organization structure specifies the various job tasks and shows how job tasks are formally divided; grouped and coordinated.

Organizational structure covers the overall arrangement of an organization.

It provides an appropriate framework for intra relationship and also indicates the hierarchy of authority and the reporting relationships.

So organizational structure coordinates the relationship between the various positions in the organization.

There are some elements with which each member of the organization should be familiar with. Following are the main elements:-

- Members of the organization should understand about the well-defined goal of the organization.
- They should be familiar with the rules, regulation, policies, and procedures of the organization.
- They should know with whom they have to work.
- They should understand their duties and responsibilities towards the organization.
- They should understand the delegation of the authority and responsibility.

Organization Type- Line and Staff, functions and their characteristics

Types of organizations

There are different types of organization structure have been developed and the following are more common

- Line or military organization
- Functional organization
- Line and staff organization
- Matrix organization.

Line or Military Organization

- Line or military organization is the simplest and earliest form of organization.
- This system of organization is based upon the scalar principle.
- According to this principal when the level of authorities arranged in the structure from the chief executive at the top to the workers at the bottom the system is known as scalar principle.
- In this line structure the authority and the responsibility flows directly from the manager to foremen and from foremen to workers.
- In other words authority and responsibility should flow directly in a line vertically from the highest level of the organization to the lowest level of the organization.
- Line organization is also called as military administration or military organization.
- This is suitable for small and medium size factories, Continuous process industries like paper, sugar, textile etc and automatic plants.

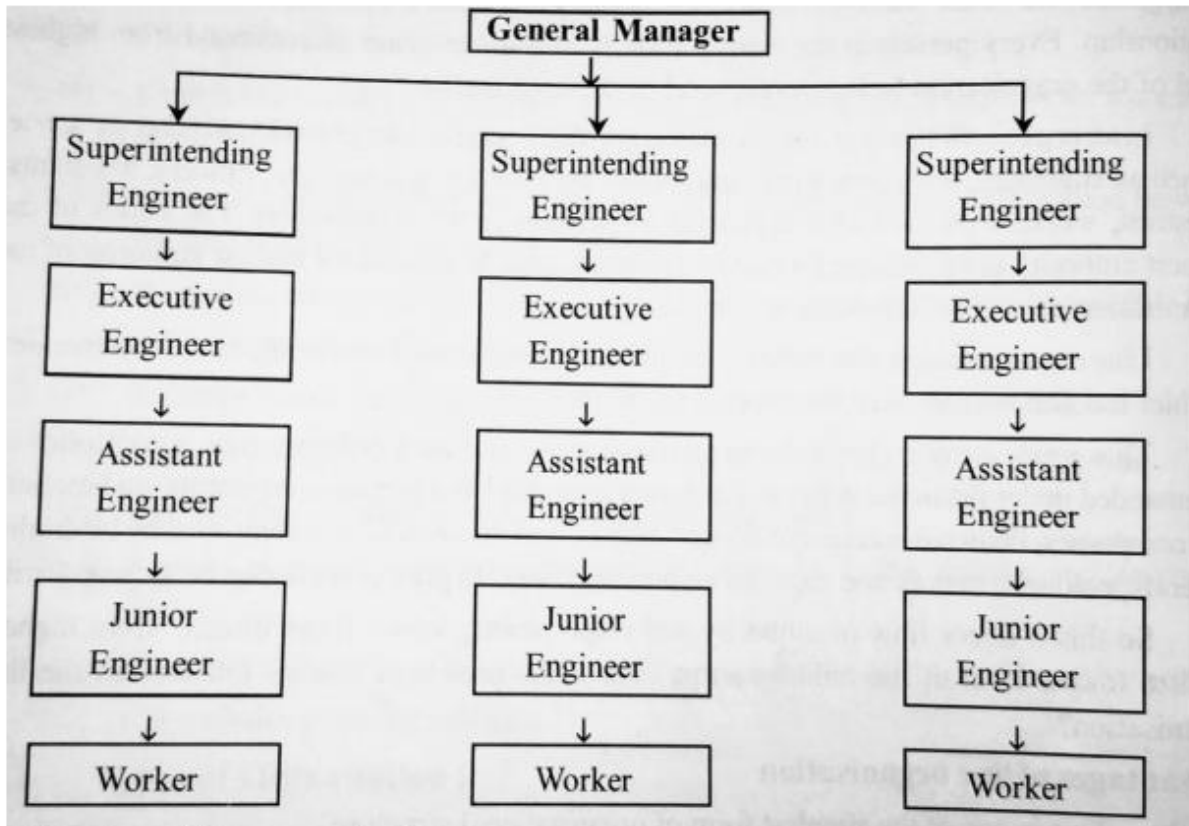
Advantages of line organization

- This is one of the simplest form of organizational structure.
- It is simple to work effectively & economically.
- In this structure discipline is easily maintained.
- It facilitates decision making and its execution.
- Also quick decision making and action are permitted to one individuals.
- Performance of duties in a perfect manner can be fixed upon certain individuals.
- An effective co-ordination is maintained with in each department of organization.
- In this structure of organization, due to the flexibility of the system, one person can be moved from one position to another without any difficulty.

Disadvantages of line organization

- Sometimes, the top executives are over loaded with work.
- Persons with specialization are neglected by this arrangement.

- Due to neglect, the loss of capable person may affect badly the entire organization.
- Due to loss of specialization, it may cause more wastage of materials and man power.
- The major disadvantage is that if any wrong decision is made at the top level, the same is carried out simply without any objection down the line.
- It affects the progress of work as a whole, not partly.



Functional Organization

- In functional organization the work of the management is divided in such a way that each man in organization should have a few functions as possible to perform.
- It is widely used because of its simple logic and common sense appeal.

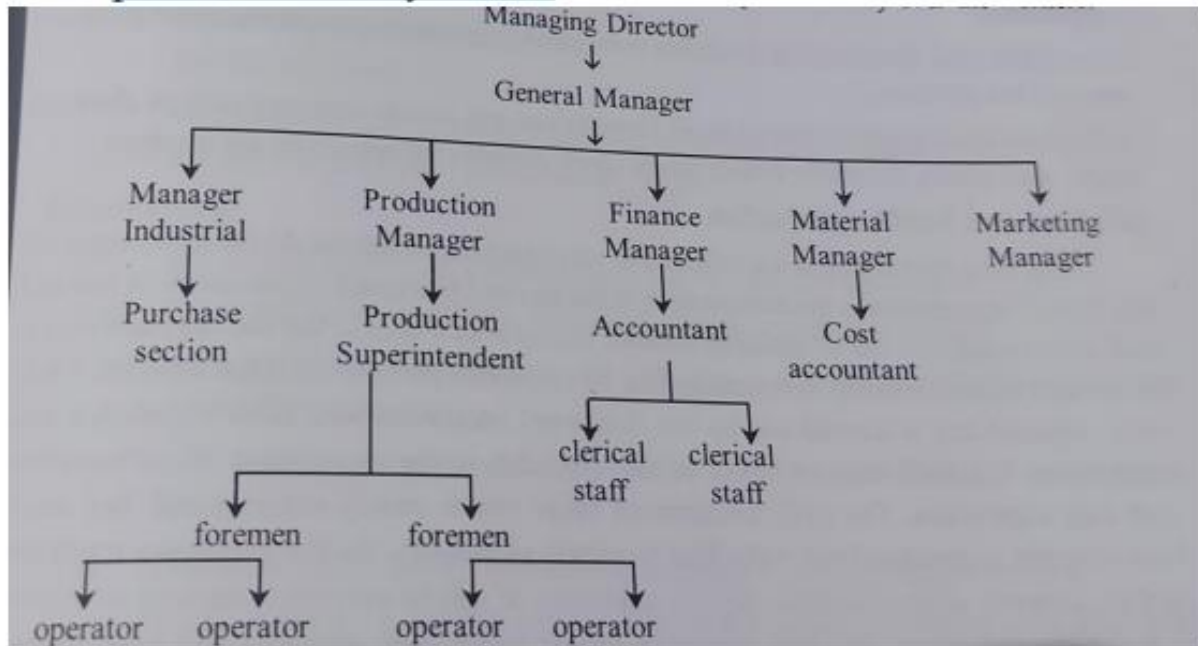
- Here the tasks are grouped together on the basis of common function, so that all the productive activities or all financial activities are grouped into a single function and each person is fully responsible for the function assigned to him.
- This is suitable for small and medium organizations and all Govt. and private concern like Chemical plants, steel plants, electricity board.

Advantages of functional organization

- Because of its simple logic and commonsense appeal, this type of organization is most widely used.
- On the basis of functional specialization, the whole work of the organization is divided.
- Due to functional specialization, the efficiency increases as each person has to perform limited number of function.
- It makes use of specialists to give expert advice to workers.
- Also the number of accidents and wastages of material can be reduced by expert guidance.
- By grouping people together on the basis of their specialist expertise, organization can prosper.
- Functional grouping also provides opportunities for promotion and career development.

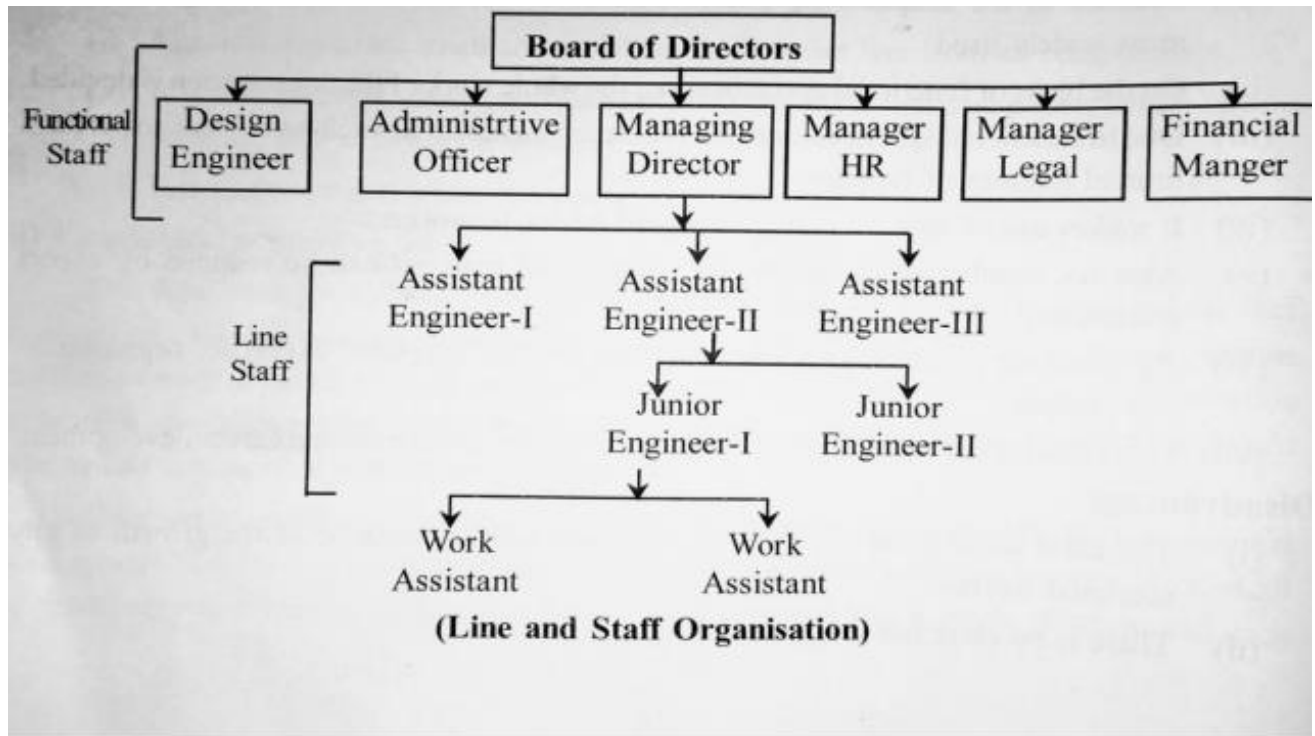
Disadvantages of functional organization

- The main disadvantage is that it may create conflict because of the growth of any sectional interest.
- There is no clear but line of authority
- It is difficult to fix responsibility.
- It is difficult to maintain discipline in the organization.
- It makes the complex industrial relationship.
- It is difficult to know who is the 'boss' of whom.



Line and Staff Organization

- As the name suggest this type of organization is the combination of the line and functional organization.
- Here the line of authority remains the same as it does in the line organization i.e. authority flows from top to bottom and the line executive perform the major function while staff responsibilities carried out by the functional specialist with their knowledge and experiences.
- The staffs are constituted by the specialists in the organization who are expert with long experience.
- In this system staffs are divided into functional staff and line staff as shown in the figure below.



Advantages

- Line and staff organization possesses all the advantages of the line and functional organization
- Discipline is maintained by the line authority.
- It improves quality of product.
- It enables availability a greater variety of jobs.
- Expert advice from specialist staff executives is available. So it is a planned & specialized system.
- Line executives get sufficient time to devote more to achieve organizational objectives.
- It enables availability a greater variety of jobs.

Disadvantages

- Due to high salary of the staff executive the product cost will increase.
- There may develop jealousy between staff executives.
- Line staffs do not have direct authority to enforce their decision and implement their ideas.

- If the duties and responsibilities are not clear, it may create confusion between line and staff organization.
- Staff personnel do not have direct authority to enforce their decisions and implement their ideas.
- Due to lack of authority, the staff organization may be ineffective to work.
- Sickness of any one section will affect the whole system, which may create indiscipline among the workers due to lack of responsibility.

Application of Line & Staff Organization

- This organization is best suitable for medium and large scale industries.
- It can be applicable for automobile and other intermittent industries depending upon their internal structure.

Matrix Organization

- Matrix structure is the combination of two departments. One is functional and another is product responsibilities. Product manager is also known as project manager.
- In this system every group of employees have two bosses one is there functional department manager and another is there project manager.
- The matrix structure allows for an efficient use of resources because teams include specialists from various departments.
- These are applicable in Advertising agencies, aerospace firms, research & development laboratories, construction companies, hospital, insurance, banking, Govt. agencies, management consulting firm, entertainment companies.



Advantages of matrix organization

- The cases, where the project authority and functional authority is well defined, this concept is best suited.
- It ensures the effective utilization of the services of the people with highly specialized skills.
- Communication improves by direct contact with the different functional specialists.
- It ensures more flexibility by the frequent contact of the functional specialists.

Disadvantages of matrix organization

- Reporting to one boss introduces role of conflict and ambiguity among workers.
- The struggle between Project manager and functional manager creates conflict for sharing of same set of resources.
- Matrix organization incurs higher cost than other conventional hierarchy organization.
- It creates problem of coordination and complexity in organizational relationships.
- Project manager does not have authority on the temporarily employed persons from different department.

Principles of Organization- Meaning and Significance of terms-control, authority, responsibility, job and Task:-

Principles of Organization

Principles mean rules and regulations which can be applied under similar conditions. For a successful organizational relationship and achieving the basic objectives of the organization, there are many principles which are designed with regards to the organizational need.

Following are some common principles which are designed for organization:-

Principle of objective

In an organization different employees perform different work. Every employee works for achieving objectives of the organization. The objective of all the employee's should be same as the objective of the organization and it should be unified and concentrated. Therefore, the employees should have the unity of objectives.

Principle of division & distribution of work

The main work of the organization should be divided into many subparts, jobs and bits. After dividing the work scientifically, the similar activities should be grouped together for better distribution among the employees. Distribution should be done depending upon the capabilities of the employee, so that proper division, grouping and better distribution of work is ensured.

Principle of coordination

There should be a link among the employees. So it is essential to maintain a good co-ordination among all the employees in order to achieve the goal of the organization. Finally, by uniting all the efforts of the individuals, groups & departments together, it will be possible to achieve the goal of the organization. So there should be a good harmonious co- ordination among the employees of the organization.

Principle of efficiency

Achievement of efficiency is an important principle of the organization. The efficiency at all the levels of work can be achieved under one condition that there is optimum utilization of the available resources. Every effort should be made to maximize result at minimum possible cost. For this at first the efficiency of men, machine, material & money should be increased. When efficiency is achieved at every level of the work, then overall efficiency is ensured.

Principle of delegation

For a sound organization, effective delegation of duties and responsibility is essential. With the help of delegation, the executive gets his work done through his sub-ordinates. By passing down the work of executive to the sub-ordinates, they can be able to take decision themselves to perform efficiently. Through the process of delegation downward to the lower level, the sub-ordinates get the chance to think and develop in taking decisions.

Principle of authority and responsibility

The necessary of authority & responsibility is very high for getting the works done through delegation. So for a smooth functioning of an organization, both authority and responsibility are the two components that have high importance in the organization. It is important that the authority should be equal to the responsibility because a person without authority can't be held responsible.

Principle of span of control

An executive or superior can't supervise the work directly when he has a large number of subordinates for guidance, so an executive or a supervisor can supervise the work directly of maximum six numbers of sub-ordinates. As the executives have limited time and energy available, so there should not be more than six sub-ordinates under the guidance of one executive of supervisor or that he will not be over-burdened.

Principle of balance

According to this principle, a perfect balance should be maintained among power, authority & responsibility. Excessive centralization and excessive decentralization of power in the organization should be avoided so as to maintain perfect balance between both.

Principle of communication

Communication is a process through which different parts of an organization can be tied up together. Through communication, a smooth flow of information and understanding can be ensured among the individuals, departments and sections of the organization.

Principle of definiteness

Different employees perform different types of work in an organization. Due to division of main work, there should be definite link or relation among the employees and the groups of the organization. Since any work in the organization is a part of the main work, there should be a definite relationship between the main work and the sub part of the works performed by different employees.

Principle of unity of command

According to this principle, for every individual employee, there should be a single boss or superior. Every employee should perform their work under the guidance of a single supervisor and he can be ordered only by him to take the responsibility. If the orders or instructions of many superiors are received by only single employee, then there will be decrease in his efficiency. So the guidance of any command to a single employee should be unity.

Principle of scalar chain

There should be a link among all the persons working in the organization with one another just like the different links of a chain. As a result, the authority and command can flow properly from top to bottom of the management. The chain should be continuous, instead of longer chains. Proper transmission of authority is more effective in the shorter chains.

Authority

Meaning & Significance of Authority

- Authority is the right to give orders, make decisions and the power to enforce obedience.
- Authority means the right enjoyed by any individual to make a subordinate to do the work.
- In an organization everybody possesses some authority from top to bottom of the management.
- Authority is the right person which influences the subordinates to get the work done through them.
- Authority is used as per rules, regulations, policies and norms of the organization.
- It is essential for a manager to get his work done through others.
- It is just like a chain in which the individuals act as seniors, juniors and subordinates.
- An individual with an authority can force a person to do the work.
- Authority is a legal power of an individual to do certain work through subordinates.
- If the subordinate refuse to do a work or the subordinates refuse to follow instructions given by superiors, then the superiors have the power to discharge the subordinates or he may take any disciplinary action over the subordinates.
- Without Authority, there will be indiscipline in the organization.

Characteristics of Authority

- Authority is a legal power or legitimate tool because it is provided by the organization.
- The limit of authority is specified by the organizations, so it is limited.
- There may be centralized or decentralized authority.
- It is provided to a particular position in the organization not to position holder.
- It may be equal to responsibility.
- It must be utilized for awarding punishment to the disobedient subordinates.
- It also utilized for the reward to the effective and efficient worker.

Responsibility

Meaning & Significance of Responsibility

- Responsibility indicates the duty assigned to a person.
- When an individual perform the duty which is assigned to him due to his position.
- It is not a burden but an obligation to carry out the activity of an individual.
- The superior gives the responsibility to sub-ordinate to complete the assignment.
- So it is the responsibility of sub-ordinate to complete the assign the task they can satisfy their superior with their performance so delegated to them.

Characteristics of Responsibility

- Obligation of the sub-ordinate in the performance of the duty assigned.
- It is in the form of a continuing obligation.
- It cannot be delegated.
- The person accepting responsibility is accountable for performance of assigned duties.
- It is hard to conceive responsibility without authority.

Accountability

- It is the obligation of an individual to report formally his superior about the work he has done to discharge the responsibility.
- Every employee/manager is accountable for the job assigned to him.
- Accountability is the liability created for the use of authority.
- It is the answer-ability for performance of the assigned duties.
- If the sub-ordinate does a poor job, the superior cannot evade the responsibility by stating that poor performance is the fault of the sub-ordinate.
- A superior is normally responsible for all actions of groups under his supervision even if there are several layers down in the hierarchy.
- It means that the sub-ordinate should explain the factors responsible for non-performance or lack of performance.

Leadership-necessity, styles of leadership, role of leader

Leadership

- Leadership is defined as that quality is the behavior of the individual in the guidance of the people on the desired activities.
- Leadership is the ability of a manager to build up confidence among the subordinates.
- Leadership is a process of influence a group in specific setup circumstances which encourages workers to work willingly to achieve organization objective.
- The leader must be able to influence the behavior, attitude and belief of his followers or sub-ordinates.
- A leader should have the qualities like influencing, motivating and enabling others to contribute towards the success of an organization in which they are working.
- Leader should have the responsibility of arrangement for work environment of the employees so that they can achieve their effective objective more easily.
- When a group of employees in a project have a common goal performance objective then some sort of leadership is essential there to build up confidence among the employees.
- Success of leader largely depends upon his qualities and characteristics. Leaders are both born and self-made.

Necessity of Leadership

- It leads the group to a higher level of performance.
- It implies a motive power to group efforts.
- Leadership acts as a way of influencing, inspiring, taking actions by the authority.
- It influences the behavior of the sub-ordinate towards achievement of organizational goals.
- Leadership plays a vital role at all levels of management because management can't achieve the goal without presence of effective leadership.
- Effective leadership creates a better understanding between the— subordinates and the management.

Styles of Leadership

According to the attitude and behavior patterns, leaders are classified as the following

- Autocratic or authoritarian style
- Laissez-faire or free-rein style
- Democratic or participative style leader
- Paternalistic style leader.

Autocratic or authoritarian style

- This type of leader is the absolute power with him.
- Here the subordinates are completely obedient to the leader and the leader also centralized all the powers decision making in him.
- Here the subordinates have to follow the leader's orders, rules and regulation blindly or forcefully without any question.
- There is a threat of penalties and punishment to the subordinates in case of deviation.
- The most important problem is that the subordinates only do what their leader orders but they can question is as why.
- In this type there is no priority on the subordinate's opinions and suggestions or initiative.
- Such leaders give orders; assign duties and responsibilities without consulting the employees or caring for their opinion.
- So these types of leader are not a real leader.
- In this style leadership produces hostility towards their leaders and the production drops to a minimum in the absence of the leader.

Laissez-faire or free-rein style

- This type of leadership maintains a good relationship between subordinates and its leader because under these type of leadership the subordinates allowed there maximum freedom.
- They are given the capacity to decide their policies and programs with their own style and take their independent decisions.
- While decision making, if the subordinates require the help of the leader, then the leader provides help, otherwise the leader doesn't interfere in their work.

- But this type of leadership rarely exists because in this type of leadership the subordinates must be required to be competent, sincere and self-disciplined.
- This type of leadership creates a self-confidence and encouragement among the subordinate and also creates an opportunities to develop their talents.
- But it is not possible to work under all situations with all type of workers.

Democratic or participative style

- This type of leadership is the exactly middle position between two extremes of the autocratic and free rein style of leader.
- Under this style, authority is decentralized after consulting with subordinates and based upon their feedbacks, the decision are taken.
- By this process of decision making the subordinates are encouraged to make suggestions while taking decisions.
- Subordinates are given chance to explore their potential in strength to complete the challenging responsibilities.
- It creates a friendly working atmosphere and reduces conflicts like strikes, industrial unrest, employees' complaints etc.
- Due to long process this type of leadership may cause delay and may create indiscipline within workers, but this type of leadership improves job satisfaction in subordinates.
- In this type, the difference in production during the absence of the leader is negligible.
- This type of leadership tends to increase the production as it wins the confidence, co-operation, loyalty and initiative from his follower.

Paternalistic style or functional style

- Under this style of leadership the subordinates become dependent upon the leader.
- Here the sentiments and emotions are given more priority.
- And the leader looks after his subordinates like a father looks after his children and family.
- He is supposed to help, guide and protect his subordinates but there is no chance of growth individual.

- In this case, leaders lead because of their expert knowledge and win the confidence of their followers by their superior knowledge.

Role and Function of a Leader

Some important functions of a leader are as follows:-

Setting goals- It is important for a leader as a functional head to layout goals and policies and also to induce the subordinates to work with confidence and zeal.

Clarity of goal- an effective leader should have clarity about the goal, vision and knowledge of what is to be done and directs the organization with an idea of sustainability.

Organization- This is an important function of a leader to create and shape the organization such that it can assign roles appropriate to individual's ability to operate towards the achievement of organizational goal.

Clarity about Role- It is important for a leader to identify and clarify an effective role for focusing the future for his subordinates.

Link between the management and workers- An effective leader maintains a better link between the management and the sub-ordinates.

Creativity and innovation- It is an important function of a leader to develop new ideas, models, application of technology, so that it can differentiate the organization and help it stand apart.

Achieving the task- Leader possesses clear idea about his task and understands how it fits into the objectives of the organization. He effectively plans to accomplish these tasks.

Keeping group moral high- The leader regularly briefs the group, provides genuine consultation wherever needed and makes effective the grievance redressal procedure.

Getting the best out of each member- A leader sees each person gets a sense of personal achievement in this job. He informs the members of the group having unsatisfactory performance and helps them to improve.

Team building- He establishes clear aims, guard against over ambitious targets at the start and also without false expectations. He prepares a realistic time board programme and ensures that everyone agrees to the programme.

Human Relations

It refers to study of the behavior of the people in groups in particular work place and in field such as industry and organizations.

Human relations cover all types of interactions among people, their conflicts, co-operative efforts and group relationships.

It is the study of the reasons for beliefs, attitudes and behaviors of persons. Sometimes causing inter-personal conflicts in personal lives and work related situations.

Human relations are the relationship between groups of people, especially between different workers in an organization.

It is important in a work-place for reducing employees' turnover, increasing productivity and fostering creativity.

Relation with Peer

We respond and reciprocate with them very easily and very firstly. They are typically the same level as us either in intelligent quotient or status or family structure or in any other way at par with us. We normally tend to be comfortable with them in terms of talking and interacting. One more reason of a person being comfortable with peers is they have similar problems and they empathize very well with each other. For example colleagues in office, friends, cousins, acquaintances, social circles, etc.

Relation with Subordinates

They are lesser either by age, experience, knowledge or relationship and that's why we feel good dealing with them and sometimes even show them off our seniority. They are the ones who need our reciprocation for their growth but still our responses to them are important; if we have to take

work from them or they are in our social circles or fall in as a team to achieve targets in professional fronts.

Relation with Supervisor

The teachers, mentors, bosses, family, etc. generally fall in this category. They are the ones who are higher than us as far as the knowledge or experience or intellect quotient or relationship goes. They expect a certain kind of respectful treatment from us, while we deal with them. We normally tend to take time to interact with them directly; more so, particularly because they also have an expectation barrier to break first with us. They are the ones from whom you learn effortlessly because we know that they know more than us. For example uncles, aunts, bosses, bosses of bosses, mentors, aged consultants, senior positions in any way, etc.

Group Behavior

Groups are composed of individuals. Hence, the group behavior implies behavior of its members. Each member of the group affects the behavior of other members and in turn, is also attached by them.

The nature and pattern of reinforcement the members receive through their interaction with one another is also determined by group itself.

Characteristic of Group Behavior

Effective groups could be distinguished in terms of its characteristics such as role structures, norms, cohesiveness, leadership, status, task and size. These characteristics are responsible for understanding why some groups perform better than others.

Role Structures

Each person in a group is normally assigned with a role or a pattern of expected behaviors associated with a certain position in the group.

- Group members have an expected role for each individual.
- Through verbal and behavioral messages, group members communicate their expectations.
- The individual group member's perception of these communication results in a perceived role.

- The group member's response, acting out the perceived role is the enacted role.
- A group is most likely to be effective if its members understand and accept the roles that are consistent with high performance.

Norms

- The standards that a work group uses to evaluate the behavior of its members are its norms of behaviors.
- These norms may be written or unwritten, verbalized or not verbalized, implicit or explicit.
- Norms may exist in any aspect of work group life.
- They may evolve informally or unconsciously within a group, or they may arise in response to challenges.
- Norms reflects the culture of the particular group, so they vary from one group to another.
- The degree of which the norms have an impact depends on the extent to which group members comply with them and the group's enforcement of them.

Cohesiveness

- The commitment of members to a group and the strength of their desire to remain in the constituted group is called group's cohesiveness.
- It is the interpersonal glue that makes the members of a group stick together, is known as group cohesion.
- Group cohesion may enhance job satisfaction for members and improve organizational productivity.
- Highly cohesive groups at work may not have many interpersonal exchanges away from the workplace. However, they are able to control and manage their membership better than work groups low in cohesion.
- This is due to the strong motivation in highly cohesive groups to maintain good, close relationships with other members.

Leadership

- A key role in determining the success of the group is the role of the leader.
- Effective leadership can shape a group into a powerful force for accomplishing what individual members could not or would not do alone.
- Organizations need to cultivate effective group leaders whose goals support the organization's objectives.

Status

- Status is the degree of worth and respects that other members of the group accord individual group members.
- Status may arise from the person's job or behavior in the group.
- A group member's status linked to the person's position in the organization.
- Status based on age, gender, education level, seniority, race or other characteristics.
- The status of group members can enhance effectiveness. High status members have the most to contribute to the group objectives.

Tasks

The productivity and satisfaction of group members also depend on the kinds of tasks the group carries out. Major ways to describe group tasks are in terms of type and performance requirements.

Task type: - It is defined by the major kinds of activity involved. Different type of tasks are: -

Production task-Tasks requiring the group to produce and present ideas, images or arrangements.

Discussion task- Tasks requiring the group to evaluate issues.

Problem solving task - Tasks requiring the group to decide on a course of action for resolving a particular problems.

Performing requirements: - These task may be following type: -

Disjunctive tasks - Tasks that can be completed through individual efforts of group members.

Convective tasks - These are tasks where each person's efforts are tightly linked to the efforts of others. Group members are highly inter dependent.

Additive tasks - Where productivity is measured by adding together the output of each group member.

Mob psychology

- It is also known as crowd psychology which is a branch of social psychology.
- This field relates to the behaviours and the thought process of both the individual crowd members and the crowd as an entity. A mob is one of the most influential and also overlooked forces in changing people's behaviour.
- Basic concept is the thought process and the behaviour patterns of the individual often vary from those of a larger group, although these some individuals often adapt to the expectations of the surrounding culture and modify individual traits in order to identify with the crowd.
- The convergence theory as applied to the crowd psychology is that the behaviour of the crowd takes on focus and form based on the input of the individuals who make up group.
- The Emergent-Norm theory approach to crowd psychology affirms that crowds are collections of individuals who usually come together around foundation of connected understandings but still retain many of their individual traits.
- It is possible for an individual to function as a leader at one point and later modify his or her expression to that of a follower or manager.
- As with any psychology theory, there are a number of other approaches to crowd psychology that tend to assign responsibility for group dynamics and individual reactions to a wide variety of situations and motivations.

Absenteeism

- Absenteeism is the term generally used to refer to unscheduled employees absences from workplace.
- Many causes of absenteeism are legitimate, for example personal illness or family issues, but absenteeism also can often be traced to other factor such as poor work environment or worker who is not committed to their jobs.
- If such absence becomes excessive, they can have a serious adverse impact on a business's operations and ultimately its profitability.
- The labor department in India defines the absenteeism rate as total man-shifts lost as a percentage of the total number of man-shift scheduled.

- Employee absenteeism is one of the most common workplace problems facing employers in today's workplace.
- Legitimate illnesses as still count for majority of employees absences but studies have shown that less than 1/3rd of absences from the workplace are related to poor health.
- Therefore, most employers offer their workers vacation, sick leave, paid time off or other kind paid and unpaid leave.

Causes of absenteeism

The following are the major causes of absenteeism:

Child care:- This means that when a child is ill or when normal child care arrangements fail for any reason, one of the parents may have to call in sick to look after their child.

Accidents:- Accidents are inevitable in an industrial/working environment and every workplace has its own share of accidents.

Sickness and low vitality:- Epidemics like cholera, small pox, corona and malaria often break out in most industrial areas. The low vitality of the Indians workers makes them easy prey to such epidemics and bad housing or in-sanitary conditions of living aggravate the trouble.

Bullying:- It is due to harassment policy and is unwanted, aggressive behaviour towards employees that involves a real and perceived power imbalance.

Lack of flexibility:- Lack of consideration towards flexible working practices, like holiday banking or flexible working hours etc. leads to absenteeism.

Poor leadership:- It leads to lack of any real commitment of workers to their jobs.

Bereavement:- When people suffer a protracted bereavement, reaction problem arises. Bereavement reaction goes through four separate stages-disbelief, anger depression and reconciliation.

Change:- A changing work environment, caused by manager, poor economic climate or unforeseen circumstances, can make employees feel insecure and stressed, leading to absence.

Means of transport:- The rate of absenteeism is higher in the industries not having good transport facility than those having easy transport facility or provided by the industry itself.

Ergonomics:- Lack of good ergonomics design of workplaces may lead to stress and consequent absenteeism. Provision of open plan offices, for space and team building reasons, causes a lot of ambient noise and concentration problems besides the ventilation problems.

Long hours of work, Night shift, Rural exodus, Social and Religious function etc. are other factors for absenteeism.

Handling Grievances

Grievance handling is the management of employee dissatisfaction or complaints (e.g. favoritism, workplace harassment, or wage cuts). By establishing formal grievance handling procedures, you provide a safe environment for your employees to raise their concerns.

A grievance is any dissatisfaction or feeling of injustice having connection with one's employment situation which is brought to the attention of management.

- Dissatisfaction is anything that disturbs an employee, whether or not the unrest is expressed in words.
- Complaint is a spoken or written dissatisfaction brought to the attention of the supervisor or the shop steward.
- Grievance is a complaint that has been formally presented to a management representative or to a union official.

Causes of Grievances: -

- Economic
- Work environment
- Supervision
- Organizational change
- Employee relations

The effects are the following:

On the production: Low quality of production, Low productivity, Increase in the wastage of material, spoilage/leakage of machinery, Increase in the cost of production per unit

On the employees: Increase in the rate of absenteeism and turnover, Reduction in the level of commitment, sincerity and punctuality, Increase in the incidence of accidents, Reduction in the level of employee morale.

On the managers: Strained superior-subordinate relations, Increase in the degree of supervision and control, Increase in indiscipline cases, Increase in unrest and thereby machinery to maintain industrial peace

Labor Welfare

Labour welfare refers to all the facilities for labourers to improve their working conditions, provide social security, and raise their standard of living. Several state legislatures have enacted an Act exclusively focusing on the welfare of the workers, known as the Labour Welfare Fund Act.

Conflicts in organization- genesis of conflicts, types-intrapersonal, interpersonal, intergroup, resolving conflicts.

Conflicts

- Conflict can be considered as an expression of misunderstanding, rivalry or antagonism. A conflict arises with the situation where two opposing groups involve in contradictory interests.
- Conflict is defined as misunderstanding or a disagreements between two or more individuals or groups or a struggle between individuals or groups for the same struggling needs, wishes or interests.

Features of conflict

- When the individuals are not able to choose among the available alternatives actions, then conflicts occurs.
- As it indicates a series of events, so it is a dynamic process and is also made up of a series of inter-locking conflicts.
- No conflict exists in the organisation so long as no body is aware of the conflict.
- Conflict between two individuals implies that they have conflict in their perceptions.

Types of conflicts - the various types of conflicts are as follows:-

Conflict within the Individual

- It is very common that all individuals have conflict within themselves. It occurs when there is a difficulty to choose out of the alternative course of actions, which are either unacceptable or the incomparable.

- Conflict within individual can also occur because of his various positions and roles in the organization.
- If an individual is expected to play a specific role in the organization but his own values and beliefs does not allows him to do so then conflict may occur.

Interpersonal Conflict

- When two or more individuals are involved in conflict, then that type of conflict situation is called interpersonal Conflict.
- It is the most recognized and most common conflict.
- Mostly, conflicts involve conflict between a person in one group in one organisation or a group and another person in group or organisation. So all conflicts are basically interpersonal conflicts.
- As every individual has a separate acceptable alternative cause of action, so different individual prefer different way.
- When opinions are highlighted rather than facts, this type of conflict can arise.
- As conflicting parties are not in a position to remain tense for a very long time, so interpersonal conflicts have tendency to resolve by itself.

Intragroup Conflict

- Intragroup conflict involves conflict between the individual and the group.
- As there are more than two persons in a group and they have the interaction with each other, they usually have a well-defined structure of the rule regulations for the smooth maintenance of the group.
- Sometimes the individual may disagree with the group methods but he/she may want to remain in the group for social needs.
- When a group face new problem, interpersonal conflict may arises.

Intergroup Conflict

- When conflict arises between the different groups in the organisation, such type is known as intergroup conflict.
- As intergroup conflicts are due to factors inherent in the organisational structure, so the conflicts are not so personal in nature.

For example:- Conflict between production and marketing department in an organisation. Suppose sales department promise their customer certain quantity and quality of product, which the production department may find difficult to make it. In that case conflict arises between them.

Resolving Conflict

There are two approaches for resolving the organisational conflict.

Preventive measures

These are some preventive measures which the management can take to resolve the organisational conflicts.

- Establishing common goal
- Reduction in interdependence
- Trust and communication
- Co-ordination
- Use of superior authority
- Development of effective leadership

2. Curative measures

There are following steps which can be taken in resolving conflict.

- At first full details of conflict should be drawn out and stages of conflict is pointed out.
- There are two stages of conflict:- preliminary & advanced. If the conflict is advanced stage, then there is requirement of more effort to resolve it.
- There may be causes of conflict such as facts, goals, methods and values. There should be proper analysis about the issues involved in the conflict and it should be understood clearly.
- Discussion by the management or mutually by the parties involved in conflict may be done for problem solving.
- Management may attempt to sweep out and smoothen the affairs.