

Site organisations

- It has generally been seen that even those projects which were initiated and started after detailed planning, goes out of control due to improper management of day-to-day activities of the project at site.
- Lack of coordination and experience and absence of accountability are some of the reasons responsible for non-completion of the project by the target date in a cost effective manner.
- This can be avoided by having systematic field management system by employing a motivated team of management personnel.
- This field management team should be responsible for,
 1. Inspection
 2. Supervision of all construction activities.
 3. Coordination between different agencies.

6. Crashing of network where required.
7. Locating problem areas and finding solutions.
 - Well organized time look after the following aspects of site management during the implementation of construction work.
 - 1) Time control.
 - 2) Quality control and quality assurance.
 - 3) Expenditure control.
 - 4) Safety measures.
 - 5) Organisation behavior.
 - Generally construction at site is supervised and carried out by two separate agencies, namely the client team lead by the project manager .
 - The contractor work force managed by his construction manager.

- The project manager is required to plan work programme, manpower, materials, construction machinery etc.

Organisational set-up:

- The organisational set-up for project management at site is built up and structured to meet site requirements depending on the nature of construction work.
- The owner organisation of a construction project may need a small team for overall supervision and control, but the contractor who has been entrusted with the job of construction of project needs a larger team for controlling labour, supervising technical work, timely supply and consumption of materials, coordination with the client, and local authorities.
- Authority should be clearly delegated to each member of the management so as to enable him to deliver which is expected from him

- Organisation set-up for a construction project is temporary and ceases after completion of the project.
- It comes in to existence at the start of planning stage , grows gradually, undergoes changes in various in stages of the project lifecycle to meet the project needs , and towards the end it runs down and ceases after completion of the project.
- The management team of the project is capable of handling the problems as they arise and its members are experienced persons who can respond speedily with changing situations and can take immediate decisions.

Designing the project organisation:

- For the purpose of designing an organisation set-up of a construction project following steps should be taken:
 1. Organisational groups are designed to conform with the project work break-down structure.

2. Each of these groups are assigned responsibilities and resources are allotted so as to meet these assigned responsibilities.

3. As the project work grows and reduces in different stages, with the change in the tasks, the size and structure of the organisation changes so as to meet the alteration in requirements.

4. The project groups are structured with emphasis on team work and also on nature and quantum of work.

5. Channels of communication should be less preferably 2 to 3 with any group for managerial tasks and organisation structure should be avoided.

6. Key staff where possible should be derived from their respective departments in corporate office, so that objectives of the project and goals of the organisation should be achieved in a better way.

8. There should be clearly defined authorities and responsibilities for planning , organising, directing, coordinating, procuring, Quality Assurance , contract administration, etc. and the monitoring and controlling, the available resources.

9. Head of the project should be accountable for the whole project and all managers working in the project.

10. Personal commitment to objectives of the project , provide a climate for motivation , effectiveness and personal development.

11. Effective communication system balances the conflicting objectives of specialist staff there by leading to effectiveness.

Time planning and control:

- During construction of various activities are to be closely monitored to ensure that the work volumes are completed proportionate to the team allotted.

- Time planning for simple and small projects is carried out using bar charts , while complex projects are best planned using network techniques.
- Sometimes date of start and date of completion of project are fixed , therefore the schedule must meet these constraints, and must account for holidays and non- working periods.
- Time control of a construction project aims at timely execution of work as per the work programme and application of corrective measures in case of deviations. It involves
 - i) Measuring the project time progress,
 - ii) analyzing the implications of deviations from the project time schedule.
 - iii) taking remedial measures including time crashing, additional

Resources planning:

- During preparation of detailed project report , detailed planning for resources is done considering the anticipated outcome for future based on the currently available information which may or may not hold good in future.
- Major resources required for the execution of a construction project are:
 1. Human resources are skilled, semi skilled, and unskilled labour, supervisory personnel both technical and non technical , managerial personnel , security staff , staff engaged for operation and maintenance of construction equipment etc.
 2. Capital in the form of liquid money and assets like materials, equipment etc.
 3. Technology in the form of know- how, intellectual property rights and patents are also considered as resources

- a) Determining the requirements of resource inputs in terms of quantity and quality.
 - b) Planning the acquisition of needed resources.
 - c) Allocating the resources in an optimal manner to meet the objectives of the organisation effectively and efficiently.
- During implementation of the project , it has generally been observed that resources are in limited supply at some time or the other at construction site , that may cause a delay in the completion of the project.
 - Limited supply of resources may result in the following implications:
 - i. Delay in starting of a job.
 - ii. Delay in completion of an activity may cause delay in starting succeeding activities.
 - iii. Non- critical jobs may turn out to be critical.

iv. Scarcity of resources may occur at a time , resulting in unbalanced requirement of resources.

Planning of Human Resources:

- Human resource in the form of managerial talent , workers skill and employees cooperation helps in the growth and development of any organisation.
- Human resource planning may be defined as the strategy for the acquisition , utilization, improvement and preservation of organisation resource.
- The objective of human resource planning is to make efficient use of the human resouces through maintaining and improving the human skills necessary for achieving the objectives of the organisation.
- The process of human resource planning mainly involves identifying the trades or the skills required , establishing productivity standards determine the number of workers

- The scope of construction man power planning is as under:
 - i. Establishing workers productivity standards
 - ii. Estimating requirement of each category of manpower for each work package.
 - iii. Scheduling data wise, category wise , direct labour.
 - iv. Grouping project manpower.

For determining the workers requirements,

(a) Workers productivity = worker output norms * product efficiency factor.

(b) No of workers required =
$$\frac{\text{work quantity} * \text{workers productivity standard}}{\text{working period available}}$$

(c) Working Hours:

- Manpower requirement is directly related to the total hours worked per day by employees in a project.
- If no of hours for which a worker has to work is more , less manpower will be needed and vice versa.

(d) Number of shifts:

- It has been felt that production falls in the night shifts as compared to day shifts. This factor should be considered while deciding the manpower requirements for activities to be done in the night shifts.

(e) Nature of work:

- Nature of work decides the output, which includes adverse weather conditions, climatic conditions, topography, toughness etc.

(f) Equipment utilisation and their availability should be

Scheduling workers:

- The manpower schedule indicates, data-wise as well as category wise, the workmen strength required to accomplish the schedule work.
- The past performance data is used for manpower forecast ,schedule for each project has to be complied separately.
- The bar chart of construction work schedule with its dates of start and completion of each activity of work-item forms the basis for developing direct workers schedule .
- Since activity has a specified duration, work-content, and manpower required for its accomplishment, the daily average manpower required for each scheduled activity can be assessed.

Grouping project manpower:

- The man power groups for a construction project can be divided into the following functional units:

(a) command and control groups:

- These groups manage the project and provide support. This group includes planning and monitoring staff, contracting, costing, design and drawing office, quality control and laboratory, administration and personal staff, materials handling, finance management, and accounting staff.

(b) Construction groups:

- These groups execute the construction work of the project and are responsible for transforming inputs into outputs.
- These groups include groups of construction of various structures and other work centers as per project break down structure.
- Depending upon the volume of work, each work group consists of one or more construction teams and are allotted resources. Each team is headed by an incharge.

(c) **Support centres:**

- Support centres provide men, materials, technical machinery and other facilities to support the construction groups.
- These groups provide accommodation, hospitality, repair and maintenance of equipment, materials purchase, stores and supply, electrical supply etc.

Planning material Resources:

- Materials resources include construction materials like cement, steel, aggregate, sand etc., components , spares, and other items required for meeting production needs.
- The materials are planned based on forecast as per construction schedule .Spared and other items are planned based on experience or past trends.
- Construction materials planning involves identifying the materials required , estimating quantities, defining specification , locating sources for procurement, getting material samples approved, designing materials inventory, and developing the procurement plan.

- For efficient materials management in a construction project it is necessary to have an integrated approach covering **various functions** such as materials planning and programming , materials purchasing, inventory control, inspection and quality control , store keeping and warehousing, materials transportation, and handling at site, materials codification and standardization and disposal of surplus and scraps.

Planning construction equipment:

- Proper planning , selection, procurement, installation, operation, maintenance, and equipment replacement policy plays an important role in the equipment management for the successful completion of project.
- Construction equipment's are used for excavating, handling, transporting, compacting, grading, and levelling, hoisting, concreting, casting, trenching, production of aggregate, production of cement concrete, asphalt concrete, etc.

- Work of equipment planning starts with the identification of the activities which will be carried out with the help of equipments. For deciding the number and size of the equipments, following factors should be considered:

- i. Quantum of work
- ii. Working days available for completion of work.
- iii. Number of shifts planned.
- iv. Site conditions.

Capital Resource planning:

- Capital is a source of funds owned or used by the project. As the total supply of funds is limited , the use of funds has to be carefully planned and controlled.
- Financial planning is essential concerned with the economical procurement and profitable use of funds.
- Financial planning of the project has to be formulated considering the present needs of capital for fixed assets, working capital and other requirements.

- The budget quantifies the project cost objectives in monetary terms , it reflects the resources ear-marked pinpoints the results to be achieved and provides a device for controlling performance.
- The project budget is a financial commitment for actions , an instrument for delegation of responsibilities and provides a standard.
- In the budget each responsibility center is assigned goals in the form of targets and allocated resouces in the form of materials , manpower, equipment and funds for the assigned goals.

Controlling Construction projects:

- Control is an important function of the management and is the continuing process of measuring actual results in relation to the results which were planned.
- Control can also be defined as that management activity where by the managers compare actual performance against the planned one, find out the deviation and take corrective actions.

- A control system involves:

- a) a predetermined goal , a plan a standard, a policy, a norm, a criteria.

- b) a means of measuring activity.

- c) a mean of comparing activity and,

- d) a mechanism to correct the activity so as to achieve the desired result.

- Controlling and planning functions are closely related to each other and cannot be viewed in isolation since control is not possible with out specified objectives and plans.

- Project control involves following major functions:

- i. Control over performance. (to control over time)

- ii. Control over quality and workmanship.

- iii. Control over movement and consumption of materials.

- iv. Control over human activities.

- v. Control over costs.

Control over performance and productivity:

- The success of a project depends upon the performance of the input resources.
- Each responsibility centre accounts for the performance of the assigned parameters, and forward the deviations between the actual and planned performance to the monitor .
- In construction projects , the main performance parameters which are required to be controlled are:
 1. Time progress.
 2. Resource productivity.
 3. Resource mobilisation.
 4. Direct cost.
 5. Budgeted cost.
 6. Work done or work quantity.

- Productivity is a measure of performance of input resources.
- Productivity aims at measuring efficient utilisation of inputs of men, materials, equipment and capital by identifying causes of their wastage and making efforts to minimise them.
- The causes of wastages are located by analysing variances. The productivity parameters which need to be controlled in construction projects are , labour productivity, equipment productivity, and materials productivity.
- Some of the main factors which affect the production efficiency are:
 - i. Work complexity.
 - ii. Repetition of work.
 - iii. Quality control.
 - iv. Equipment task.
 - v. Supervision.

vii. Labour availability.

viii. Role of management.

Budgetary control:

- A budget is a widely used technique for managerial control.
- A budget is a financial and quantitative statement, prepared and approved prior to a defined period of time for the purpose of attaining a given objective.
- Budgetary control involves continuous checking and evaluation of actual results compared with actual results regarding expenses and performances.

Cost control:

- Cost control is a continuous process and is exercised by several techniques, some of which are **standard costing, inventory control, performance evaluation Budgetary control value analysis, standardization, simplification and work-study**.²³

- The expenses involved in running a construction work include many items like, the materials cost, handling charges, wages to direct and indirect labour, operations and maintenance charges of machinery, expenses for purchasing stores, etc. Following are the some of the measures which should be adopted to control site expenditure,

1. Material wastage should be controlled.
2. Purchase of materials at right place, in right quantity, at the right time.
3. Employment of labour and staff should be maintained at an optimum level.
4. Work should be carried out strictly as per schedule so as to avoid overtime wages at a later date to cover up the time loss.
5. Idle labour should be avoided.

6. Receipt of materials should be tapered off as the work draws

Quality control:

- Quality depends upon the selection and application of materials, men , machines, and working conditions. Systematic control of all these factors is the quality control.
- In the planning, designing, and tendering stages, of ant construction project, the specifications, quality standards and the nature of the end products are defined by the project authority.
- The process of quality control is an continuous process and is spread through out, the construction process, right from the sources of materials like sand, coarse aggregate, and cement etc.as per specifications, using them in the right quantity in different items of work and also controlling the human involvement and get the desired workmanship.
- Use of plants and machinery in a judicious way also enhances the quality.

- In the construction project, testing, inspection, and quality control measures are required to be carried out in three phases:
 1. During pre-construction stage, quality control measures are taken for testing raw materials, deployment and installation of machineries of proper specification and capacity, deployment and recruitment of skilled workmen for specific jobs etc.
 2. During construction stage, quality control measures include supervision, of all construction activities, testing of materials, like concreting, compaction etc.
 3. During post construction period, quality control include testing of concrete cubes, curing of concreting, load testing of piles etc.

Project Management Information System(MIS)

- The main function of MIS in a construction project is to collect data, classify them systematically so as to assess and know about the status of the project.
- Continuous monitoring of the work in progress is possible through an effective use of MIS.

Performance monitoring:

- A performance report is a written document that shows up-to-date performance status of a task to a responsibility person.
- Monitoring department specifies the frequency of different formats, considering the objective of reports and tasks to be handled, ranging from daily reports to weekly to monthly to quarterly to yearly reports.
- The project monitoring and control system aims at economically collecting the right information in the right form

- Progress monitoring is carried out with the objective of time control, resource control, and cost control.

Time control covers:

1. Measuring the progress of current activities.
2. Adopting time reduction techniques like time crashing
3. Updating sub-project plans.
4. Updating the project master schedule.

Reports and returns:

- A report in the form of tabular statements, charts, comparing side by side is always preferred.
- Reporting is a part of MIS, and reports are helpful for the management to take necessary decisions.
- The reporting should be clear, concise, well presented, need based, control and action oriented, and based on , management by exception.

- The periodicity of the report should be decided on the basis of:
 - i. User level,
 - ii. Criticality of items,
 - iii. Size and complexity of work,
 - iv. Time required for processing the information for action,
 - v. Type of report.

Maintenance:

- Machines, buildings and infrastructural facilities including service facilities are subject to deterioration due to their use and exposure to environmental conditions.
- It is therefore necessary to attend to them from time to time, to repair and recondition them so as to enhance their life economically.

The main objectives of maintenance are:

- a) To maximise availability of plant, equipment, and structures for productive purposes.
- b) To extend the life span of plant, equipment and other structures.
- c) To ensure operational aspects.
- d) To reduce the cost of lost production due to breakdown.
- e) To ensure safety through regular inspection and maintenance.

Maintenance are of following types:

- 1) Breakdown maintenance.
- 2) Preventive maintenance.

Breakdown maintenance:

- Breakdown of a machine can occur due to

b) Due to gradual wear and tear of the parts, which can be eliminated by regular inspections.

- In breakdown maintenance, defects are rectified only when a machine cannot perform its function any longer, and maintenance men have to be called for repairs.

Preventive maintenance:

- Preventive maintenance also termed as “Planned Maintenance” or “Scheduled maintenance”.
- It aims to locate the sources of trouble and to remove them before the breakdown occurs.
- Care should be taken to prevent overloading, dampness, negligence, and misuse.
- Periodic inspection or checking helps to find out the reasons leading to breakdown and to rectify them.

Condition based maintenance:

- In this system , health of the equipment and structures etc. is regularly monitored and recorded in the form of vibrations, noise, acoustic, displacement, thermal emissions, changes in chemical compositions, smell, appearance etc.
- For better understanding some common sources of degradation in industrial structures needing repair and maintenance are given here,
 1. Settlement of foundations.
 2. Dampness, rainwater penetration through roof or walls.
 3. Defective thermal insulation.
 4. Fungi in wet environment, rot in timber and insects.
 5. Structural decay due to acid fumes.
 6. Accumulation of rain water on roof and defective roof treatment.
 7. Overloading of structures.
 8. Faulty construction.
 9. Effect of weather on structural components , steel cement, etc.

Maintenance programmes:

- Maintenance programmes in various units should be carried out on yearly basis and continued for the whole economic life.
- These programmes are for machinery, structures, water supply, and sewerage system, township, colony roads, electric supply etc.
- During the economic life of the structure or its components , there is a need for yearly maintenance schedule like, cleaning, painting, tightening of loose bolts, replacement of missing ones, and petty repairs.
- A proper record of repairs and maintenance for each item is maintained.
- In most cases contractor is the responsible for construction is entrusted with the task of maintenance for one to three years after completion.

Thank You