

CONSTRUCTION MANAGEMENT

LECTURE THREE: DEVELOPMENT OF PROJECT PLAN

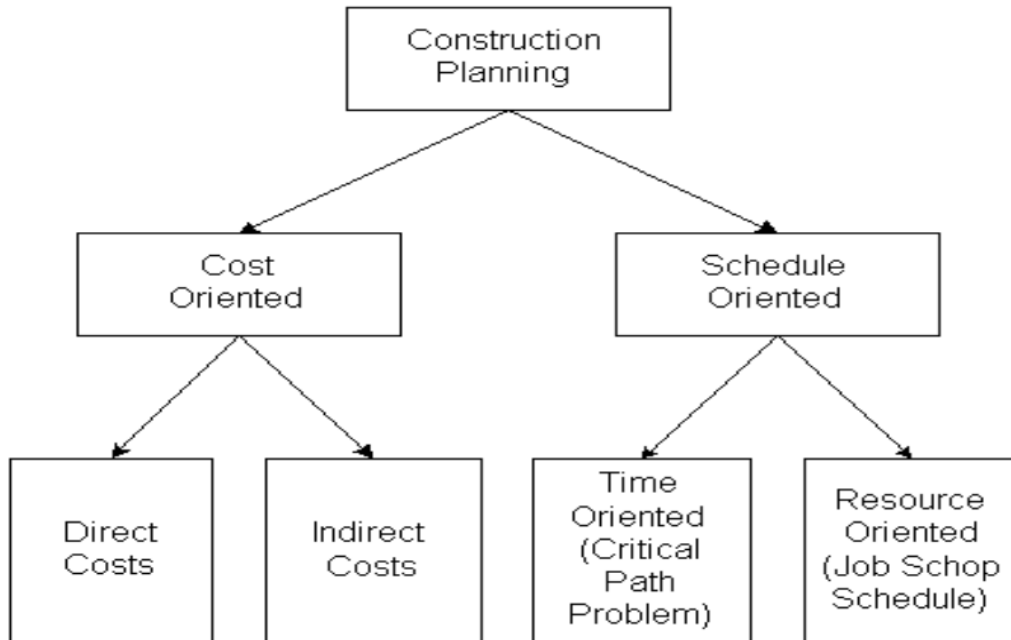
Construction planning involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks, and the identification of any interactions among the different work tasks. Planning is the process of developing the project plan. Planning aims at formulation of a time – based plan of action for coordinating various activities and resources to achieve specified objectives. The plan outlines how the project is to be directed to achieve the assigned goals. It specifies a pre determined and committed future course of action, based on discussions and decisions made on the current knowledge and estimation of future trends. A good construction plan is the basis for developing the budget and the schedule for work. Construction planning is a fundamental and challenging activity in the management and execution of construction projects.. Developing the construction plan is a critical task in the management of construction, even if the plan is not written or otherwise formally recorded. In addition to these technical aspects of construction planning, it may also be necessary to make organizational decisions about the relationships between project participants and even which organizations to include in a project. For example, the extent to which sub-contractors will be used on a project is often determined during construction planning. Forming a construction plan is a highly challenging task.

In Construction planning, a planner begins with a result (i.e. a facility design) and must synthesize the steps required to yield this result. Essential aspects of construction planning include the generation of required activities, analysis of the implications of these activities, and choice among the various alternative means of performing activities.

In developing a construction plan, it is common to adopt a primary emphasis on either cost control or on schedule control as illustrated in Figure below. Some projects are primarily divided into expense categories with associated costs. For other projects, scheduling of work activities over time is critical and is emphasized in the planning process. Finally, most

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complex projects require consideration of both cost and scheduling over time, so that planning, monitoring and record keeping must consider both dimensions. In these cases, the integration of schedule and budget information is a major concern.



Construction planning should be an essential activity during the facility design. Also, if problems arise during construction, re-planning is required.

- Planning involves advance thinking as to what is to be done ,what are the activities ,how it is to be done ,when it is to be done ,where is it to be done ,who is to do it and how to ensure that it is done .
- All the above is channelized to generate aimed at achieving the specified goal.

Process involved in construction planning can be broadly divided into three following stages

- 1) Planning time –
 - a) What is to be done?
 - b) what are the activities involved
 - c) how it is to be done?
 - d) when it is to be done?
 - e) where is to be done?
- 2) Planning resources –
 - a) what is needed to do it?
 - b) who is to do it?
- 3) Planning implementation –
 - a) how to organize a control system?
 - b)how to monitor what is done?

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- c)how to analyze variances?
- d)how to forecast trends ?
- e)how to communicate performance?

The project planning process, techniques and methods employed to develop the project plan is given in table below:

PROJECT PLANNING PROCESS

PIANNING DATA COLLECTION	<ul style="list-style-type: none"> • Where to look for data? • What is to be done? • What are the activities involve? • How it can be done? • When it is to be done? 	<ul style="list-style-type: none"> • Studying relevant document • Defining scope of work • Breaking down project work in to the activities. • Developing network plans • Scheduling work
PLANNING RESOURCES	<ul style="list-style-type: none"> • What is needed to do it? • Who is to do it? 	<ul style="list-style-type: none"> • Forecasting resources requirement • Planning manpower requirement • Planning materials procurement • Planning equipment procurement • Budgeting costs • Designing organizational structure • Allocating tasks and resources • Establishing responsibility centre
PLANNING IMPLEMENTATION	<ul style="list-style-type: none"> • How to account performance? • How to monitor performance? • How to communicate information? 	<ul style="list-style-type: none"> • Designing control system • Formulating monitoring methodology • Developing project management information system(PMIS)

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STAGES	PLANNING PROCESS	TECHNIQUES/METHODS
1) PLANNING TIME	<ul style="list-style-type: none"> • Breaking down project work • Developing time network plans • Scheduling work 	<ul style="list-style-type: none"> • Work breakdown • Network analysis ,Gantt chart ,line of balance technique • Time limited scheduling resources
2) PLANNING RESOURCES	<ul style="list-style-type: none"> • Forecasting resource requirement • Planning manpower requirement • Planning materials requirements • Planning requirement procurement • Budget costs • Designing organizational structure • Allocating tasks and resources 	<ul style="list-style-type: none"> • Forecasting • Manpower scheduling • Material scheduling • Equipment selection and schedule • Cost planning and budgeting • Organizational design • Resource allocation
3) PLANNING IMPLEMENTATION	<ul style="list-style-type: none"> • Formulating monitoring methodology 	<ul style="list-style-type: none"> • resource productivity control • Time control • contribution control • Budgeting control

TYPES OF PROJECT PLANS

DEVELOPMENT STAGES

- 1) Inception stage
- 2) Engineering stage
- 3) Implementation stage

NATURE OF PLAN

- Project feasibility plan
- Project preliminary plan
- Project construction plan

TIME PLANNING PROCESS

In construction all projects are time bound. The project time objective specifies the project completion time. The project time and cost objective are correlated-it is the time factor which determines the project cost. Time is the essence of all construction contracts.

The time planning process involves the following 3stages.

1) Project Work Break Down—This means breaking down the scope of project work into its constituent sub-projects, tasks, work packages and activities

2) Modelling and Analyzing Networks---This includes developing logic diagrams or sub-networks; integrating these to develop a time –planning model(usually a network), and analyzing this model to determine the project completion time.

3) Scheduling Work Programmes—This involves putting the time plan on a calendar basis, and using the scheduled programme to forecast inputs and output.

Project Work Break Down:

The project work breakdown process involves splitting of the project works into its manageable constituents arranged in a hierarchical order till the desired level. The work-breakdown levels are categorized into sub-projects, tasks, work packages , activities and operations.

Modeling and Analyzing Networks:

With the advancement of technology and the speed of construction, the traditional bar charts planning approach has become inadequate to tackle the modern complex construction projects.. The bar charts provide very little information about the inter –relationship of the voluminous interdependent tasks.

The network analysis techniques developed is being used as a management tool for planning and then scheduling of complex projects involving interlinking activities.

Project networks analysis is a generic term that covers all network techniques used for planning scheduling and controlling of projects. The three commonly used techniques are

- Critical Path method(CPM)
- Program evaluation and Review Technique(PERT)
- Precedence Network Analysis(PNA) technique.

Network Analysis procedure:

The modeling and analysis of a network involves the following steps:

- Defining scope of network
- Determining activities
- Developing network logic diagram
- Structuring model
- Incorporating activity durations
- Numbering events/activity
- Computing critical path
- Validating Network

Work Scheduling Process:

Object of scheduling

Scheduling means putting the plan on calendar basis. A project network shows the sequence and interdependencies of activities, their time durations and their earliest and latest completion time, but this needs to be scheduled to determine commencement and termination dates of each activity, using optimum resources or working within resource constraints. A time schedule outlines the project work programme, it is a time table of work.

- To be scheduled to determine commencement and termination dates of each activity ,using optimum resources or working within resource constraints
- It is the time table of work

Scheduling Procedures, depending upon type of project can be broadly divided into two categories:

- Scheduling non-repetitive network based projects
- Scheduling repetitive project using line of balance techniques

Procedure for scheduling network-based plan

- Outline scheduling constraints
- Design Scheduling calendar
- List Activities in order of sensitivity
- Draw earliest start time schedule
- Determine resource optimization criteria
- Schedule critical activities

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- Schedule non-critical activities
- Validate time objectives
- Schedule other resources
- Scheduling within resources constraints
- Scheduling repetitive works projects