

# Time and Cost Planning in Construction Project

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**Abstract:** *The project management technique of planning and scheduling using tools and devices are helpful in comparing the project with stipulated cost, time and quality. Resource tracking, Minimize the uncertainty and Cost Effectiveness is focused in this project. The software tool used for planning and scheduling is Primavera project planner enterprise for construction. The study covers three case studies of the process of planning, scheduling the activities and monitoring. A general re sequencing model had been proposed to overcome the delay factor from the critical area, to minimize the delay of the construction and to reduce the time, cost and it also helpful to concentrate on the major areas in the project. Re sequencing model leads the management to cost savings and make entire project success. Resource planning is one aspect, which decides the systematic execution of the project at worksite. This study is to have hands-on experience in an ongoing project, and evaluation of schedule of equipment, staff, Labor and Materials. It helps to plan and evaluate the resources for the Construction of the building project. This study also compares the cost variation due to the delay of the project and re scheduling the project by crashing process.*

**Keywords:** cost, time

## 1. Introduction

Planning is the most important technique of the management. Planning means "Looking ahead". Planning is necessary to ensure proper utilization of human and material resources to achieve the objectives of the project. In any project, the plan includes the estimates, the budget and time schedule and sequences of completion of each part of the project, manpower planning and the plant and equipment. Project planning is closely aligned with developing the project strategy. The differentiator in planning is focused on optimizing the sequencing of the work as a precursor to scheduling; it is a key subset of developing the overall project strategy. Information is frequently limited therefore planning requires good knowledge and experience of the project work. It should start early in the design phase, and involve all key stakeholders.

Project planning is part of project management, which relates to the use of schedule such as Gantt charts to plan and subsequently report progress within the project environment. Initially, the project scope is defined and the appropriate methods for completing the project are determined. Project planning is the process of identifying all the activities to successfully complete the project. At this stage, the project plan may be optimized balance between resource usage and project duration to comply with the project objectives. Project planning involves a series of steps that determine how to achieve a particular community or organizational goal or set of related goals. This goal can be identified in a community plan or a strategic plan. Project plans can also be based on community goals or action strategies developed through community meetings and gatherings, tribal council or board meetings, or other planning processes. The planning process should occur before you write your application and submit it for funding. Computer based integrated tool for the project management of building construction is developed and is very useful for the cost monitoring of the project through BOQ item wise

and at the same time it will facilitate time monitoring in terms of activity wise. Planning decisions will influence:

- The overall strategy of how the work process is to be broken down for control.
- How the control is to be managed (staff resources)
- Design, and sub-contract packages, including what methods are to be used for design, procurement and executing the work
- The interface between the various participants, their work methods and safety
- Costs and quality issues
- Time to complete and sequencing including the zones of operation and their interfaces. Project planning directly integrates with risk and opportunity management.

The objective of maximizing the efficiency of the project strategy with respect to cost and time has to be balanced against the risks associated with new methods of working and the overall quality of the finished deliverables.

## 2. Aims and Objectives

The overall objective of the study is to identify the factors responsible for the over-runs of time and cost in a construction project and suggest suitable remedial solutions. The specific objectives of the study are as follows:

- Track slippages in the actual time & cost schedule by comparing with the planned schedules & study of the reasons behind the same
- Study the trend followed by organizations of good repute, by conducting surveys in the form of questionnaire
- Suggest remedial measures in terms of modifying strategies, practices and procedures, organizational structure, contract agreement
- To find out the impact of over-runs on the stakeholders, especially the client.

### 3. Causes of Delay of Project

- Delay in installation of dewatering system.
- Confined Space for material handling.
- Unavailability of Epoxy coated reinforcement.
- Hot weather effect on construction activities
- Late procurement of materials.Changes in Drawings.
- Relocating existing utility services.
- Material Handling issues due to unavailability of overhead cranes.
- Conflict between contractor & client.
- Changes in material specification.
- Additional scope of works.
- Changes in drawings.
- Labor Strike.
- Delay due to Accident.
- Shortage of skilled labors.

#### 3.1 Methods Adopted to Overcome Delay

- Overtime Work.
- Implementing proper inventory control system.
- Proper planning & scheduling for the work.
- Reducing Delays on critical activities.
- ABI requested to provide additional storage space for handling the materials.
- Implementing quality management system for the work.
- Arranging Skilled labors.

#### 3.2 Planning & Scheduling for Saving Time And Cost

##### 1) Planning Construction Labour

The project manpower planning primarily focuses on determining the size of the project workforce, its structuring into functional groups and worker's team and scheduling the manpower. To determine the number of workers needed to perform a given job in the specified time, data-wise forecasting of the workers requirements for accomplishing the project work, and finally, organizing the planned work.

##### 2) Planning Construction Materials

The construction materials involves identifying the material required, estimated quantities defining specifications, forecasting requirements, locating sources for procurement, getting material samples approved and designing materials inventory and development the procurement plan to ensure a smooth flow of materials till the connected construction works are completed at the project site.

##### 3) Planning Construction Equipment

Construction equipment is indispensable in the execution of modern high cost, time – bound massive construction projects. It saves manpower, which is becoming ever more costly and demanding. It improves productivity and quality. Equipment planning for a project aims at identifying the construction tasks to be undertaken by mechanical equipment.

##### 4) Schedule of staff requirements

This schedule assists the head quarters resource department, regional and project team in mobilization in time, required staff fir the project and if necessary in planning new recruitment. It also forms the basis of action plan for demobilization. Here the schedule of Labor requirement for three case studies is tabulated.

##### 5) Schedule of Requirements for Plant and Machinery

This schedule will help in mobilizing in time required plant and machinery from his own/hire as also in planning and procurement of new items. It will also the basis of the action plan for demobilizations. Here the schedule of plant & equipment requirement for three case studies is tabulated.

##### 6) Schedule of Labour Requirements

This Schedule will help in stage wise mobilization of labour, particularly skilled workmen like Mason, Carpenter, Bar bender etc. and in ensuring that there are no abnormally high peaks or through in labour requirement resulting. The various labour required for the three case studies is tabulated.

##### 7) Schedule of Material Requirement

This schedule will indicate approximately the total quantity of all essential materials (such as aggregates, cement, structural and reinforcement steel, formwork materials, timber etc) to be produced. Ensure sufficient lead-time for procurement of materials at best possible prices/ terms and avoid emergency purchases. Complete material requirements month wise for each items as per breakup of quantities. Here the schedule of material requirement for the three case studies is tabulated.

### 4. Recommendations for Saving Time and Cost

Since the time and cost overrun and its control is extremely vast and complex subject which requires in-depth studies and it also requires a sound knowledge of other specialized subjects like. Financial Management, Risks Management, Legal Frameworks for Construction, Project Management and others, it becomes difficult to suggest any solution to minimize the overruns. However, the foregoing analysis of the reasons for time and cost overruns definitely provides some clues for the remedial steps. These can be listed as follows:

##### 1) Better Formulation and Appraisal of Projects

Investment decision on a project should be undertaken only after full investigation, collection of data, analysis and crystallization of the concept. The appraisal system also needs to be made more effective for checking the data, questioning under- estimates and unrealistic assumptions. For this purpose, suitable databank for project analysis containing data about other similar projects (past and present) should be developed. Evaluation studies of completed projects should also help in developing this data bank. Once final investment decision after sound appraisal is taken, no significant change in project concept, location, technology and scope should normally be permitted.

##### 2) Sound Implementation Planning

Sound implementation planning is a pre-requisite for effective implementation. Realistic, resource-based implementable plans can be formulated by using techniques such as PERT/CPM and estimating activity times, linkages and resource requirements realistically through an interdisciplinary group-process where experiences of many persons is pooled together. Here also a data bank on similar projects (past and present) would be useful. Good computer software packages are available for project planning with PERT/CPM, equipment scheduling, manpower planning, cost optimization and control, monitoring etc. which could

be effectively used. With sound implementation planning after proper project formulation more than half of the battle is won.

### 3) Advance Action

Even after the government approval of the project, there may be many clearances required from various government agencies, in order to save time, there may be one or more 'Empowered Committees', consisting of the secretaries or senior officials from concerned ministries, which may give some of the necessary clearances. Some major projects, for which such committees were constituted, were successful in minimizing time and cost over-runs.

### 4) Assurance of Funds

Resources Once a project is approved for investment and 'go ahead' is given, funds should be committed to meet the requirements (both for the project and for the inter-linked activities/projects of other agencies on which it is dependent) as determined from the programme of work projected by resource-based network. It may be advisable to determine year-wise requirement of funds for all projects under implementation for the whole plan period, which may be updated at each annual plan. Similarly, year-wise requirements for key materials like cement; steel can also be worked out in advance which should be committed by the respective allocating agencies, till the completion of the project.

### 5) Better Contract Management, Penalties and Incentives

Since in majority of projects, execution is through contracts, their proper management is a key to minimize time and cost over-runs. The contract planning (both for works and equipment supplies) has to be linked closely to resource-based implementation planning of the projects. Contractors and suppliers should be bound to give their resource and time plans integrated with project plans (based on PERT/CPM) and follow them. Each contract's dates should be as per the detailed network. There should be close follow-up and interaction. Existing penalties and incentives need to be considerably enhanced so that contractors are also interested in on-time performance. Where delays are anticipated, project authorities should be able to off-load contracts (partially or fully) to other parties (either within the country or abroad) well in time.

Target cost contracts with incentives for savings should be encouraged to minimize time over-runs. Where consultants are used for planning, awarding and following up the contracts, the effectiveness of consultants in contract management should be properly evaluated. 'Expeditors' from project authorities or consultants can be helpful in watching progress, expediting deliveries and giving advance warnings, as they will be stationed at or visiting the suppliers' shops. Contractors should be considered as partners in project execution and help should be provided in solving their genuine problems, as otherwise project execution will be help up.

### 6) Monitoring

A simple and effective monitoring system is essential to identify and anticipate the deviations from implementation

plan, analyze the underlying problem areas and suggest corrective action. Anticipation is important from the point of view of preventing or overcoming the problems before they occur or taking alternative steps to minimize their impact on project time and cost. A good data bank on implementation of activities of this and other similar projects (past and present) could greatly help in the monitoring process. Over-monitoring should be avoided as it leads to unnecessary paper work, tying up of project manpower resources and viewing of monitoring as an end in itself rather than as means to achieving the ends. Emergence of 'Project Monitoring', as a specialized profession should be encouraged. The objective of external agencies, which are monitoring the performance, should also be to provide help in solving problems rather than finding faults. Joint 'Monitoring groups' can be established, which may consist of representatives of the project as well as inter-linked agencies and the parties concerned. The groups could monitor and review the progress of the complete system -the project and the inter-linked activities/projects.

### 7) Management Techniques, Systems, Incentives

Industrial engineering and management techniques such as method study, value engineering, etc., can help in reducing time duration of activities and giving up of unnecessary items/activities. Over-specification can be avoided so that the costs can be reduced. The project organisation should be distinct, separate from operation side, complete with all functions, under the charge of one competent project leader and with all responsibilities clearly defined. There should be full delegation to project leader and his team and down the line. Human side of project management is an important (if not more) as the quantitative techniques and attention to inter-personal skills, interaction, human resources development etc. is important from the very initial stage. After all, implementation of a project is a group or team effort.

It is the effectiveness of this team effort, which will determine the success of the project. The consciousness to adhere to time and cost schedules is to be generated at all levels. In the projects which were successful in meeting their time cost targets, the core project management team, starting from the top person, had full commitment and made it a mission or a goal to complete the project within its time schedule/cost, whatever may be problems and they achieved this. This spirit should also be followed up with incentives (in the form of rewards/promotions, recognitions etc.) for those who achieve time and cost targets and punishment for those who fail badly, and this linkage between project performance and incentives/punishment should be clearly visible. The core project team should be properly chosen and placed preferably during the formulation stage and thereafter it should stay till the completion of the project. Changes in the team, particularly, the project leader, should be made only in exceptional cases.

## 5. Conclusion

- Most of the projects are facing the problem time and cost overrun in construction projects. Many projects are suffering because of delay from the part of the client to supply of some of the material which as part of the

contractual agreement they have to supply to the contractor or delay in settling Running Account bills.

- These problems together with other problems such as delay in getting clearances and other problems listed above makes it more difficult to complete the project on time and within planned budget.
- Even then, the use and implementation of better project management and management techniques can improve the situation and can lead to achievement of more growth and development to the economy as a whole.
- Construction project are frequently influenced by delay factors leading to cost overrun of project. This study investigated the factors leading to constructional delays and which factors mostly affects the cost of construction project.
- Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. However, it is rarely happen that a project is completed within the specified time.
- Time and cost overruns occur in every construction project and the magnitude of these delays and cost overruns varies considerably from project to project. So it is essential to define the actual causes of time and cost overruns in order to minimize and avoid the delays and increasing cost in any construction project.
- Delays can be avoided or minimized only when their causes are identified. So main aim of the project is to identify of delays that could threat project objectives in construction projects.

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