

## Study of Cost Control in Construction Projects

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**Abstract**— This paper will give a brief presentation about study of Cost control of construction project and the methodology about the specific process of applying the method in cost accounting and cost forecasting. It also provides certain aspects of cost overrun. In India the number of building construction projects is increasing however, these projects are not completed in allocated time and cost. We tried to find information on the factors that cause cost, overrun during construction and their effects on building construction projects. The important causes of cost overrun were found to be inflation or increase in the cost of construction materials, poor planning and coordination, change orders due to enhancement required by clients, excess quantity during construction. With the help of available literature we found out major causes of cost overrun. The attainment of effective cost control measures for development projects is a prerequisite for the successful completion of such projects, which are vital for the country's socio-economic advancement.

**Key words:** Construction, Cost Control

### I. INTRODUCTION

The Indian construction industry is an integral part of country's economy and its growth and a conduit for a substantial part of India's development investment. Successful management of construction projects is based on three major factors i.e. quality, cost & time. Time and cost are the lifelines of every project. The success or failure of any project depends highly on cost and time apart from its quality. Now-a-days Construction industry is facing severe problem of poor cost management resulting in huge amount of cost overrun. Socio-economic growth of a country largely depends on construction industry as it provides necessary infrastructure such as hospitals, schools, roads and other basic and enhances facilities.

In the construction sector, the aim of control the project is to ensure the projects finish on time, within approved budget and achieving other properties & objectives of project. It is a very complex task undertaken by project managers in practice, which involves constantly measuring progress; evaluating plans; and taking corrective measures when required. In many construction projects, project managers and contractors find difficulties like poor planning of project, poor material, poor communication, labour shortages, increased cost of material, delays in deliveries, wastage of material, unexpected weather changes, lapse in management and control, over budgeting etc. This results into time and cost overruns, conflicts in project. So there is need to study costs included in projects and to identify cost reduction or cost control techniques for carrying construction projects efficiently & effectively. Reduction of cost of construction is a constant goal for construction industry. One way of reducing construction

cost is to develop methodologies to increase productivity. Due to cost reduction techniques cost of project is managed so that contractor does not suffer losses while carrying different activities of projects. Cost overruns are very common in the construction industry. Hardly few projects get completed within original approved cost. The Construction industry of India is an important indicator of the development as it creates investment opportunities across various related sectors. The successful execution of construction projects and keeping them within estimated cost and prescribed time depends on a methodology that requires engineering judgment. Therefore, improving construction efficiency by means of cost-effectiveness and timeliness would certainly contribute to cost savings for the country.

### A. Problem Statement

Construction can be considered as a dynamic industry which is constantly facing uncertainties. These uncertainties make the management of costs difficult which consequently causes cost overruns. Therefore, cost overruns are considered one of the most critical issues during the execution of construction projects.

### B. Objectives of the Study

The main objectives of the research are as follows:

- 1) Questionnaire Survey.
- 2) Identifying the main causes of cost overrun and their overall effects for buildings construction projects.
- 3) Identifying the related responsible party to the causes of cost overrun.
- 4) Forwarding recommendations to minimize or to avoid cost overrun and frequency of its occurrence.
- 5) To identify cost control technique frequently used in construction projects.

### C. Common Causes of Cost Overrun

Major causes of cost overrun are as follow:

- 1) Inadequate project formulation: project information, bad cost estimates, Poor field investigation, inadequate lack of experience, inadequate project formulation and feasibility analysis, poor project appraisal leading to incorrect investment decisions.
- 2) Lack of proper contract planning and management: Improper pre-contract actions, poor post-award contract management.
- 3) Poor planning for implementation: Inadequate time plan, inadequate resource plan, inadequate equipment supply plan, inter-linking not anticipated, poor organization poor cost planning.
- 4) Lack of project management during execution: Insufficient and ineffective working, delays, changes in scope of work and location, law and order.



Fig. 1: Causes of Cost Overrun.

#### D. Significance of the Study

This study will be of importance to building professionals and the general public because it would not only clarify but also create awareness of the extent to which inadequacies in cost control techniques can adversely affect project performance. The study will also help contractors, clients, consultants and all parties involved in construction projects about ways of improving their current method of cost management and control.

## II. LITERATURE REVIEWS

Urmila A Mahadik [1] carried out study of cost reduction techniques in construction projects. Author had studied first what are the factors affecting the construction cost and some cost reduction techniques. Author has discussed that using cost control techniques by value and economy are improved through alternate design concepts, material and construction method without compromising quality and functional requirement, also concluded that different management techniques during the execution of project plays important role in saving cost as well as time.

Smiritee Srivastava et al. [2] studied project cost overrun in infrastructure project. Also discussed on a study conducted by infrastructure and project monitoring division of ministry and programme implementation report on ongoing projects, and found that cost overrun of 28.6% in that projects. Authors identified major causes of cost overrun like poor time management, increase material cost, machine and equipment prices, wrong estimation and estimation method are major causes of cost overrun.

Anant Narayan Shete et al. [3] has discussed on analysis of cost overrun and time overrun of construction project. Author had studied about causes of time overrun and causes of cost overrun. Author has worked on data collection and analysis section which is based on the results of projects. After study and discussion authors had suggest some points that minimizes cost overrun in construction projects.

Pramod M et al. [4] focussed on the construction industry due to excessive cost escalation project delays and underperformance. The absence of a well-established effective system for monitoring and controlling project cost is the main reason for cost escalation and delays in the project. Author studied Earned Value analysis and Earned

Schedule concept as the two monitoring systems which can be used to monitor a construction project has suggest stronger picture, managers can create risk mitigation plans based on actual cost, schedule and actual development of the work.

C.I. Anyanwu [5] has discussed about the various parameters regarding the cost such as budgeting, cost monitoring and control systems. he discuss about the cost control and the cost control parameter in material, labour, equipments etc .As per the author concept of budget can be define as the translation of an organizational plan into concrete form by way of resource allocation in form of cash. He discuss about the various tools used by the management and cost supervisors for planning, controlling, and monitoring of project such as Gantt chart, network analysis, CPM, PERT. Main focus of author is to study the manufacturing philosophy and inputs which contributes in evaluating and maintaining construction cost in order to reduce the project abandonment which is caused due to cost overrun. Author suggest techniques like organization, supervision, implementation and control are equally applied on already plan so as to make sure that there are no deviations on the original master programme to reduce or eliminate the cost of projects.

T. G. K. Vasista [6] had discussed large construction projects scope, time, cost and quality as process success parameters and how specifically the cost element would influence the project success based on applying the CRASP methodology concept. Author focused on principles or standards by which judgment is made; whereas factors are the set of circumstances, facts or influences which contribute to the result. Two broad criteria to determine the macro viewpoint of project success are: completion and satisfaction. Author conducted different methods would essentially keep the project to analyze it to derive the scope of conducting cost-benefit analysis by properly tuning the project success.

T.Subramani et al. [7] discussed that the main objectives of this paper are to identify and analyze the causes of cost overrun in construction. The results carried out from survey showed that, poor contract management, slow decision making, poor schedule management, increase in material/machine prices poor design/ delay in providing design, rework due to wrong work, long period between design and time of bidding/tendering and wrong estimation/ estimation method are the major causes of cost overrun.

Dr. Subramanian K. et al. [8] has studied Time overruns and cost overruns a major issue in many Indian construction projects. The objective of this paper to study significant factors causing Time overruns and Cost overruns in Indian construction projects. The result accomplished from the survey revealed that the major cause for time overruns are contract modification, material market rate, and high level of quality requirement and the major cause for cost overruns are change in material specification, high transportation cost, and escalation of materials price.

C. Sarma, Hoijat Adeli [9] the objective of this paper is to optimize cost of concrete structures involves beams, slabs, columns, bridges, water tanks, frame structures, tensile members, folded plates, and shear walls, pipes. One method for Optimization Using Reliability Theory is explained. From the study the authors concluded

that there is a need to perform research on cost optimization of realistic three-dimensional structures, especially for the large structures with number of members where optimization can result in substantial savings.

A.S. Ali et al. [10] as per the author for management of construction 4 parameters important are as follows: scope, cost, time, and quality. The main aim of the author is to find out the problem or parameters which contribute for the cost overrun. For this they carried out the quaternary survey on the live projects. For the data analysis the method used is quantitative based i.e. descriptive statistics and ranking analysis is used. From the investigation they found that factors which contributes to cost overrun was inaccurate or poor estimation of original cost and factor which don't affect is mistake in design for this to control the construction cost method suggested by the author is proper costing and financing.

### III. METHODOLOGY

#### A. Details of the Questionnaire Survey

In these section the questionnaire survey which was used to get the opinion of major contractors in the construction industry. This will present the results on the causes of cost overrun on the basis of their opinion. The causes are ranked and arranged on the basis of probability of occurrence, severity of impact and overall importance. The results of the questionnaires are presented and analysed in the subsequent sections.

#### B. Questionnaire Survey Response Rate

For the purpose of getting information on the causes of cost overrun, questionnaires were distributed to clients, consultants and contractors. A total of 30 questionnaires were distributed to representatives of consultant and contracting organizations in the construction sector & 24 questionnaires were filled and returned.

From the Questionnaire Survey the major Causes of Cost Overrun:

- 1) Lack of effective site management and supervision.
- 2) Lack of project planning and scheduling.
- 3) Use of inexperienced subcontractors.
- 4) Lack of good suppliers.
- 5) Use of inappropriate construction methods.
- 6) Lack of co-ordination between parties.
- 7) No pre construction planning of project tasks.
- 8) No pre planning of resources needed.
- 9) Lack of support from the labours.
- 10) Lack of skilled labours.
- 11) Improper communication between contractor and labours.
- 12) Poor quality of materials late delivery.
- 13) No timely payments to labours.
- 14) Ignoring items of abnormal rates during evaluation.
- 15) Delays in issuing information to the contractor during construction stage.
- 16) Lack of effective site management and supervision.
- 17) Delay in material approval by consultants.
- 18) Low productivity by labours.
- 19) Insufficient number of staff.
- 20) Absence of consultant's site staff.
- 21) Equipment and tool storage on site.
- 22) Poor material handling on site.

- 23) Lack of maintenance of equipment.
- 24) Additional work at owner's request.
- 25) Poor economic conditions.

#### C. Frequently Used Methods

##### 1) Work Programmes:

Contractor has to prepare and use schedules to monitor progress and financial performance of project.

##### 2) Inspection of Works:

Inspection of works is carried out & comparison is made on the budget of project.

##### 3) The project Budgets:

Cost attached with responsibility centres along with work targets to be accomplished.

##### 4) Site Meetings:

Meetings held to check & review the progress of work and compare it with the monetary allocations.

##### 5) Record Keeping:

Documentation work of activities carried out to enable early detection of variation from the set standards.

##### 6) Monitoring Work and Cost Performance:

Consultants and the contractors used monitoring tools of schedules, budgets, inspection & feedbacks to keep a watch on the cost performance of project.

##### 7) Evaluation of Works Carried Out:

Quantification of works and comparing with the costs in the bill of quantities. Inspection was also reportedly used to evaluate works.

### IV. TIME & COST OPTIMIZATION WITH NETWORK ANALYSIS

There is availability of various techniques for optimization and project control software, still many construction projects do not achieve their cost and time objectives. The basic scheduling techniques commonly used in practice include the Critical Path Method (CPM) & Program Evaluation Review Technique (PERT)

#### A. Critical Path Method (CPM)

Critical Path Method (CPM) was developed to optimize the organization of complex procedures of an activity network and also to identify critical activities in a network critical path. Because activities in the network can be carried out in parallel, the critical path is the length of the longest path from the start of project to its finish. An activity is said to be critical if there is no delay in determining its start and finish times. Once the duration of all the activities is estimated, the project duration can be calculated with CPM, the project duration is the sum of the durations of all activities on the critical path.

#### B. Program Evaluation and Review Technique (PERT)

Since uncertainties such as inclement weather, unforeseen site conditions, poor labour performance, inadequate resource allocation, low equipment performance and inferior management style incurred during a construction process, it could be difficult to estimate activity durations correctly. Program evaluation and review technique (PERT) was originally designed to orient time elements of a project and adopted probabilistic time estimate to determine the probability that a project could be completed by a given date. This method uses weighted values of three time

estimates: i.e. pessimistic, most likely and optimistic duration to estimate the mean and variance. The expected mean values then are used to determine the mean critical path.

- 1) Optimistic time (O): the minimum possible time required to complete a task, assuming condition that everything proceeds better than is normally expected
- 2) Pessimistic time (P): the maximum possible time required to complete a task, assuming condition that everything goes wrong (but excluding major catastrophes).
- 3) Most likely time (M): the best estimate of the time required to complete a task, assuming condition that everything precedes as normal.

The best estimate of the time required to complete a task, accounting for the fact that things don't always proceed as normal

$$TE = (O + 4M + P) \div 6$$

## V. CONCLUSION

This study is conducted to investigate the cost overrun in building construction projects from consultants' perspective through a questionnaire survey. The analysis of the participants' responses reveals that the cost overrun in building construction projects is a severe problem.

Based on the study findings, the following points are suggested in order to minimize and control cost overrun in building construction projects.

- 1) Paying a lot of attention to project planning.
- 2) Material prices and labour rates should be updated continuously.
- 3) Sufficient time should be given for preparing feasibility studies, planning, design, information documentation and tender submission. This helps avoiding or minimizing late changes.
- 4) Attempt to stay within the scope that was originally planned.

The issue of cost overrun in any sort of projects is a long standing one Researchers, therefore, always pay keen attention through the identification of major causes of cost overruns in order to reduce the impacts. However, most of the projects especially residential projects encounter various issues which delays the project and leads to increase in cost i.e. cost overruns. The purpose of these is to identify major causes leading to cost overruns in residential building. The study then aims to suggest possible solutions to deal with such concerns.

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