

Cost Control in Residential Construction Management

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Abstract— My current idea of doing this project stems from the belief that there is a need for those individuals who use the services of the construction industry, and those that are engaged in one or other facets of it, to be involved with cost and its implication. Not only is there a need to be involved with the cost that concerns their own particular, perhaps limited participation; but also to have an understanding of the ways and forms in which other parties to the construction process need to have information about cost in order to operate on a sound and efficient commercial basis.

One of the reasons why cost overrun and delays occurs in majority of construction projects in India is the absence of a good cost control mechanism for different parties involved in a project, namely the owner, the contractor and the client's consultant. Our thesis, therefore attempts to look at a wide range of aspects of the control of cost from the point of view of the potential owner of a constructed asset through the financial feasibility studies for the investment, then through the design and, ultimately, the control of the cost of the work on a side both from the point of view of an owner and the contractor or a group actually constructing the facility.

Our current work will include the various control processes so that the reasons for the different views that are taken can be understood. It draws attention to the fact that if one party to the construction saves some money by a particular device, then it can cause another party to incur the equivalent amount of cost elsewhere. Our current study would contribute to each party involved in a construction project making proper allowance for the cost that they will incur. It is important too that each participant to the process understands the various sensitivities that project cost has relation to the activities in which they are engaged and the possible consequences of changes in established cost of the work proceeds.

Our work will include suggesting practical approaches to the cost control in construction project only during the execution phase. This analysis will include a feedback collected through questionnaire from contractor's point of view. For gathering information, we have used primary methods of data collection through a series of meetings, site visits, and telephonic conversations with reputed construction companies.

Keywords- Cost Control in Residential Construction Management

1. INTRODUCTION

1.1 GENERAL

The cost control is a process that should be continued through the construction period to ensure that the cost of the building is kept within the agreed cost limits. The cost control can divide into two major areas; the control of cost during design stages and the control of cost by the contractors once the construction of project has started. According to Nunnally (1998), cost control of a project involves the measuring and collecting the cost record of a project and the work progress. It also involves the comparison of actual progress with the planning. The main objective of cost control of a project is to gain the maximum profit within the designated period and satisfactory quality of work.

The main aims of the cost control are probably:

- To give the building client good value for money- a building which is soundly constructed, of satisfactory appearance and well suited to perform the functions for which it is required, combined with economical construction and layout
- To achieved a balanced and logical distribution of the available funds between the various parts of the building. Thus, the sums allocated to cladding, insulation, finishing,

services and other elements of the building will be properly related to the class of building and to each other.

There is a need for strict cost discipline throughout all stages of stages of design and execution to ensure that the initial estimate, tender figure and final account sum are all closely related. This entails a satisfactory frame of cost reference (estimate and cost plan), ample cost checks and the means of applying remedial action where necessary (cost reconciliation).

1.2 OBJECTIVES

The objectives for this research are:

- To study the cost control method in a construction project.
- To identify the cost control method frequently used by contractor during the construction stage.
- To identify the main problem faced by the contractor in controlling the costs on site.

1.3 SCOPE OF STUDY

The study is carried out in Pune city in the state of Maharashtra and involves the contractor's point of view. Due

to the limitation of time, the study only covers during the construction phase and not in bidding and design phase.

2. LITERATURE REVIEW

2.1 Introduction

The cost control is a process that should be continued through the construction period to ensure that the cost of the building is kept within the agreed cost limits. All expenditure limit control must be related to the functional requirements of the particular building type, but it is perhaps less obvious that functional cost limits may be expressed in a variety of units.

2.2 STATEMENT OF FACTS & VIEWS OF PROMINENT AUTHORS IN COST CONTROL

1. Bent Flyvbjerg

(Department of Development and Planning, Aalborg University, Aalborg, Denmark)

Bent obtained the results from the first statistically significant study of the causes of cost escalation in transport infrastructure projects are presented. His study is based on a sample of 258 rail, bridge, tunnel and road projects worth US\$90 billion. The focus is on the dependence of cost escalation on:

- The length of the project-implementation phase,
- The size of the project and
- The type of project ownership.

6. Mueller (1986) states that the cost control is the ability to influence the final cost of project positively with modifying negative performance trends.

7. Austen and Neale (1984) states the main purpose in cost controlling for a construction project should be active controlling of final costs for owner, and not just to record and registering the payment.

2.3 SUMMARY

This shows that the project cost control and management is a decision-making from the investment accounts to the completion of the process of management, any link would be indispensable. In order to achieve the desired investment objectives, give full play to investment returns, only the entire process of construction to achieve the purpose of cost control. Control project cost not only to prevent breakthrough investment limit, meaning a more active is to promote the building, construction, and design units to strengthen the management of human, material and financial resources, such as limited resources can be fully utilized to obtain the best value for money and social effectiveness. Therefore, to do the project cost control and management, to ensure and accelerate the economic development of great significance.

3. COST CONTROL CONCEPT

3.1 INTRODUCTION

Cost control is equally important to all companies, regardless of size. Small companies generally have tighter monetary controls because the failure of even one project can put the company at risk, but they have less sophisticated control techniques. Large companies may have the luxury to spread project losses over several projects, whereas the small company may have few projects. In this chapter, we shall see the techniques available to the cost control and the steps included in controlling the same. Cost control is not only "monitoring" costs and recording data, but also analyzing the data in order to take corrective action before it is too late. Cost control should be performed by all personnel who incur costs, not merely the project office. Cost control implies good cost management, which must include:

- Cost estimating
- Cost accounting
- Project cash flow
- Company cash flow
- Direct labor costing
- Overhead rate costing

3.2 COST RELATED ISSUES

In these days where "Rising Costs Loom for Construction," energy shortages mean higher cost and escalation and multi-billion dollar projects such as oil and gas pipelines, nuclear power plants, and offshore platforms are more commonplace, cost control is becoming even more important for owners and contractors. Some problems and solutions are:

- Materials costing more than estimated.
- Labor costing more than estimated.
- Labor productivity too low.
- Supervision costing three times more than estimated on a cost plus fixed fee job.
- Change orders costing more than estimated.

Solutions:

- Computerized cost accounting and integrated cost control system.
- Unit prices in cost control, etc.
- Good supervision and management.
- Incentive.

3.3 PROJECT DEVELOPMENT PROCESS

The basic aim of an infrastructure project is to implement an economically beneficial improvement whose objectives are determined in terms of technical performance, budget and timescale.

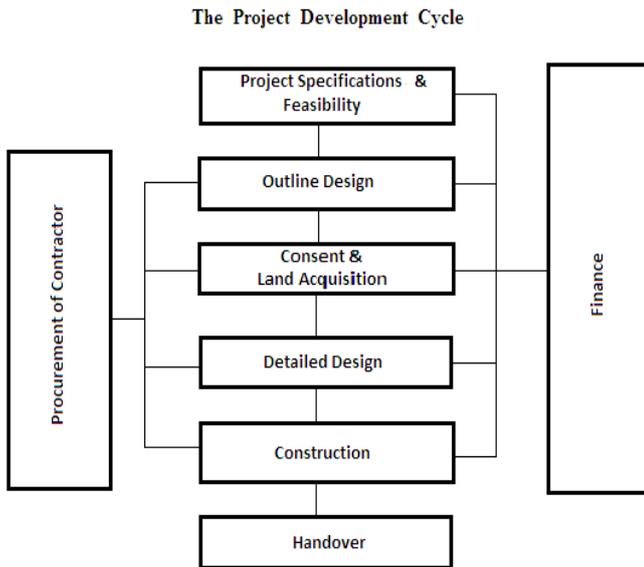


Fig 3.3. Project Development Cycle

3.4 METHODS OF COST CONTROLLING

The purpose of this section is to review ways in which the cost and time management of projects can be improved by risk management and by more realistic estimation of contingency budgets. Whilst this is ultimately the responsibility of project sponsors and their project managers, an understanding of the principles involved should also be of value to desk officers.

- **Risk identification:** what could go wrong?
- **Risk assessment:** it is possible to quantify or at least rank any of the risks?
- **Risk management:** what steps can be taken to mitigate or manage these risks in order to prevent cost over-runs?

3.5 CONCLUDING REMARK

The cost estimation is done before the construction begins while the cost control is performed during the construction period. The organization which controls the cost could be different from the organization which prepares the cost estimate. Moreover, different softwares are available for cost estimation and cost control

4. COST CONTROL SYSTEM

4.1 General

Construction constitutes an important component of development effort under the five year plans in almost all the sectors of the economy. The percentage share of construction in outlays for meeting basic requirements like irrigation, flood control, power, transport and communication etc is significant. Nearly 47.4% of the total outlay in the 11th plan is on construction and the situation is unsightly to be different in the plans to follow.

4.2 ACCOUNTING STANDARDS –07

For construction industries accounting standard-7 is mandatory applicable. In this statement cost is mainly categorized into three heads:

1. Direct cost to contract.
2. Attributable cost contract.

4.2.1 Direct cost to the Contractor:

- a. Site labor cost.
- b. Material cost used in construction.
- c. Depreciation of machinery used for the contract.
- d. Cost of moving machinery and materials to and from contract site.
- e. Cost of hiring machinery for the contract.
- f. Cost of design/technical assistant.
- g. Estimated cost of;
 1. Rectification
 2. Guarantee, including warranty costs.
3. Claims from third party relating to contract.

4.2.2 Attributable Costs:

- a. Insurance on materials/machinery construction overheads.
- b. Interest cost-(if permissible under AS-16

4.2.3 Costs that are excluded from the Contract Costs:

- a. General administration cost for which reimbursement is not specified in the contract.
- b. Selling cost.
- c. Depreciation of idle plant not used for a particular contract.

4.3 COST CONTROL METHOD

It is necessary to decide which control is required and amount of detail that will be entered into the construction stage. Many cost control methods have been used in the past in different companies and have not survived. The cost itself is a major difficulty in operating a detailed cost control system. It is an expensive operation in the time of cost clerks, etc, for a large contract to carry out a detailed cost control system. There are three types of cost control system; they are by comparison with a cost standard, by subdivision by detail and by integration with other functions.

4.4 COST CONTROL AND COST REDUCTION

4.5 Cost Control

4.6 Cost Reduction

4.7 Material Cost Control

4.8 Labor Cost and its Control

4.9 Overhead and its Control

5. MANAGEMENT CONTROL SYSTEMS

Nature and Significance of Control

Controlling implies measurement of accomplishment of events against plans and the correction of deviations to assure attainment of objectives according to plans. Once the plans become operational, control is necessary to measure progress, to uncover deviations from plans and to indicate corrective actions. According to Fayol "Control consists in verifying whether everything occurs in conformity with plan adapted, the instructions issued and principles established. It has an object to point out weaknesses and errors in order to rectify them and prevent reoccurrence. It operates on things, people, action. Goetz puts it, and "managerial control seeks to compel events to conform to a plan".

Principles of Management Control System

Prerequisites of a Management Control System

Tools used in Cost Control

Control Require Plans

Management Involvement

Accounting system of control

Budgetary Control

Budgetary Control and Budgeting

Objectives of Budgetary Control

6. R & D IN THE PARTICULAR AREACOST CONTROL MEASURES

6.1 INTRODUCTION

Adequate control of expenditure is a Pre-requisite to the success of any enterprises, and as the national rate of construction investment continues to rise, it is increasingly important that each contributor to the building process should have the necessary technique and skill to control cost within his part of the process. The cost control is the longest running discipline applied to any project, for it does commence simultaneously with the design process and last until the designers and constructors are long gone and figures are still being counted. The construction project manager is always in constant pressure to limit the cash flow within the estimated budget, yet in most of the cases the client has to pay more.

6.2 THE MANAGEMENT PROCESS

Before technological economics can be applied it is necessary to look at the management process of decision making as a whole in order to understand both the general details of the process and the sequence in which the elements of it will normally be undertaken.

6.3 WHY CONTROL CONSTRUCTION COST

The decision to invest capital in building and civil engineering structures and all types of plant and equipment is taken on the basis of an estimate of capital cost together with the need for

the associated working capital (for raw materials, labor, work-in-progress, product stocks, etc) and sundry other items such as future replacement, repair and maintenance costs. These investment costs are expected to be returned over the life of the asset plus an additional margin by way of return for the investment. It is important, therefore, that the capital cost of the facilities is controlled during design, construction and installation so that the basis of the investment appraisal can be sustained during this phase of the creation of capital assets.

6.4 COST CONTROL AT DESIGN STAGE

6.5 VALUE ENGINEERING

6.6 Cost control during construction

6.7 Changes to Project

6.8 Monitoring System

Reports:

The use of reporting as a tool, by the contractor essentially falls in two areas:-

- Gathering / receiving information and feedback from site office and other relevant departments.
- Gathering the information for the owner's organization (if required) or government.

Gathering / Receiving Information

- Reports should contain all the information, which are essential from monitoring viewpoint.
- Except for the narrative parts, the reporting data should be on standard formats.

Exception Reports

This is an effective method, which can be used for management information by contractor for highlighting the deviations and exceptions in the actual performance against a present program or budget.

6.9 CONCLUDING REMARK

The purpose of physical progress monitoring is to ascertain factual progress of work as per schedule, i.e. whether or not activities and events have been accomplished as originally envisaged.

7. VENDORS ASSOCIATED RESULT AND DATA ANALYSIS

7.1 INTRODUCTION

This chapter reports the analysis of the questionnaire floated to the companies. The major topics in this chapter include the cost control method carried out by contractor during construction stage and identify the problem faced by the contractor in controlling the costs on site. This analysis will focus on contractor and not the rest of the professionals.

7.2 Narrative of the data required

Table 7.1: Breakdown of various groups responding

Sources : Questionnaire

Group	Number of Respondents	Percentage (%)
Developer	1	05.00
Contractor	17	90.00
Consultant	1	05.00
Sub Contractor	0	0
Total	19	100

From the Table 7.1, there are 1 developer (05.00 percent of total respondents), 17 contractors (90.00 percent of total respondents), 1 consultant (05.00 percent of total respondents) and none of subcontractors in it.

7.3 Cost Control reporting System used by the Contractors

There are three types of cost control reporting systems used by the contractors for data analysis; they are:

- Profitability of the work (comparing total expenditure with values of the work done).
- Efficiency of the work (Comparing the standards set with the output rates).
- Unit Costs (Direct costs for one unit or operation of measurement).

There are 13 contractors using the profitability of work as the cost control Reporting System (76.40 % of Total Contractors), 1 contractor using the Efficiency of work as the cost control Reporting System (5.80 % of total Contractors) and 3 contractors using the Unit Cost System as the cost Control Reporting System (17.80 % of total contractors). Fig 7.2 shows the percentage of the types of cost reporting system use by the contractors.

7.4 The interval time of contractors to prepare the cost reports

The contractors prepare their cost reports in three types of interval time; they are weekly, monthly and quarterly for data analysis. There are no contractors who prepare their cost reports weekly, 17 contractors prepare their cost reports monthly (100.0 % of total contractors) and 2 contractors prepare their cost reports on both monthly & quarterly basis (12.0 % of total contractors). Figure 7.3 shows the percentages of the interval time in which contractors prepare their cost reports.

The percentages of the interval time during which contractors prepare their cost reports

Source : Questionnaire

7.5 Problems faced by contractors in controlling the costs on site during Execution

There are 6 problems faced by the contractors in controlling the costs on site for the purpose of data analysis; they are ever-changing environment of construction work (e.g. weather), duration of the project, qualified expertise, additional costs to carry out the system (not beneficial), difficulty in collection of standard data and the shortages of material, labor or mechanical plant. They are all given the equal importance in analysis.

8. CONCLUSION& SUMMARY

8.1 Introduction

Interview and questionnaire is the first source in order to achieve the objectives. Besides, literature review also helps to achieve the objectives. Data analysis using relative index and frequency analysis is explained in Chapter 7.

Overall, the objectives of the study were achieved. The following are the objectives that have been achieved:

- a) To study the cost control method in a construction project.
- b) To identify the cost control method frequently used by contractors during the construction stage.
- c) To identify the main problem faced by the contractors in controlling the costs on site.

The study of the cost control method in a construction project was achieved by literature review. The control method frequently used by contractors during the construction stage and main problem faced by contractors in controlling the costs on site was achieved using the questionnaires.

8.2 Conclusion

From the study that was done, the conclusion of each objective was achieved. The conclusions from the study that can be made are:

Objective 1: The cost control method of a construction project

From the study, three types of cost control methods use by contractor are:

- a) by comparison with a cost standard
- b) by subdivision by detail
- c) by integration with other functions

The main objective of cost control is to minimize and reduce the project costs. Cost control is necessary for all types of project disregarding its sizes. Most local contractors have their own cost control system

Objective 2: Cost control method frequently used by contractors

From the study, three types of cost control methods frequently used contractors are:

- a) Overall profit or loss (overall costs of project compared to the money received)
- b) Unit rates (compare the actual unit rate to the estimate unit rate) and
- c) Profit or loss based on progress payment

Objective 3: The main problems faced by contractors in controlling the costs on site

From the study, the 6 main problems faced by contractors in controlling the costs on site by ranking are:

1. Shortages of material, labor or mechanical plant
2. Difficulty in collection of cost data
3. Ever-changing environment of construction work (e.g. weather)
4. Qualified expertise
5. Duration of the project
6. Additional costs to carry out the cost control system (not beneficial)

The shortage of materials, labor or mechanical plant is the main problem faced by contractors in controlling the costs on site. The duration of the project and additional costs to carry out the system are the least problem faced by contractors in controlling the costs on site.

8.3 Summary

Project cost control aims at controlling changes to the project budgets. Cost control involves processing of cost accounting reports received from various responsibility centers or operating divisions, relating the cost incurred from standards, analyzing the reason for variance, and presenting the result of monitoring to the project management for making decisions for the future. Cost control plays vital role for the success of any project. The critical factors for the success of a project are time cost and performance of an integrated approach is required. The project manager should take proactive as well as time approach to control the cost of project.

Overruns in terms of time and cost are the biggest enemies, pressurizing the performance of budget. Decisions making in projects is crucial and its impact on time and cost should be analyzed with the various tools and due importance should be given to the demanding parameter.

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