



COST CONTROL IN RESIDENTIAL CONSTRUCTION

Pavankumar Mohan Korke¹, Prof. Dr. A. B. More², Prof. Ganesh P Jarad³

¹,PG Scholar) Padmabhooshan Vasantdada Patil Institute of Technology, Bavdhan, Pune, (India)

²,Head of Department of Civil Engineering Padmabhooshan Vasantdada Patil Institute
of Technology, Bavdhan , Pune, (India)

³Padma bhooshan Vasant dada Patil Institute of Technology, Bavdhan, Pune, (India)

ABSTRAC

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.

Keywords: *Cost Control in Residential Construction, Cost Estimation , Cost Control Measures.*

I. 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 Annually (1998),cost control of 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:

- a) 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



b) 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.

c) To keep total expenditure within the amount agreed by the client, frequently based on an approximate estimate of cost prepared by the quantity surveyor in the early stages of the design process.

1.2 Objectives

The objectives for this research are:

1. To survey construction industries for studying and analysing the present practices of cost control methods used in construction projects.
2. To examine how many construction industries use Cost Control Practices.
3. To identify the cost control method frequently used by contractor during the construction stage.
4. To study Different Cost Control Technique and Analyse the Performance, identifying the main problem faced by the contractor in controlling the costs on site.
5. To apply concept of Cost Control & its manifestation for cost reduction in construction projects.

1.3 Scope of study

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

II. 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. Denis F. Cioffi

Director, Project Management Program, The George Washington University)

The so-called S-curve of a project's accumulated costs is given a closed mathematical form that allows specification of a slope and the time at which half the total funds are spent. In addition, a more compact, uniform, and ultimately clearer notation for earned value analysis is presented. Denis like teaching and studying project management because of the strong mix of science and art. More specifically, proper project management practice demands expertise with skills both technical and emotional.

2. Research on Cost Control and Management of Real Estate Project By Qun Gao

(School of Business Administration, Nanjing Institute of Industry Technology, China, December 2009)

This paper takes the cost control and the management of real estate project as the object in research, and analyses and studies relevant issues. By analyzing the cost structure of real estate construction, this paper



identifies problems in cost control and management of real estate construction at present. Besides, this paper puts forward measures for cost control and management of real estate construction, with the hope of offering useful ideas for this issue.

Along with the fast development of China's economy, the real estate industry has achieved wonderful successes, pulling economic development significantly, and contributing a lot to China's economic development. Today, real estate construction assumes more tasks. In 2008, 3,000 billion RMB enters real estate construction. The cost control and regular management of real estate construction turns into the focus. **Problems in Cost Control and**

3. Management of Real Estate Construction

At present, serious problems exist in the cost control and management of real estate construction. For example, for some real estate construction, the design is earlier than the study of feasibility, which makes the later turn into useless. All these activities make the cost of real estate construction out of control in China, which is harmful for the sustainable and healthy development of real estate industry.

The cost control and management of real estate construction is a systematic project. Its success depends on all participators' dedication. The guidance thought for cost control and management of real estate construction is in accordance with the idea of building a resource-saving society in China. This paper is supposed to exert certain effect on China's real estate construction, with the hope of benefiting the cost control and management of real estate construction in future.

4. 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.

III. 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.

3.2 Cost Related Issue

Problems

1. Materials costing more than estimated.

2. Labour costing more than estimated.
3. Labour productivity too low.
4. Supervision costing three times more than estimated on a cost plus fixed fee job.
5. Change orders costing more than estimated.

Solutions

1. Computerized cost accounting and integrated cost control system.
2. Unit prices in cost control, etc.
3. Good supervision and management.
4. Incentive.

3.3 Initial Project Costs and Cost Varying Factors

Following are the key determinants of the cost in a project and cost changing factors in a project:

3.4.1: Key Determinants of Costs

No two infrastructure projects will cost the same amount of money no matter how similar they are. Apart from basic technical factors, the wide range of economic and institutional conditions in different Member States will itself always lead to variations. Nevertheless, the fundamental project costs are based on the actual cost of the land, materials, equipment and labor in the region where the project is being procured.

These basic costs will vary depending upon a number of factors which are given below.

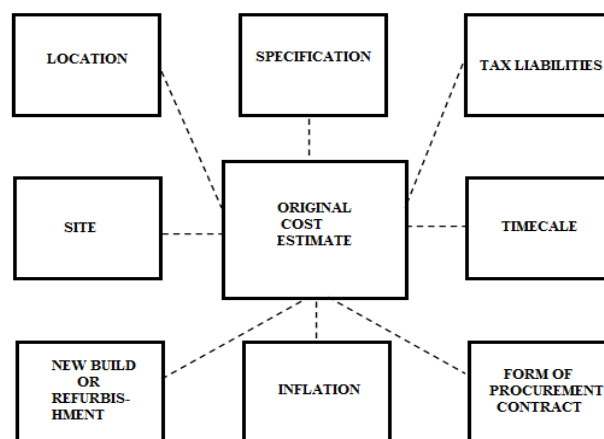


Fig 3.4.1 Key Determination of Cost

3.4.2. Cost Changing Factors

The level of certainty about the final or outturn costs will vary for each of these three situations. Obviously, if an application comes forward very early in the project development cycle, then there is a much greater chance that the project will experience time and cost over-runs. Figure below illustrates some of the factors that result in projects

being delayed or costing more than originally planned.

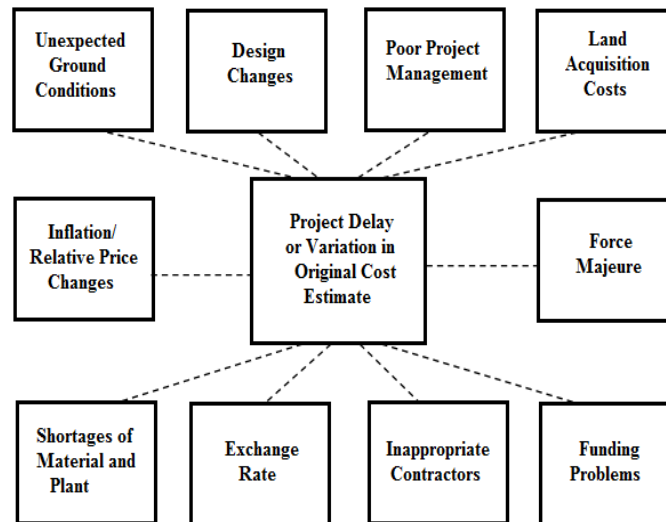


Fig 3.4.2 Cost Changing Factors

3.5 Understanding Control

Effective management of a program during the operating cycle requires that a well-organized cost and control system be designed, developed, and implemented so that immediate feedback can be obtained, whereby the up-to-date usage or resources can be compared to target objectives established during the planning cycle. The requirements for an effective control system (for both cost and schedule/performance) should include:

1. Thorough planning of the work to be performed to complete the project.
2. Good estimating of time, labor, and costs.
3. Clear communication of the scope of required tasks.
4. A disciplined budget and authorization of expenditure.
5. Timely accounting of physical progress and cost expenditures.
6. Periodic re-estimation of time and cost to complete remaining work.

3.6 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 principals involved should also be of value to desk officers.

3.6.1 Uncertainty in Project Costing

The preparation of project cost estimates is a difficult task because construction projects are subject to risks and uncertainties, particularly in the early stages when very limited information about the project is available. Yet, the cost estimates prepared at this stage are most important to the project sponsor because they often form the basis of the bid for funds.



3.6.2 Risk and Contingency Planning

By giving greater attention to which cost determining factors are most likely to change, and why, project sponsors should be able to develop more accurate contingency estimates. This in turn should reduce the risk of cost over-runs.

Although a potentially complex subject, risk management basically involves three quite simple stages:

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

3.7 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 software's are available for cost estimation and cost control.

IV. 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.
3. Cost which is excluded from the contract.

4.2.1 Direct cost to the Contractor

- a. Site labour 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).

Note-as per AS-16 - Borrowing costs that are directly attributable to the acquisition, construction or production of any qualifying asset (assets that take a substantial period of time to get ready for its intended use or sale) should be capitalized.

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 Methods

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 Material Cost Control and Reduction

4.6 Labor Cost Control and Reduction

V. MANAGEMENT CONTROL SYSTEMS

5.1 Nature and Significance of Control

The significance of control emerges from the need to maximize the use of scarce resources and also to attain an orderly systematic and purposeful behavior of an organization and its member. The need of control, arises further from weakness which are inherent in the psychological makeup of individual in the absence of control, an individual tends to allow results to deviate from plans or orders.

5.2 Principles of Management Control System

Control is a managerial function. It is each and every manager's responsibility to design and enforce controls effectively and efficiently. Now, most direct form of control is taken as assurance of the quality of managers that is many deviations in the plan will not occur if the enterprise is well managed.

5.3 Basic Steps In Controlling Process

Regardless of what is being controlled, the following 3 basic elements or phases are observed in the control processes.

- a. Standards
- b. Evaluation
- c. Corrective action

5.4 System Approach - An Overview

The system approach may be defined as logical and disciplined process of problem solving, the word "process" indicates an active ongoing system that is fed by input from its parts .

5.5 Management Information and Control System

"A management information system is a system through which specified data are collected, processed and then communicated in order to support decision-making by those who are responsible for management of resources by providing accurate and relevant information concerning these at appropriate time."

5.6 Prerequisites of A Management Control System

The successful operation of management control system depends upon the presence of the following pre conditions

- a. Controls require plans
- b. Management involvement
- c. Full communication
- d. Accounting system which supports control

5.7 Tools Used in Cost Control

5.7.1 Standard Costing

5.7.2 Budgetary Control

VI. COST CONTROL MEASURES

6.1 Introduction

The cost control is an active function which involve decision-making and besides skill in analysis, a knowledge of forecasting beyond that undertaken in the preparation of the estimate. Cost control monitors a controls cost repercussions of changes in design or construction throughout the life of the project. It should question whether or not systems, subsystems and components within a project are making their best contribution to the project, that the components are cost effective, and that they represent a realistic balance of expenditure within the project.

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**6.4 Cost Control at Design Stage****6.5 Value Engineering****6.6 Cost Control at Tender Stage****6.7 Cost Control during Construction****6.7.1 Changes to Project****6.8 Monitoring Systems****6.9 Concluding Remark**

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

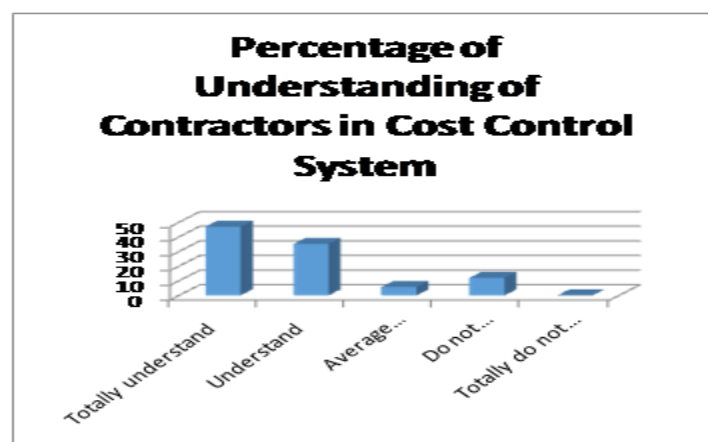
VII. RESULT AND DATA ANALYSIS**7.1 Introduction**

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: Questioner

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

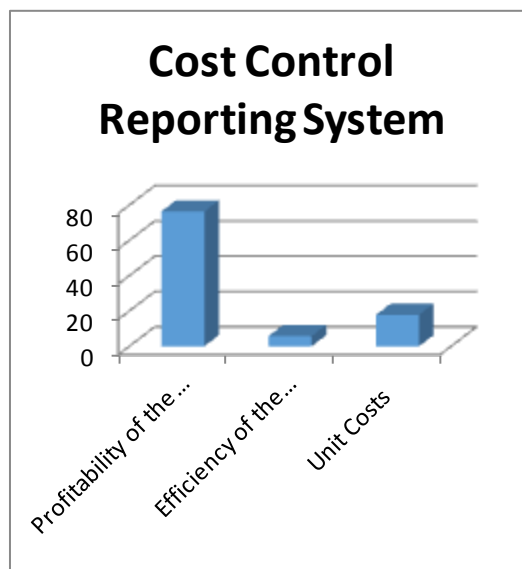
7.3 The Understanding of Contractors in Cost Control System in Construction

7.4 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).

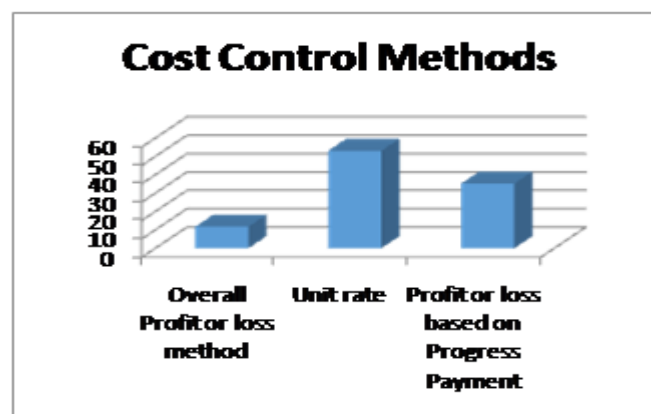
There are 13 contractors using the profitability of work as the cost control Reporting System (76.40 % of Total Contractors), 1 contractor using the Efficiency of work as the cost control Reporting System (5.80 % of total Contractors) and 3 contractors using the Unit Cost System as the cost Control Reporting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



7.6 Cost Control Methods Used By Contractors

There are three types of cost control methods frequently used by contractors for data analysis, namely;

- Overall Profit or loss (Overall costs of project compared to the money received)
- Unit rates (Compare the actual unit rate to the Estimate unit rate)
- Profit or loss base on progress payment..



7.7 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.

Table 7.2: The Relative Index and Ranking of Main Problems In Controlling the Cost on Site.

Problems faced by contractors class F in controlling costs in site	No.of respondents in Ordinance Scale						Relative Index (RI)	Rank
	1	2	3	4	5	6		
Ever-changing environment of construction work	0	6	2	4	1	4	0.604	3
Duration of the project	4	1	2	2	4	4	0.646	5
Qualified expertise	2	4	2	1	4	4	0.625	4
Additional costs to carry out the system	0	2	6	2	4	3	0.646	6
Difficulty in collection of standard data	2	4	4	4	2	1	0.500	2
Shortage of material, labour or mechanical plants	8	0	1	4	2	2	0.479	1

VIII. 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.
- d. The main objective of cost control is to minimize and reduce the project costs.

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, labour 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)

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.

During the execution of a project, Procedures for project control and record keeping become indispensable tools to managers and other participants in the construction process, these tools serve the dual purpose of recording the financial transactions that occur as well as giving managers an indication of the progress and problems associated with 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.

REFERENCES

BIBLIOGRAPHY

- [1] Ahuja, H.N., "Project Management: Techniques in Planning and Controlling Projects", John Wiley & Sons, New York, 1984.
- [2] Alan Webb, "Using Earned Value a Project Manager's Guide", Gower Publishing House, London 2003.
- [3] Austin, A.D., "Managing construction Project", John Wiley & Sons, Inc., United States, 1992.
- [4] Barrie, Donald, "Professional Construction Management" McGraw-hill Inc, 1984.
- [5] Bill G. Tompkins, "Project Cost Control for Managers", Jaico Publishing House, Mumbai, 1991.
- [6] Chit kara K.K., "construction Project Management", Tata Mc-Graw-hill, New Delhi, 2005.
- [7] Choudhury S, "Project Management", Tata Mc-Graw-hill, New Delhi, 1988.
- [8] Collier, Keith., "Fundamental of Construction Estimating and Cost Accounting" Prentice-Hall Inc., Englewood Cliffs, N.J, 1974.
- [9] Davies Michael, "project Management", Published in Association with Harbridge Consulting Group Limited, 2002.
- [10] Eur Ing Albert Lester, "Project Planning and Control", Butter Worth & Co, publishers Limited, London, 2003.
- [11] Harvey Maylor, "Project Management", Pitman Publishing, London, 2001.
- [12] Kharbanda O.B, "Project Control in Action", Gower Publishing Co., Hampshire, London, 1980.
- [13] Kwakye, A.A, "Construction Project Administration In Practice", Addison Wesley Longman Limited, p186, 1997.
- [14] Lock Dennis, "Project Management Handbook", Gower, London, 1987.
- [15] Lucey, T., "Costing", Continuum, London and New York, 1996.
- [16] Muller, Frederick Wm, "Integrated Cost & Schedule Control for Construction Projects", Van Nostr and einhold Company, New York, 1986.
- [17] Nagarajan K., "Project Management", New Age International Publishers, New Delhi, 2004.
- [18] Nunnally, S.W., "Construction Methods and Managements", Prentice-Hall, Inc., New Jersey, p 501, 1998.
- [19] Oxeley R & Poskitt J., "Management Techniques Applied to the Construction Industry", Blackwell Science Ltd., 1996.
- [20] Parker, H.W., "Methods Improvement For Construction Projects", Litton Educational Publishing Inc., United State, 1988.
- [21] Patel Bhavesh M., "Project Management", Vikas Publishing House, New Delhi, 2003.
- [22] Paul C. Dinsmore, 'A guide to Project Management Book of Knowledge', an American National Standard, Pennsylvania, 2000.
- [23] Peters, Glen, "Project Management and Cost Control", construction Press, London, 1981.
- [24] Quades, E.S., "A history of cost-effectiveness", Rand Corporation Report, P-4457, 1971.