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STUDY ON FACTORS AFFECTING COST MANAGEMENT OF CONSTRUCTION PROJECTS

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ABSTRACT: Construction sector is an important sector in developed and developing countries and affects other sectors in direct and indirect ways. Therefore, special attention should be given to control and manage it wisely particularly in the aspect of cost management. Cost management is one of the important factors determining project complete successfully within limited time with reasonable profit. Construction companies are the main stakeholders in the construction sector and the main agents to meet the needs of the sector. They carry out the construction of public or private projects, which require efficient management and coordination to maximize resources and ensure the continuity of works and revenues. These companies mainly depend on the results of the projects contracted for their survival, growth, and generation of an adequate amount of profits. Therefore, contractors should focus on various project portfolio management processes to achieve the project goals, of which the project cost management process is the most essential and common problem in the whole construction sector. However, the management of construction costs has become more complicated with the introduction of new acquisition methods, technologies, resources and various professionals involved in a project, Pereira and Imriyas (2010).

INTRODUCTION:

Most national contactors are characterized by the lack of an adequate financial management system, and the lack of management of these projects will lead to insolvency which weakens their organizational capacity. The number of contractor failures in the construction sector is known to be much greater than it should be. As the study shows, the high failure rate is not due to the fact that contractors are unfamiliar with construction techniques but have not developed the necessary administrative skills. In accordance with the guidelines of PMBOOK (2013), the cost management of the project mainly deals with the cost of the resources necessary to complete the planned activities of the project during the execution phase, and this includes the costs of use in the tender's contract, in the construction, maintenance and support of the project results.

COST MANAGEMENT

Cost management can be defined as a strategic process that stresses the optimization of efficiency and focuses on the customer and on profitability, it is "a philosophy", "an attitude" and "a set of techniques" to create more value at lower cost, that consisting of six steps including: Understanding of what causes the cost and revenue structure of the business, Understand and reduce inter-functional complexity, Provide the tools to manage costs, Involve employees in decisions, Increase effectiveness and continuously improve costs, Measure decisions against the strategic business plan

Cost Management in Construction Project

Cost management involves controlling the project's expenses while ensuring the scope of all deliverables is maintained. The cost management process (CMP) is crucial for overseeing and regulating project expenses from start to finish, including ideation, development, design, execution, final payment, and project closing. Cost management is interdependent with time schedule and quality and cannot function autonomously. Cost and scheduling are intimately interconnected since they both utilize a significant amount of shared data in their management processes. Cost management involves resource planning and estimating. Efficient allocation of resources such as labor, capital, equipment, and materials, with a focus on time management, is likely the optimal approach to cost control.

Construction cost management can be applied throughout the entire construction process, including planning, estimating, designing, tender bidding, materials buying, machinery usage, financial allocation, budgeting, and monitoring of men and materials handling. Cost is the primary resource of the project. Cost overrun happens when

the project manager fails to efficiently handle project operations from start to finish. Poor coordination among the client, architects, project managers, contractors, and engineering team can lead to cost overruns. According to Darshi et al. (2001), construction coordination plays a crucial role in the building process. Effective management is crucial for the construction business. Chua (1999), Chalabi (1984), and Ahuja (1980) also mentioned that the construction industry faces challenges related to inefficient time, cost, and quality management practices, communication issues, and the performance of the project manager, which result in project delays and cost overruns. Many Indian contract companies, with the exception of a few large ones, struggle to meet their planned program when executing work on-site. Identifying problem areas and coordinating projects are crucial functions in the construction process. Charlel et al (1990) found that larger projects are more prone to have a cost overrun rate of 1 to 11% compared to smaller projects. Throughout a building project, there are various stages and activities that occur from beginning to end, both in terms of quantity and quality. This study focuses on conducting both quantitative and qualitative assessments. Cost Management involves arranging the allocation of resources such as people, materials, and equipment for project tasks. Project Cost Management focuses on the expenses associated with the resources required to carry out different project activities.

Cost management procedures are being used in Indian industry due to increasing awareness of cost issues (CII 1994, Dissanyaka 1999). Efficient project managers are necessary for effective cost management of diverse tasks. An advanced Project Cost Management technology, together with expertise in all management knowledge areas, is crucial for effectively controlling costs in a building project. Project Managers are essential stakeholders in a Construction Project and are evaluated through qualitative analysis. Project Management Consultants play a crucial role in the construction business (Gandage 2007). Okpala et al (1988) found 20 variables that may lead to delays and cost overruns, as well as seven variables that could cause construction costs to escalate without generating delays. Quantitative and qualitative analyses were conducted in this research by collecting data through survey questionnaires and personal interviews to identify gaps in selected project process levels.

COST ESTIMATING ON BUILDING PROJECTS

Cost management is the total process, which ensures that the contract sum is within the client's approved budget or cost limit. It is the process of helping the design team design to a cost rather than the QS costing a design. The basis of the design cost control using the cost-planning technique is the analysis of existing projects into functional elements in order to provide a means of comparison between projects planned with data from existing projects. A building element is defined as part of a building performing a function regardless of its specification. Elemental analysis allows the comparison of the costs of the same element to be compared between two or more buildings. As the cost element under consideration is performing the same function, an objective assessment can be made as to why there may be differences in costs between the same elements in different buildings. There are four main reasons why differences in costs occur:

1. Differences in time (inflation)
2. Quantitative differences
3. Qualitative differences
4. Differences in location.

Design stages

If at any time during the design process it becomes apparent that the agreed budget is likely to exceed without a change to the brief, the client should be informed and instructions requested. Likewise, if it becomes apparent that the whole of the agreed budget will not be required, the client should be informed. Budget-estimating techniques On projects where non-traditional procurement routes are used, the responsibility for developing the cost plan may change but the stages suggested here remain appropriate. However, the principles of budget, cost plan, cost checks and reconciliation should be adhered to whenever possible.

Construction Project Management in India

Construction projects are becoming more complex and highly–risky due to cost overrun. These overruns often results in either delay or incompletion or other such difficulties. The various factors that contribute to the failures can be classified as (i) external and (ii) internal. The

external items, such as political impact, natural calamity etc, are beyond our control. Hence the internal factors are only considered for this study, such as human – related factors, project related factors, project procedures and project management actions to find out the variable influencing the cost overrun in the construction on project (Albert P.C. Chan et al, 2004).

IDENTIFICATION OF THE PROBLEM

In India, the construction activities are increasing day by day to improve the infrastructure facilities like roads, bridges, flyovers, IT Buildings etc. When the budget outlay for the construction activities is huge, even a little savings will make millions of rupees. For developing countries like India, achieving economy by avoiding cost overrun is very helpful. Small improvement discovered in research for cost reduction will be of great value for the effective management of the construction industry.

OBJECTIVE OF THE PRESENT WORK

- A cost control plan aims to guarantee the project's timely delivery, adherence to scope, and staying under budget.
- Cost control necessitates accurate projections and continuous supervision throughout our initiatives.
- Project cost management involves estimating, planning, and controlling costs to ensure expenses stay within the agreed budget across the project life cycle.
- To determine the elements influencing cost management in on-site inspections and expert consultations and analyze the main component using SPSS software.

LITERATURE REVIEW

The objective of literature review was to develop a framework for the Research study and it provided the complete understanding and information on the "Cost Management Processes and Techniques" for various "Construction Project Processes". It also gave some methodology for the present research, highlighted by the past researcher

D.S. Sachdev, (2006) has suggested that "the Fast Track completion is to be followed by increasing use of management techniques such as CPM/PERT, value analysis, standard costing, budget control etc., for improving the physical performance and reducing cost".

The study made by Rajiv Bhatt (2006) revealed that "the cost overrun happens due to (i) delayed payment from client or contractor, (ii) delayed supply of materials and decisions, (iii) delayed possession of site, (iv) inflationary increase in material rates, (v) Revised estimate"

Sach-deva and Umesh Sharma (2006), in their study, concluded that the materials management which includes procurement, inventory shop fabrication and field servicing needs special attention for cost reduction

According to Young Hoonk Wak and Williams Ibbs (2002), 'Cost Management is the process of controlling the expenditure on a construction project at all stages from initiation to completion, within the approved budget. Cost Management is crucial because cost overruns are common resulting in serious cost problems during project execution'.

Swee–Lean chan and Nga–Na Leung (2004) have concluded that "web based documents and the displayed informations will be useful for construction cost management and the system retrieves useful data from the original documents and reorganizes the information according to specific tasks or users".

In their study made by Youngsoo Jung and Sungkwon Woo (2004), they revealed that "the integrated cost and schedule control system with a flexible work breakdown structure (WBS) optimizes the overhead efforts by means of reducing the amount of data to be controlled". Mohammed Fadhil Dulaimi and David Langford (1999) concluded that "the psychological aspects and behaviour of the Construction Project Managers influence very much on the Cost Management".

The project planning process leads to the development and maintenance of a workable scheme to accomplish the business needs for the project. It includes defining overall scope, identifying planning strategy, developing the work breakdown structure for cost and schedule, refining estimates and analyzing commitments

optimizing the project plan, developing risk management plans; and organizing the project team to establish a project – driven organization environment.

According to Young Hoonk wak (2002), the project cost management includes scope planning, scope definition, resource planning, cost estimating and cost budgeting Scope planning is the process of developing a written scope statement as the basis for construction project decisions including cost management. Scope definition involves subdividing the major project deliverables into smaller, more manageable components in order to,

(i) Improve the accuracy of cost, time and resource estimates.

(ii) Define a baseline for performance measurement and control.

(iii) To facilitate clear responsibility assignments.

(iv) To do project success critically.

Resource planning involves determining what physical resources like (i)Men (ii) Materials (iii) Machinery (iv)Methods and what quantities of each should be used to perform project activities. Cost estimating involves preparation of estimate for the Costs of the resources needed to complete project activities. Cost estimating differs from pricing. Cost estimating is an assessment of the likely quantitative result, how much it will cost the performing organization to provide the product or service involved. Pricing is a business decision as to how much the performing organization will charge for the product or service that uses the cost estimate. Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance and for cost controlling. As defined under Project Management Institute Standard Committee (PMI) (2000) and Royal Institution of Chartered Surveyors, (RICS) (1998), the Cost Information System will be useful for the CMP in project planning process.

According to William C. Ibbs, Clarence K. Wrong and young Hoon Kwak (2001), “changes in projects are common, but it affects the cost, the scheduling and the duration of projects, both directly and indirectly. A comprehensive project change management system that is founded on five principle, (i) Promote a balanced change managementsystem that is founded, (ii) recognize change, (iii) evaluate change, (iv) implement change, (v) continuously improve from lessons learned. By applying this project change management system, project participants can minimize deleterious change and promote beneficial change”

Smith, J., & Johnson, A. (2023) This review highlights the importance of adopting advanced cost management practices such as Building Information Modeling (BIM) and Earned Value Management (EVM) to enhance project cost control and improve project outcomes. It suggests that integrating technology-driven tools with traditional cost management methodologies can lead to more accurate cost forecasting and better decision-making throughout the project lifecycle.

Garcia, M., & Martinez, B. (2022) studied identifies poor project planning, inadequate risk management, and ineffective communication among stakeholders as major contributors to cost overruns in construction projects. It emphasizes the need for proactive risk identification and mitigation strategies, collaborative project planning processes, and enhanced communication channels to minimize the occurrence of cost overruns and improve project cost management.

Lee & Wang (2023) explored the application of advanced cost management techniques such as Life Cycle Cost Analysis (LCCA) and Green Building Costing (GBC) in sustainable construction projects. It concludes that integrating sustainability considerations into cost management practices can lead to long-term cost savings, environmental benefits, and enhanced project value. However, it highlights the need for further research and industry collaboration to standardize sustainable cost management methodologies and promote their widespread adoption in the construction sector.

Chen, L., & Zhang, H. (2024) this research demonstrates the potential benefits of integrating Lean Construction principles into cost management practices to reduce waste, improve productivity, and

optimize project costs. It emphasizes the importance of continuous improvement, value stream mapping, and collaborative teamwork in achieving cost efficiency and enhancing project performance. The findings suggest that adopting Lean principles can help construction firms streamline their cost management processes and achieve competitive advantages in the industry.

Tumi, S., & Ndekugri, I. (2022) The research presents an information processing approach to managing construction projects, focusing on the role of information exchange and decision-making processes in cost management. It suggests that improving information flow, enhancing communication channels, and adopting advanced project management tools can enhance cost management effectiveness in construction projects.

Olawale et al. (2019) This study identifies inhibiting factors affecting cost and time control in construction projects and proposes practical mitigating measures. It emphasizes the significance of effective project management, stakeholder collaboration, and technological integration in addressing cost and time-related challenges in construction projects.

Shen et al (2021) the study investigates cost overruns in construction projects in Myanmar and identifies factors contributing to such overruns. It emphasizes the importance of improving project management practices, enhancing skills and capabilities, and implementing effective risk management strategies to address cost overruns effectively.

Chan et al (2019) this research underscores the impact of environmental factors on building project performance, including cost management. It suggests that factors like weather conditions and regulatory requirements significantly influence project costs and recommends strategies for adapting project management practices to mitigate these effects.

Kim & Lee (2022) this study investigates the role of Project Management Information Systems (PMIS) in improving cost control and monitoring in construction projects. It concludes that leveraging PMIS facilitates real-time data access, enhances communication among project stakeholders, and enables proactive cost management measures, ultimately leading to better project cost performance and outcomes.

SUMMARY FROM LITERATURE

- The literature indicates a growing emphasis on effective cost management strategies in construction projects, driven by the need for improved project performance and profitability.
- Integration of Building Information Modeling (BIM) with Earned Value Management (EVM) emerges as a promising approach for enhancing cost control and project delivery efficiency.
- Risk management remains a critical aspect in construction projects, with a comprehensive understanding of risks essential for mitigating cost overruns and schedule delays.
- Adoption of lean construction practices demonstrates potential benefits in cost management through waste reduction, improved productivity, and enhanced project value.
- The application of artificial intelligence techniques, particularly in cost estimation, presents opportunities for more accurate and efficient project budgeting and forecasting.

RESEARCH METHODOLOGY

The research methodology employed in this study is descriptive surveying. Following a review of the relevant literature, actual construction project cost overruns were identified, and a set of queries was formulated in accordance with the factors that contribute to cost escalation in the construction industry. Data samples were gathered via the administration of questionnaires. On the basis of the sample data, the questions' dependability and applicability were evaluated, and specific inquiries were modified in the sample survey prior to the final questionnaire's distribution. Figure 3.1 depicts the methodology of present work

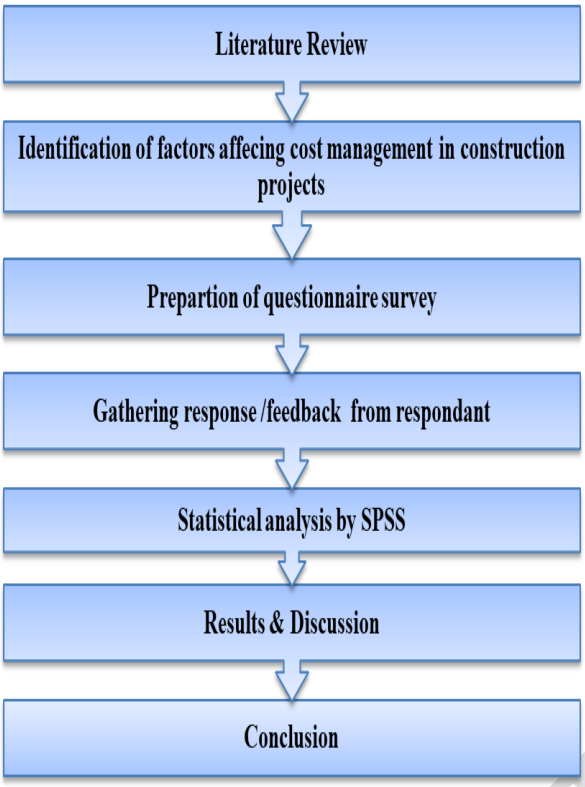

Figure 3.1 Methodology of present work

The questionnaire was distributed to the respondents who were involved in various construction projects in Tamil Nadu interviewed personally. The respondents were,

(i) Project Managers / Site Engineers, (ii) Contractors / Builders , iii) Owners, (iv) Others: Consultants / Architects

Addresses of organizations for the survey were collected from the Builders Association of local areas. The feedback from the respondents through the questionnaire was collected. In addition, other reasons and data for the cost escalation in their respective projects were also collected.

All the data collected through survey were analysed using the Statistical Packages for Social Scientists (SPSS) that provides a comprehensive range of statistical programme suitable for facilitating the work of analysis. The statistical analysis is the most powerful tool for making appropriate decisions and hence it is adopted in this research. The questionnaire was developed for the following factors affecting the cost management in construction projects in Tamilnadu. Through consultations with specialists, literature reviews, and site visits, these factors are identified. The major factors influencing cost management are

- Poor Leadership and Inappropriate Management
- Inefficient Deployment of Resources
- Excessive Wastage of Materials on Sites
- Complex Payment Mechanisms
- Equipment Handling
- Labour Leave

CONCLUSIONS AND WORK SCHEDULE FOR PHASE-2

The following findings are the outcomes of an on-site inspection and a review of relevant literature.

- The questions have been formulated with consideration for the elements that affect each component of cost management on building sites.
- Previous research and on-site inspections at the specified sites allowed us to categorize the subjects into six distinct groups.
- For data collection, several private construction firms in the Coimbatore, Tirupur, and Erode region have been chosen.
- To ascertain the most crucial parameters, an analysis of the gathered data will be conducted utilizing the SPSS program.

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