

ANALYSIS OF COST OVERTURN IN FAST TRACK RESIDENTIAL BUILDINGS

BISMA, JANAGAN
ASSISTANT PROFESSOR
DEPARTMENT OF CIVIL ENGINEERING,
GNANAMANI COLLEGE OF ENGINEERING, SALEM, TAMILNADU, INDIA.

Abstract : Cost overrun is leading factor which affects the construction activities and it is more common in Fast track projects. The impacts of cost overruns are very high in developing countries fast track activities are much affected by cost overrun due to various factors throughout the project cycle. The deviations between the actual cost incurred during construction phase and originally estimated cost is known as cost overrun and it is one of the most predominant factors affecting the successful completion of the overall project, factors which are mostly influencing the cost overrun in interior fit-outs of *mass construction projects* and rank the factors identifies based on their impact mostly affecting the construction activities finally giving recommendations to overcome the critical factors.

INTRODUCTION

1.1 FAST TRACK PROJECTS:

Fast track projects are those in which construction begins before all of the architect's drawings and specifications are complete. Also known as, phased construction, the method is intended to save time by passing the traditional sequence of documentation, tendering and construction. The construction industry has long been recognized as risk-laden. Risk in construction is defined as a variable in the process of construction whose occurrence results in uncertainty as to the final cost, duration and quality of the project. Risk management control the level of risk management process for the construction industry includes risk identification, risk assessment, risk allocation, risk mitigation and risk monitoring. The literature survey revealed various risks in construction projects having varied impacts on the success of the project. Qualitative and quantitative techniques can be used for assessment of risks. The paper focuses on the Risk factor and priority Model where the risk are quantitatively evaluated in terms of probability of occurrences and their impact on the project goals, The study conducted a questionnaire survey of the identified risk factor in order to determine their relative importance. The questionnaire survey was self-administered on construction practitioners in contracting organization consultancy firms involved in real estate construction projects. Survey responses were analysed using the 'Risk Factor and Priority Model'. This model gives an overview of the general level and pattern of risks facing the project focuses management attention on the high-risk items in the list; helps to decide where action

is needed immediately and where action plans should be developed for future activities; and facilitates the allocation of resources to support management's action decisions.

COST OVERRUN:

Construction has become an important player in the economy of many countries, especially developed countries. This industry contributes to the GDP and employment rate of many nations and for this reason it is considered vital for the economic development of any nation. Moreover, the construction activities have become a significant market due to the fact that this industry procures products and material from other businesses in other sectors. The more resources, engineering, labour, materials, equipment, capital, and market exchange are provided from within the national economy, the higher the factor of the extent of self-reliance. The increasing complexity of infrastructure projects and the environment within which they are constructed place greater demand on construction managers to deliver projects on time, within the planned budget and with high quality.

Cost overruns reduce competitiveness of the economy. Services provided by infrastructure projects serve as input for other sectors of the economy. Cost overruns in construction projects lead to an increase in the capital output-ratio for the entire economy. Infrastructure projects in India are infamous for delays and cost overruns. Indeed, very few projects get delivered in time and on cost. The cost overruns have become hallmark of infrastructure projects in India. In an attempt to shed some light on how each construction project party perceives the relative importance of these cost overrun factors. This study is carried out with an objective to understand major and minor factors leading to cost overruns which helps in improving the performance of the industry and benefit the infrastructure industry. Cost overruns reduce competitiveness of the economy. Services provided by infrastructure projects serve as input for other sectors of the economy. Cost overruns in construction projects lead to an increase in the capital-output-ratio for the entire economy. Infrastructure projects in India are infamous for delays and cost overruns.

Main objectives of this study are:

1. To identify the various factors which are mostly influencing the fast track interior fit out projects.
2. To rank the factors based on their impacts and significance.
3. To find out various critical factors which are major reasons for the cost overruns.
4. To make recommendations to overcome or discard those critical factors in future fast-track **2.1**

FAST TRACK PROJECTS: THE PREDICTABILITY OF FAST-TRACK PROJECTS,

The accelerated development of the project market such as industrial, engineering, procurement, construction, and information technology (IT) during the past decades has created a large demand on shortening the project duration. The shortening usually increases the complexity of the project creating real challenges for the project's team. The main challenges occur in the interconnection between the project's phases and the reactions to the changes during the project period. As a result, several management approaches have been initiated to achieve accelerated completion. Fast tracking techniques and phased construction were essentially developed as part of the Professional Construction Management (PCM) approach to meet the challenges and accelerate the project phases (Fazio et al. 1988). A simple definition of fast tracking is the process of overlapping sequential activities or phases in parallel to compress the project schedule (PMI 2004).

Huovila et al. (1994) indicated in a study comparing fast tracking with the concurrent engineering approach that fast tracking is a project delivery method built on a practical basis without considering a firm conceptual or theoretical basis. The Fast-Track Manual's broad definition (Eastham 2002) considers fast-tracking as the "reduction of the schedule to the minimum practicable is the principal driving force for one or more stages of the project". Despite the different definitions, fast-track projects are similar to conventional projects in terms of predictability importance to success. In order to consider a fast track project as a successful project, the project needs to be predictable. Project predictability, in general, can be measured by the success in meeting the project's essential objectives (Henry et al. 2007). In other words, the objectives are employed as indices of predictability to show how near to or far from to the project completion of the planned objectives. These objectives are cost, time and quality (Atkinson 1999). The more work done earlier on meeting the project's planned objectives, the more predictable the project is. UK government in 1999 selected time predictability and cost predictability in addition to other measurements (quality, client satisfaction, change orders, business performance, and health and safety) as National Construction Industry Key Performance Indicators (KPIs) (The KPI Working Group 2000). UK government defined predictability generally as the number of projects completed on time and within budget. In detail, the study expressed time predictability as a measure of how closely the project was delivered to the original schedule, and cost predictability expressed as a measure of how well outturn costs compared with original budget.

Martin (2003) added that cost and time overruns are as bad as underruns for predictability. Both reflect variations of predictability for construction economists. In addition, he indicated that the specific definition of predictability would be completing the project on target or better or on

target or lower. This means achieving the project planned budget or schedule within $\pm 5\%$, for example. The existence of cost variances; schedule variances, changes, reworks, defects and deviations are indices of how predictable a project is. Instead of predictability, some researchers refer to uncertainty. The more uncertainty in the projects, the less predictable the project's outcomes.

2.2 RISK IN FAST TRACK CONSTRUCTION:

Construction projects are increasingly growing in value and complexity. Most of them are innovative resulting into inclusion of a high level of risk and uncertainty. The management of risks within these projects remains a major factor in their success or failure. Risk management involves identifying risks, assessing them and then developing strategies to manage them. Risks can be assessed qualitatively and quantitatively. The study emphasizes the identification and assessment of various risks in case of fast track projects. The evaluation of risks can help in prioritizing risks for effective risk management and successful completion of a project.

Risk is defined as the probability of an Undesirable uncertain event occurring and its Impact or the chance of something happening that will have an adverse impact on objectives. Risk is situation where there exists no knowledge of its outcome or exposure to loss resulting from inadequate or failed internal process. Risk is a function of uncertainty of event, potential loss/ gain from events. risk is characterized by three factors, first the event which is possible occurrence which could affect the achievement; second is the likelihood which is the chance or probability of the risk event occurring within the time period and third factor includes the impact of the event in terms of financial value of the effect of the risk event. In large construction engineering projects sources of risks can be categorized as market completion and institutional. Market risk is mainly caused by the demand uncertainty, completion risks refer to technical risks during and after the completion of a project. Institutional risks are related to the political uncertainties in specific situation.

2.3 STUDY OF FACTORS INFLUENCING COST OVERRUNS:

Cost overruns have become issues of serious concern in construction industry. These overruns have detrimental effect on the national economy. Cost overruns have many reasons/factors which are not taken into consideration at the time of planning resulting into delays and cost increases. In the present study, we have studied literature and identified those factors influencing cost overruns. The primary findings emanating from the study revealed that empirical studies have identified a number of important factors which because projects cost overruns. These factors have

been categorized in different groups depending on their orientations. It is found that, understanding fundamentals of such factors is important role of construction manager for avoiding or minimizing cost overruns and better cost performances

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. The industry plays a pivotal role in developing the country's infrastructure, a pre-requisite for high levels of economic growth. Most construction projects experience cost overrun and it put massive financial burden on the client or owner. Therefore, this research was carried out to identify the causes leading to cost overrun in construction projects. Desk study along with questionnaire survey was used to identify the causes of cost overrun. A total of 30 filled questionnaires were collected from clients, consultants and contractors. The respondents were asked to rate the listed causes on the basis of probability of occurrence and severity of impact. Importance of each cause was calculated on the basis of cumulative effect of occurrence and impact. Spearman rank order correlation analysis was used to evaluate whether consensus of opinions exists between groups of respondents (client versus consultant, client versus contractor and consultant versus contractor).

2.4: COST OVERRUNS IN BUILDING CONSTRUCTION PROJECTS: A CASE STUDY OF A GOVERNMENT OF GHANA PROJECT IN ACCRA

Generally, the delay in the implementation of many building projects undertaken by government leading to cost overruns is obvious to many. The construction industry plays a very significant role in the socio-economic development of the nation. The interrelationship between the construction industry and the broader economy emanates largely from three of the industry's characteristics namely: the public sector client as its major client, its large market size with the ability to produce investment or capital goods which contribute significantly to the national GDP, and as a major source of employment both directly and indirectly by its multiplier effect. In Ghana, the construction industry is the highest recipient of government budget in terms of government development programmes. The building construction industry has special features that are not usually encountered in other industries. When conditions in the field tend out to be more complex than what was anticipated in the planning and design phase, additional cost and time are needed. Any extremes can affect productivity levels. Moreover, the industry is custom oriented, meaning it is difficult to use mass production techniques. Because of all these factors, it is difficult to predict accurately how much money will be required to complete construction projects. Cost overruns, delays and other problems tend to be proportionally monumental (Gould, et al, 2002). Cost is one of

the primary measures of a project's success. This is true for public buildings in developing countries like Ghana because, public building construction projects are executed with very scarce financial resources. The common criteria for project success by most literature on construction projects are generally considered to be cost, quality and time. A building project is considered successful if it is completed within the stated budget, on schedule, conform to user expectations, meet specifications, and achieve quality of workmanship and with minimized construction aggravation (Songer and Mollenaar, 1997). In Ghana, the present state of the construction industry falls short of meeting domestic and international quality standards and the performance demand expected from the sector. The critical problems faced by the construction industry are the inability to complete projects on schedule, low quality work and high cost overrun. In general, most (if not all) building construction projects experience time and cost overrun during their execution phase

2.5 IDENTIFICATION OF FACTOR WHICH CAUSES COST OVERRUN AND DELAYS IN INFRASTRUCTURE PROJECTS

In today 's businesses owners rely on first-to market product strategies to gain competitive advantage and increase profit margins. Within the construction industry, this has created a growing need for enhanced performance delivery systems that can achieve successful project delivery in shorter time. Owners demand greater improvements in the quality of project construction at lower costs and within reduced schedules. The completion of project 's time milestones is a crucial factor because not meeting them usually involves significant economic impacts to the owner while time savings can lead to profit improvements. However, the increasing complexity of project technologies along with the competitive nature of business oblige the owner to make changes in project scope at the last moment, hindering project delivery within the anticipated time. force the owner to accelerate project execution and demand earlier completions. In the presence of increased demands for shortening project cycle times, research has dedicated in the last year's significant time and effort in searching for the right tools and techniques to assist owners and construction managers to effectively manage time and resources aiming at expediting project execution and reducing project delivery time. Several sources of research provide the construction community with different strategies and techniques to effectively address today 's aggressive schedules and tight delivery demands. The document presented herein is a recompilation of the most effective techniques available to the construction manager that enable project acceleration to achieve reduced delivery times

3.1 OVERVIEW OF METHODOLOGY

The following section presents the research steps to achieve the mentioned objectives.

1. Various factors responsible for cost overruns were collected from literature study and they were sorted in a desired category.
2. A questionnaire was prepared with 30 items and a survey was conducted to gather the data from selected respondents to find out critical factors causing cost overruns.
3. Each factor was given a scale of 0 to 3, so that person could easily express the severity range or impact. i.e., 0 being the lowest and 3 being the highest.
4. The scale for impact is categorized into 4 types.
 - a. 0 for No effect.
 - b. 1 for Low effect.
 - c. 2 for Medium effect.
 - d. 3 for High effect.
5. Questionnaires were administered to a sample of 50 people selected from various contractors, subcontractors, site engineers and supervisors, of which 30 questionnaires were returned with completed responses.
6. The scale value obtained for each factors were found out and ranked based on Relative Importance Index (RII) of the responses are computed for their impact and significance.
7. Findings of the study based on the statistical analysis, are given.
8. Finally suggestions and recommendations are given to avoid the cost overruns in future fast track cost overrun projects activities.

QUESTIONNAIRE SURVEY

The various factors of effects for cost overrun were collected from the literature study. Further, opinions were obtained from the various contractors, subcontractors, site engineers, supervisors, etc., were listed based on the division. Finally, 7 groups with 29 factors were selected and considered for the questionnaire survey. The factors are listed below.

3.3 FACTORS OF COST OVERRUN

3.3.1 Contractor's site management related factors,

- a. Poor site management and supervision.
- b. Incompetent subcontractors.
- c. Schedule Delay.
- d. Inadequate planning and scheduling.

- e. Lack of experience.
- f. Inaccurate Time and Cost estimates.
- g. Mistakes during construction.
- h. Inadequate monitoring and control.

3.3.2 Design and documentation related factors,

- a. Frequent design changes
- b. Mistakes and Errors in design.
- c. Incomplete design at the time of tender.
- d. Delay in design and approval of design.

3.3.3 Financial management related factors,

- a. Cash flow and financial difficulties faced by contractors
- b. Poor financial control on site.
- c. Delay in progress payment by client.
- d. Financing and payment for completed works (Delays in payments).
- e. Contractual claims, such as, extension of time with cost claims

3.3.4 Information and communication related factors.

- a. Lack of coordination between parties.
- b. Slow information flow between parties.
- c. Lack of communication between parties.

3.3.5 Human resource (workforce) related factors.

- a. Labor productivity.
- b. Shortage of site workers.
- c. Shortage of technical personnel (skilled Labor)
- d. High cost of Labor.

3.3.6 Non-human resource related factors,

- a. Fluctuation of prices of materials.

- b. Shortages of materials
- c. Late delivery of materials and equipment.
- d. Equipment availability and failure.

3.3.7 Project management and contract administration related factors,

- a. Poor project management.
- b. Change in the scope of the project.
- c. Delays in decisions making.
- d. Inaccurate quantity take-off

FIELD INVESTIGATION

4.1 INTRODUCTION:

It aims to identify the undue wastage or losses and ensure that costing system determines the correct and realistic cost of production.

Cost audit provides useful information to the management regarding regulating production, economical method of operation, reducing cost of operation and reformulating cost accounting plans.

4.3 ROLES ON PROJECT

- Tracking budget of project.
- Verifying and releasing the bills to contractors and external vendors.
- Re-estimation the project for actual site condition.
- By comparing the estimate cost and actual cost to determine future execution cost.
- Updating material availability at site.
- Cross verification material utilized in site.
- Updating the estimated budget based on consumption in site.

4.4 KEY INITIATIVES TAKEN TO REDUCE THE COST

- Co-ordinating with designer for Value Engineering and savings in design with respect to Advanced Construction Environment (ACE).
- 100% safety measures have been implemented in the site.
- Training workmen to increase the productivity.
- Sub-contractor rate finalization below ACE.
- Selection of better machineries for better productivity.

- Better negotiation with sub-contractors and vendors.
- Cost-Benefit Analysis.
- Proper schedule has been followed.
- Weekly training with client about the bills and weekly details about the work have been clearly discussed.

4.2 DATA ANALYSIS

Relative Importance Index Technique (RII)

Relative Importance Index or weight is a type of relative importance analyses. RII was used for the analysis because it best fits the purpose of this study. RII aids in finding the contribution a particular variable makes to the forecast of a criterion variable by itself and in combination with other forecaster variables.

In the calculation of the Relative Importance Index (RII), the formula below was used

$$RII = \sum W / (A * N)$$

where, *W*—weighting given to each statement by the respondents and ranges from 1 to 3; *A*—Higher response integer (5); and *N*—total number of respondents.

REFERENCES

- “Identification of Factor which Causes Cost Overrun and Delays in Infrastructure Projects” by Swapnil Naresh Bhardwaj- International Journal of Engineering Technology, Management and Applied Sciences.
- “Cost overruns in Building Construction Projects”- A Case Study of a Government of Ghana Project in Accra by Kodwo Amoa-Abban Seth Allotey
- Chintan Hitesh Patel, Himanshu Chaturvedi, Megha R.Rao, Priyanka Katta and K.N. Narasimha Prasad, “An Analysis of Cost & Time Overruns in Construction Projects” NICMAR -Journal of Construction Management, April-June 2015
- A. A. ALHOMADI “**The Predictability of Fast-Track Projects**” in Procedia Engineering 14 (2011) 1966–1972, A study conducted to analyze the causes of cost and schedule overruns in front-end loading delivery system of Alberta oil sands megaprojects
- Abhijeet Sudhakar Deshpande- “Best Practices for the Management of Design in Fast Track Industrial Projects” - (June 2009)

- Eng. S.B. Wijekoon(2007). Study on the cost overruns in road construction projects in Sri Lanka,3(4).
- Bordat, C., Mccullouch, B., &Sinha, K. (2004). An Analysis of Cost Overruns and Time Delays of INDOT Projects.
- Subramani T. (2014). Causes of Cost Overrun In Construction. IOSR Journal of Engineering IOSRJEN, 4(6), 0107.
- Susana Gomez Arcila. (2012). Avoiding cost Overruns in construction projects in The united kingdom. Nature, 362(6420), 486-486.
- Mattias Lundberg, Anchalee Jenpanitsub and Roger Pyddoke. (2011). Cost overruns in Swedish transport projects. International Journal of Project Management,12(4), 254-260.

