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A STUDY ON COST AND TIME OVERRUNS IN CONSTRUCTION PROJECTS

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ABSTRACT

Construction industry is one of the fast growing industries in India and it contributes a lot on country's economy. But the construction industry suffers from problems that affects time and cost. Successful completion of the construction project is based on many factors among all time and cost is the most crucial factors. If we manage these two things then the project would be successful. The time and cost overrun study is based on the questionnaire survey, totally 42 questions are prepared and distributed to project engineers, contractors, site engineers and clients. The respondents were asked to rate the listed factors on the basis of occurrence and severity of impact. Importance of each factor was calculated on the basis of cumulative effect of occurrence and impact. The analysis was done to evaluate whether consensus of opinions exists between groups of respondents. From the analysis of the results it was found that many factors have consensus of opinion exists between respondents. Data received from the questionnaire was analyzed by using statistical technique. The aim of this study is to identify the most critical factors responsible for the overruns in both time and cost of the construction project and suggest the remedial measures to the solution.

1. INTRODUCTION

In whole world many construction projects experiences the delays and cost overruns. Time and cost overruns occur in every construction projects, either simple or complex. In Indian construction industry, delay can be defined as the extension of time in the complete project in targeted time and budgeted cost as agreed in contract. Delay is not only causes the extension of the project but also increases the cost of project. Time and cost overruns causes many problems in the construction field. In construction industry there are lot of different activities which are interlinked and are sequentially aliened. The various activities involved in the construction industry are site preparation, foundation, sub and super structure, fittings, finishing and a number of other activities are taken up. Most commonly the last activity is demolishing the temporary structures, removing the construction machinery and clearing up the site. At the starting of the project there are so many activities is there and at the end of the project the activities are goes on decreasing. The sequence of activities depends upon the method of construction adopted. Some of the activities may be delayed the project. To control over the work, different techniques are adopted. A delay in the construction varies from one project to another project. The scope of the project was mainly to focus on the ongoing projects. This will help to understand the present situation at the sites. The questionnaire survey was helpful in identifying the various factors responsible for the time and cost overruns and suggests the remedial method. It also helped to understand the opinions of the various constructional professional. The data collected from the questionnaire was analysed in the SPSS Software. And, my project does not deal with any aspects of resources in scheduling. It purely deals with the time and cost overrun factors only. Cost is the important component for any construction project. Over the years, so many researchers are going in the management of construction projects; however, the problem of cost overruns is still a critical issue in the construction industry.

To avoid overrun, very first and most important step is to identify and understand the factors which is responsible for the cost overruns and its effects. Managing construction costs includes estimating, scheduling, accumulating and analyzing cost data, and finally implementing measures to correct construction cost problems. Cost management is employed throughout the project's planning, design, and construction phases. In India after agriculture sector the construction is the largest sector to give employment opportunities to the daily labours. The construction industry plays a important role in developing the country's infrastructure, a pre-requisite for high levels of economic growth. Government of Indian invested

massive amount on construction industry to reduce the infrastructure deficit. Development of adequate infrastructure to achieve steady GDP growth is a priority for the Government of India. Development of infrastructure is key to growth within the commercial sector and the Government of India has to spend huge amount of money to improve the infrastructure of the country. The government plans to source these funds from combinations of Public Private Partnerships (PPP), public investments and exclusive private investments while Foreign Direct Investment (FDI) is expected to provide liquidity to allow road and power projects to continue to be built. India's infrastructure industry is currently experiencing unprecedented levels of growth, on the back of the expansion of the economy as a whole and continued infrastructure investment is expected to up the Tier II and Tier III cities driving demand for new, high quality commercial developments (Harris, 2011). Compare to other countries construction industry, the Indian construction sector also face a lot of challenges from land acquisition issues, adverse political and structural changes, shortage of technical skill persons, inconsistent of material and labour cost. Further, deficiencies in project planning, use of inappropriate procurement contracts and faulty contract management also contribute to delays in project implementation (ICRA, 2011). In construction industry the material and machinery cost is vary year by year. Comparing the last year statistics the cost is increasing in an unusually way. Due to the increase of the price of materials and machinery cost the project cost is also increasing and due to this there is a high chance of delaying of project. Labour cost is also increasing rapidly and there is a shortage of skill and experience labour in our country. This lead to an impact on tender prices and lead-in times, potentially requiring the use of less skilled labour teams to deliver fast-track projects. All the above factors lead to impact on the quality of the project. As a result of the current levels of material and labour cost inflation and the floating market conditions, contractors are increasing their average margins by between 5% and 7%. This makes the contractor quoted for higher price and makes the project cost more than the expected. Due to the unsteady in prices of materials and labours the competition between contractors was decaying and in future the completion between the contractors will be very low. This will impact on the quality of the project. In general, time overruns and cost overruns reduce the G.D.P or productivity of available resources, threat to the development and diminish the effectiveness of the economy. As per the Government data suggest that a majority of projects close to 60 per cent are overwhelmed by time and cost overruns. If present trends continue over the Eleventh and Twelfth Plan periods (2008 to 2017), McKinsey estimates suggest that India could suffer a GDP loss of US$ 200 billion around 10 per cent of its GDP in financial year 2017(Gupta et al., 2009). Delays give rise to disturbance to work and leads to loss of productivity, late completion of project, increased time related costs, and third party claims and termination of contract. The project manager has to check the process of work and if any activity behind the schedule add the extra resources and reduce the overall effect on the project

2. LITERATURE REVIEW

A number of studies have been carried out to determine the causes of delay and cost overruns in construction projects. Morris and Hough (1987), Gaspar and Leite (1989), Arvan and Leite (1990), and Ganuza (2007) attribute cost overruns to technical constraints. According to their studies, due to imperfect estimation techniques and the lack of data, the estimated and the actual project costs turn out to be different. Morris (1990 and 2003), Dalvi (1997), Thomas (2000), Sriraman (2003), Thomsen (2006), Jonston and Santillo (2007), Chakrabarti (2008), and Raghuram (2009) are some of the people who have done their study on public sector projects in India. According to their studies, delays in land acquisition, shifting of utilities, environmental and inter-ministerial clearances are the major causes behind time and cost overruns in India. In addition to this shortage of funds, litigations over land acquisition and contractual disputes are also some of the causes for time and cost overruns.

S. C. Tandale and Mohan M. Kumaraswamy (1997) explained "A comparative study of cost and time overruns in Indian construction projects". They concluded that poor site management, unforeseen site conditions, poor supervision lead to delay of a project and subsequently lead to cost overruns. The relationship between success on site and 'strong' management teams underlines the need for effective site management and supervision by contractor's and consultants. They found that there was a difference in perceptions as to causes of delays and cost overruns by different groups of participants in building and civil engineering works.

Akinci & Fischer (1998) according to them even a marginal cost overburden can sweep away the profit of a job, and continuous cost overburdens in most of the projects of a firm can lead to bankruptcy. Projects can be delivered within the budget but that requires a good starting estimate, project management discipline and an awareness of factors that can cause cost escalation.

Dr. A. W. Dhawale (et al 2000) studied "Construction delay: a quantitative analysis". He concluded that, time and cost overrun in construction is a critical function in public projects construction. They also found that the main causes for time and cost overruns are related to designers, user changes, site conditions, weather, late deliveries and increase in quantity.

Chalabi and Camp (2004)found that delays and cost overruns of construction projects occur entirely in the very early stages of the project i.e. during the planning stages of project development. The project owners may be responsible for the time overrun when delays, suspensions or interruptions to all or part of the work are caused by an act or failure to act by the owner resulting from breaches of owner's obligations, stated or implied in the contract. These include the failure of the owner or his representative to provide the contractor with relevant information, details etc. for which the contractor has specifically requested in writing.

Chan, et al. (2004) created a framework after a review of more than 43 articles, which were found in seven major management journals. They considered that project success depends on different factors, such as "project-related factors, project procedures, project management actions, human-related factors and external 16 environment." For instance, the framework would help to select the members of the team identifying the level of development that team members need to have for a good performance in the project.

3. METHODOLOGY

3.1. Research Strategy

Research strategy can be defined as the way in which the research objectives can be questioned. Two types of research strategies are used at studies, quantitative and qualitative research. Quantitative approach is used to gather realistic data and to study relationships between facts and how such facts and relationships accord with theories and the findings of any research executed previously, but the qualitative approach seek to gain insights and to understand people's perception of "the world" whether as individuals or groups (Fellows and Liu, 1997). The research strategy adapted for this project is quantitative research. Quantitative research is chosen to know stakeholders perception regarding time and cost overrun.

The strategy followed in this project was first started with problem identification which has been done through literature review, discussion with constructional professionals in the construction sector; and then the research design was formulated. Then data and information sources were determined based on the formulated research design. On the basis of the data the research instruments were decided; and available sources relevant to the research were reviewed. The review includes books, journals, internet sources and other documents. After the study of literature review a set of questionnaire listing the various causes of time and cost overruns were distributed to the construction contractors, clients and engineers to get their opinion based on experience. Upon obtaining the data checking and sorting of data has been done. The data was analyzed for crosschecking the validity and conformity of the information obtained through the overall project work. This was followed by thorough discussions with the construction professionals in order to draw a conclusion. An objective type survey design was used for this project work. It was attempted to collect data from various projects and rank the causes of time and cost overrun on the basis of importance. This survey-based project design has been selected as it is useful in demonstrating the problem throughout the population. Once the problem has been determined and major causes identified, it may be possible to get hints on how to prevent the problem. It also helps to identify opinions and differences among groups and to recommend possible remedies to be taken by respective stakeholders.

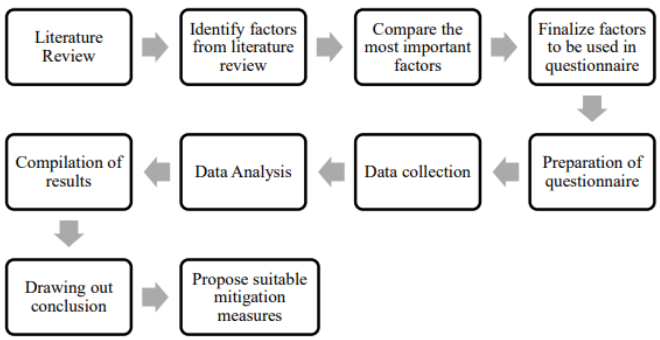

Figure 1. Detailed flow chart of current research

4. RESULTS AND DISCUSSION

4.1. Details of the Questionnaire Survey

This section presents the results of the questionnaire survey which was used to get the opinion of major stakeholders in the construction industry. This subchapter will present the results on the causes of Time and cost overruns on the basis of their opinion. The causes are ranked and arranged on the basis of probability of occurrence, severity of impact and overall importance. The results of the questionnaires are presented and analyzed in the subsequent sections.

4.2. Questionnaire Response Rate

As state before, for the purpose of getting information on the perception on causes of time and cost overrun, questionnaires were distributed to clients, consultants and contractors. A total of 42 questionnaires were distributed to representatives of client, consultant and contracting organizations in the construction sector. The valid response rate was 56% , which is a high percentage. Table 1 shows the number of questionnaires distributed to the stakeholders and the number of questionnaires returned along with the response rate % for each stakeholder category.

Table 1. Questionnaire Response from constructional professionals

Category	No of Questionnaire sent	No of Questionnaire received
Client	09	06
Consultant	08	04
Contractor	06	03
Total	23	13

In the present study, after analyzing the data from the questionnaire survey, top ten factors from each method are taken. Out of these ten factors, six were found to be common in ranking by both Relative Importance Index and Importance Index methods.

The six factors are:

1. Inaccurate estimates,
2. Poor site management and supervision by the contractor,
3. Ineffective planning and scheduling of project by contractor,
4. Improper construction methods implemented by contractor,
5. Delay's in sub-contractor's work and
6. Shortage of construction materials in market.

The following points are recommended to all parties in order to minimize and control time and cost overruns in construction projects.

- Contractors are recommended to use the advance correctly to avoid financial problems. It is recommended that contractor has to review the project from time to time in order to avoid over cost.
- Contractors are recommended to do proper planning and good site management system in the various project activities in order to avoid mistakes that may lead to a re-elaboration of the activities, resulting in time and overcoming costs. Contractor has to establish stores for the necessary building materials and especially that are

scarce or limited quantity in the market to avoid time and cost overruns.

- Planning and scheduling are processes in place during construction and match the resources and time to develop work to avoid overcoming costs and disputes. Management, Engineers, other technical staff and administrative staff should be assigned as soon as project is awarded to make arrangements to achieve completion within specified time and estimated cost.
- The client must determine the required project duration and impose a realistic duration to avoid time overruns and over cost. It is recommended to the client to have the technical staff able to handle the various phases of any project and to follow the rates of performance, and also able to compare performance with scheduled.
- The client is recommended giving sufficient time for bid documents such as technical specifications, drawings, bill of quantities and designing of the project and revising it in a good way. This is because any discrepancy in bid documents will lead to disputes between projects parts and so delay may occur. Pay progress payment to the contractor on time because it impairs the contractors' ability to finance the work.
- Client advises to minimize possible modification orders to avoid any overtime and costs. Communication and co-ordination between stakeholders should be improved to minimize time and cost overruns.
- Consultants are advised to continuous coordination and direct communication with contractors and clients, eliminating discrepancies and design errors and omissions in the design and also the opportunity to carefully examine the contract documents. This would help eliminate any modification orders or variations due to discrepancy in the specifications.
- Consultants recommend recruiting a qualified technician to handle the project in a good way so you can overcome any technical or managerial problems that may arise. It is also advisable to have a highly qualified consultant to provide appropriate instructions at the right time and to answer any questions from the contractor to avoid time and overcoming costs. They must examine and approve design documents, store design drawings and payments to avoid delays or overcoming project costs.
- Consultants adopt effective data distribution systems to protect against communication gaps are recommended; Respond as quickly as possible to the contractor's and client's requests and clarification requests to avoid delays and confusion associated as a result of time and cost overruns.
- The government should create a climate of economic stability that is sufficient to inspire investors, especially in the production of building materials that are produced with local materials and the production of sufficient quantities and the quality of construction materials in the local market; this will help to reduce excessive price fluctuations associated with imported construction materials.
- The government should provide training for construction professionals and companies to develop the performance of professionals. In addition, the government has to start intellectuals on time and general costs research.
- The government should create opportunities for local contractors and consultants to work with international contractors and consultants to share experiences and adopt new technologies.

5. CONCLUSION

Construction industry is considered to be dynamic industry which is constantly facing uncertainties that make cost and time management difficult and consequently faces cost and time overruns. In this context cost and time overruns have been considered as the major barriers during tendering and the execution of construction projects. The delays and cost overruns in construction projects in India are studied through field survey.

From the present study, following are the conclusions:

- Major factors effecting time and cost overruns were found from past literature and previous works, which are 42 in number.
- Questionnaire survey was conducted among thirteen different respondents and prioritizing the major barriers effecting cost and time overruns.
- Based on the questionnaire survey results, Relative Importance Index and Importance Index were calculated and ten most important barriers effecting cost and time overruns were found.
- It can be concluded that planning, inaccurate estimation of quantities and environmental factors are the major barriers in construction industry causing time and cost overruns.

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