

STUDY ON THE DELAYS IN BUILDING PROJECTS

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Abstract- Delays and cost overruns have become common failure factors in the construction industry due to the inherent risks and increasing complexity of modern construction projects. As the risks involved in construction projects are very high, the failures also cause very high economic loss in terms of all resources. Most of the construction projects are not making a good profit due to lack of efficiency in management. As a result, the causes behind delays and cost overruns have remained under-researched. Studies on time delay, cost overruns and project risks help to improve the profit and quality. Therefore the study of delays is very important as it paves way to future success. The purpose of this study is to find out the critical factors causing delay, cost overruns and the major project risks in construction projects through a questionnaire, The questionnaire analysis is divided into three categories. They are related to delay, cost overruns and project risks. A total of 50 construction companies including architects, builders and contractors are surveyed and the most critical factors are identified. The critical factors are ranked according to their priority. Improvements in terms of strategic management are suggested according to the valuable comments that have been acquired from various companies. Implementation of this research would be of great help for future construction projects to avoid such problems.

Keywords: Delay, Cost overrun, Questionary

1. INTRODUCTION

The growth of construction industries and infra development are one of the sustainable developments of Indian economy. As the risks involved in construction projects are very high, the failures also cause very high economic loss in terms of all resources. Most of the construction projects are not making a good profit due to lack in efficiency of

management. Successful projects make more profit and it is an advantage for the economy of the country (Ossama 1996). For all successful projects, the top management and front-line workers should ensure the quality and profit for the management policy. Studies on time delay, cost overruns and project risks help to improve the profit and quality. Therefore the study of failures is very important as it sets a path to the future success.

A complex construction job clearly requires an efficient management in excruciating detail to orchestrate materials and manpower. Inefficient management can result in waste, delays and a shabby end-product. This project is a study of the causes of failures due to inefficient management in terms of time delay, cost overruns, and project risks. A detailed study on all these factors will be done by preparing a questionnaire and circulating it among the top industries in construction field.

The risks involved in a construction project are as great as any company normally faces and these risks are different in nature from the kind of companies used to. Yet, many corporate officers and directors who constantly analyze and manage every other controllable risk fail to use all the tools available to control construction risk (Ossama 1996). One reason they overlook or underestimate construction risk – and delegate it to subordinates to handle – is that construction is considered old technology. Buildings have always been built; therefore, it is wiser to delegate a procedure that has been repeated so many times throughout history. In addition, it seems, most companies do not go through the building process frequently enough to warrant such an effort.

Hemanta Doloi (2013), defined critical factors for cost escalation are: accurate project planning and monitoring, design efficiency, effective site management, communication, contractor's efficiency, project characteristics, due diligence, and market

competition. Ibrahim Mahamid et al.(2012),ranked delay causes into project group, owner group, material and equipment group, laborer group, external group, design group, contractor group, and consultant group. K.C.Iyer et al. (2004),gives two attributes namely one for project success and one for project failure. Project success attributes are project manager's competence, supportive owners and top management, monitoring,feedback and coordination, favorable working conditions, commitment of all project participants, owner's competence whereas project failure attributes are conflict among project participants, project manager's ignorance, hostile socio-economic environment, owner's incompetence, indecisiveness of project participants, harsh climatic condition and project specific factor.

Summary of literature review says that, The preconstruction, execution, and post construction planning in many cases are found to be unrealistic where projects suffer from time delay, cost overruns and project risks. From detailed study it can conclude that the failures due to inefficient management cannot remove completely but it can be reduced to a minimum level if a strategic

2. METHODOLOGY

The methodology of this project is explained in a flow chart as Figure 3.1.

2.1. QUESTIONNAIRE DESIGN

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. The format of the questionnaire is on the format containing strongly agree-agree-neutral-disagree-strongly disagree. The questionnaire is prepared by studying the literature thoroughly and also consulting with the experts in the construction field. The questionnaire is divided into 3 parts namely Time delay, Cost overruns and Project Risk. Each part consists of 25 questions.

2.2. QUESTIONNAIRE SURVEY

Questionnaire survey will be conducting in a total of fifty companies including builders, contractors, consultancies and architects. It will be done by concentrating on two major cities in India, kasaragod and mangalore. A total of 15 companies will be surveyed at kasaragod and 35 will be surveyed at mangalore.

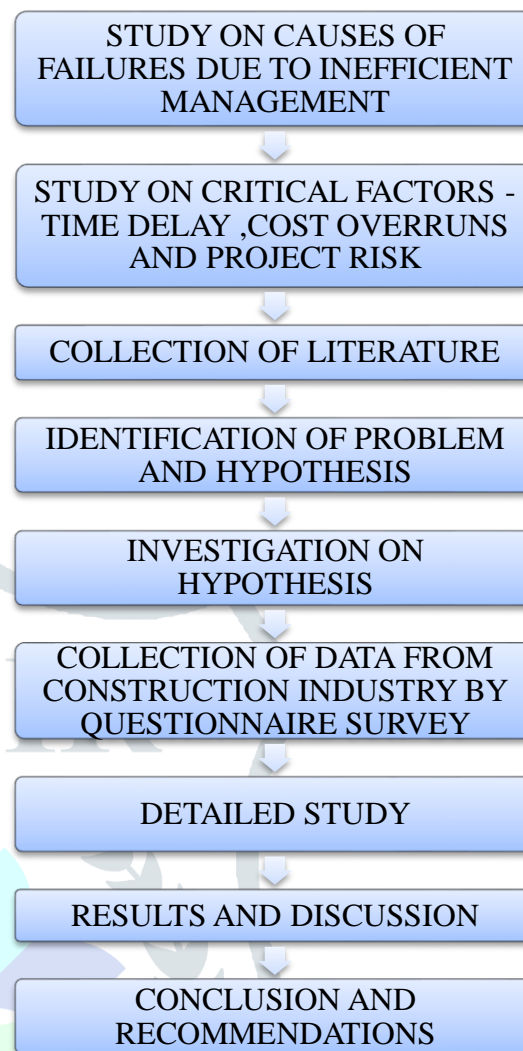


Figure 3.1 Flowchart of Methodology

2.3. RELATING THE QUESTIONNAIRE TO SAMPLE SIZE

The question of a large sample to take arises early in the planning of any survey. This is an important question that should be treated lightly. To take a large sample than is needed to achieve the desired results is wasteful of resources whereas very small samples often lead to that are no practical use of making good decision. The main objective is to obtain both a desirable accuracy and a desirable confidence level with minimum cost. In order to have confidence that the survey results are representative, it is critically important that there are a large number of randomly-selected participants in each group of survey.

Sample size (N)	Margin of error (fraction)	Margin of error (percentage)
10	0.316	31.6
20	0.224	22.4
50	0.141	14.1
100	0.100	10.0
200	0.071	7.1
500	0.045	4.5
1000	0.032	3.2
2000	0.022	2.2
5000	0.014	1.4
10000	0.010	1.0

For a 95% confidence level (which means that there is only a 5% chance of your sample results differing from the true population average), a good estimate of the margin of error (or confidence interval) is given by $1/\sqrt{N}$, where N is the number of participants or sample size (Niles, 2006). The table 3.1 shows this estimate of the margin of error for sample sizes ranging from 10 to 10,000. (For more advanced students with an interest in statistics, the Creative Research Systems website (Creative Research Systems, 2003) has a more exact formula, along with a sample size calculator that can use. For most purposes, though, the $1/\sqrt{N}$ approach is sufficient.)

It is possible to quickly see from the table that results from a survey with only 10 random participants are not reliable. The margin of error in this case is roughly 32%. This means that, for example, that 6 out of your 10 participants (60%) had a fear of heights, then the actual proportion of the population with a fear of heights could vary by $\pm 32\%$. In other words, the actual proportion could be as low as 28% ($60 - 32$) and as high as 92% ($60 + 32$). With a range that large, your small survey isn't saying much. Increase the sample size to 100 people, margin of error falls to 10%. Now if 60% of the participants reported a fear of heights, there would be a 95% probability that between 50 and 70% of the total population have a fear of heights. If we want to narrow the margin of error to $\pm 5\%$, you have to survey 500 randomly-selected participants. The bottom line is, need to survey a lot of people before we can start having any confidence in the results. Table 3.2 gives the margin of error for different sample sizes and table 3.3 shows the confidence level and the corresponding sample size for each confidence level.

Table 3.2 Sample Size and Margin of Error

With a sample size of	100	200	300
Margin of error would be	9.78%	6.89%	5.62%

Table 3.3 Confidence Level and Sample Size

With confidence level of	90	95	99
Sample size would need to be	267	377	643

In terms of the numbers selected, the sample size n and margin of error E are given by

$$X = Z(c/100)^2 r(100-r)$$

$$N = N_x / ((N-1)E^2 + x)$$

$$E = \text{Sqrt}[(N-n)x/n(N-1)]$$

Where N is the population size, r is the fraction of responses that we are interested in, and $Z(c/100)$ is the critical value for the confidence level c . This calculation is based on the normal distribution, and assumes having more than about 30 samples.

The questionnaire survey will be related to sample size, the total registered construction companies including builders, contractors and consultancies of both Chennai and Cochin will be found out and answered questionnaire will be analyzed according to the sample size. The results and recommendations will be given according to the analysis.

2.4. VALIDITY OF DATA

Validity is the degree to which the questionnaire reflects reality. The sample size for the questionnaire is 50 numbers, therefore from the studies, it was found that the margin of error is 14.1% . Therefore the validity of data will be 85.9%.

2.5. RELIABILITY OF DATA

Questionnaire is vital to the investigations around construction delays, cost overruns and project risks. The Questionnaire was distributed among

architects, project consultancies, builders and contractors. Thereby a wide range of data is collected.

3. FACTORS CAUSING FAILURES IN CONSTRUCTION PROJECTS DUE TO INEFFICIENT MANAGEMENT

Construction industry is complex in its nature because it contains large numbers of parties, contractors, consultants, stakeholders, regulators and others. Construction projects suffer from many problems and complex issues in performance such as cost, time, and safety. This project is the investigation on the causes of failures of construction industry due to inefficient management. Improvements in terms of strategic management. The causes of factors mainly focused on the following factors.

- 1) Time delay
- 2) Cost overruns
- 3) Project risk

3.1 TIME DELAY

Delay can be defined as the overrun or extension of time to complete the project. Delay is a situation when the actual progress of a construction project is slower than the planned schedule or late completion of projects. Delay gives increase to disturbance of work and loss of productivity, late completion of projects, increased time related costs and 3rd party claims and abandonment of termination of contract. Construction delay is considered to be one of the most recurring problems of the construction industry and it has an adverse effect on project success in terms of time, cost, quality and safety. Construction delays are for the most part costly, and completing projects on time is beneficial to all project parties. Therefore, it is essential to identify the actual causes of delay in order to minimize and avoid delays and their corresponding expenses.

3.2 COST OVERRUN

Construction projects, private and public alike have a long history of cost escalation. A large number of studies and research projects have identified individual factors that lead to increased project cost. Cost estimation is a technical process of predicting expenditure and success depends on accurate integration of project information, resources and control over project information. Cost overruns are the major factor that puts the construction industry into a big loss. A detailed investigation on all the factors that can affect the cost overruns will be made and ascertain the actual cost overruns. The major causes of cost overruns are listed down in points.

Causes of cost overruns

- Insufficient planning and inaccurate estimating
- Ineffective project governance, management and oversight
- Unanticipated site conditions
- Poor project controls
- Design errors and omissions
- Inexperienced management team
- Lack of skilled labor availability
- Poor risk identification, management and response strategy
- Ineffective decision making process

3.3. PROJECT RISK

Risk is involved in every business and construction industry no exception. Most of the project management issues in fact, arise from the associated uncertainties. Construction is a process governed by complicated contracts and involving complex relationships in several tiers and there are many risks involved in construction projects. Generally there are 3 kinds of construction risks they are Finance, Time and Design. This study addresses the risk in detail of different contractual relationships existing among the functional liability involved in the design, development and construction of a project and identifies the proper steps to be taken in the analysis management of construction risk.

3.4. STRATEGIC MANAGEMENT

Strategic Management analyses the major initiatives taken by a company's top management on behalf of owners, involving resources and performances and internal and external environments. It contains specifying organization's mission, vision and objectives, developing policies and plans, often in terms of project and programmes, which are designed to achieve these objectives and then allocating resources to implement the policies and plans, projects and programmes. This study summarizes of some current thinking on strategic management.

3.5. MEAN VALUE

The Mean value is defined as the average value of observed data. The mean for the data is obtained from the descriptive analysis. The questionnaire was designed by giving 5 options. They are

- 1- "STRONGLY AGREE"
- 2- "AGREE"
- 3- "NEUTRAL"
- 4- "DISAGREE"
- 5- "STRONGLY DISAGREE"

Those factors having mean value less than 2.5 that relate themselves to positive statements are taken as the critical factors for each failure. On the other hand, the negative statements that have a mean value of 2.5 and above are taken as critical factors in certain cases.

4. RESULTS AND DISCUSSIONS

The investigation has been made on cause of the failures of construction projects due to inefficient management arrived at the critical factors for delay, cost overruns and critical project risks. The factors are ranked by the analysis made in the study. Those factors which are common in all the four analysis say (overall, architects, builder, contractor) are ranked 1, and those factors common on any of the 3 analysis are ranked 2, those factors common in any of 2 analysis are ranked 3 and those factors in one analysis is ranked 4.

RANK 1: CRITICAL FACTORS THAT CAUSE DELAY IN CONSTRUCTION PROJECTS

1. Inefficiency of manpower
2. Increased lead time of materials
3. Problems between owner and contractor
4. Lack of technology used by the contractor
5. Reworks due to mistakes committed by the contractor
6. Conflicts between sub-contractors
7. Frequent change of sub-contractors due to inefficient work
8. Delay in delivering site to contractor by the owner
9. Delay made by owner in taking decisions
10. Frequent modifications in design by the owner
11. Lack of well updated schedule/risk register
12. Rework due to change in government policies
13. Errors in documents submitted to the government
14. Improper acquisition of the land by the owner

CRITICAL FACTORS THAT COST OVERRUNS IN CONSTRUCTION PROJECTS

1. Lack of unforeseen topographical condition
2. Complexity of the project
3. Location of the project
4. Delay in finalization of finished items by the sub-contractors
5. Wrong construction methods
6. Low speed in decision making by the management
7. Mistakes made during construction
8. Due diligence
9. Lack of understanding between contractor and owner
10. Poor project estimation
11. Inappropriate tender quoting
12. Owner initiated variations
13. Poor clarity in design/scope
14. Reworks made during the construction

15. Accidents in construction sites
16. Omission of important details
17. Lack of awareness of IS codes
18. Inflation in economy
19. Lack of availability of quality materials
20. Non-adherence to contract conditions
21. Fraudulent practices and kick backs in market

CRITICAL PROJECT RISKS

1. Delay penalty
2. Lack of fund and attrition of resources
3. Ensuring safety
4. Risks due to cost and time
5. Delay in getting government approvals
6. Procurement of appropriate materials at right time
7. Geography and location of construction site
8. Uncertainty of weather conditions
9. Location of site and its marketability
10. Analysing all risk factors at planning stage
11. Maintaining well maintained risk registers
12. Analysing risks of entire project
13. Building an efficient construction team
14. Management of materials and laborers
15. Prediction of all risks that can involve in the construction
16. Shortage of laborers and construction materials
17. Controlling of risk elements
18. Making of well defined strategic framework

RANK 2:

CRITICAL FACTORS THAT CAUSE DELAY IN CONSTRUCTION PROJECTS

1. Lack of periodic review meetings

CRITICAL FACTORS THAT COST OVERRUNS IN CONSTRUCTION PROJECTS

1. Long tender period
2. Necessary variations of projects

CRITICAL PROJECT RISKS

1. Coordination between top management and site team

RANK 3:

CRITICAL FACTORS THAT CAUSE DELAY IN CONSTRUCTION PROJECTS

1. Welfare programs for the laborers
2. Liquidity crunch for the owner
3. Lack of expertise and experienced management

RANK 4:

CRITICAL FACTORS THAT CAUSE DELAY IN CONSTRUCTION PROJECTS

1. Complexity of the project

CRITICAL FACTORS THAT COST OVERRUNS IN CONSTRUCTION PROJECTS

1. Inadequate insurance covers
2. Market competition

CRITICAL PROJECT RISKS

1. Completing whole project within estimated budget
2. Completing the project within approved construction schedule

5. CONCLUSION

Project delays, cost overruns and risks have been a topic of concern in the construction industry. Delays have become a universal phenomenon and are always accompanied by cost and time overruns. These failures can be minimized only when their causes are identified. This project was therefore, aimed at identifying the major causes of delays, cost overruns and the major project risks in construction industry through a questionnaire survey. Each study has a unique approach and unique results are derived from the questionnaire response data. The study has ranked the factors into 4 ranks by the results acquired from the analysis. The study will help to decrease the time delay and cost overruns in construction projects thereby ruling out the failures of management that can cause the same. Identifying the major risks in construction projects means, it can be handled with great care making the entire project to great success in case of quality and profit.

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