

Assessment of Cost Escalation and Overrun in Construction Projects

Mrs.Jeya Priya.R

Assistant Professor

Department of Civil Engineering,
MNM Jain Engineering College,
Anna University, Chennai-97.

Ms.Nandhini.S

Assistant Professor

Department of Civil Engineering,
MNM Jain Engineering College,
Anna University, Chennai-97.

Abstract

Cost is among the major considerations throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success. Despite its proven importance it is not uncommon to see a construction project failing to achieve its objectives within the specified cost. Cost overrun is a very frequent phenomenon and is almost associated with nearly all projects in the construction industry.

This trend is more severe in developing countries where these overruns sometimes exceed 100% of the anticipated cost of the project. This paper is attempted to identify the major cost overrun and cost escalation factors in the construction industry. A thorough literature review is done through which a number of cost overrun and escalation causes are identified in construction industry scenario. In total forty seven (47) factors were finalized to made part of the survey questionnaire. Out of these, cost escalation factors (14) and cost overrun factors (33) were to be considered. Using SPSS (statistical package of social science) tool, critical factors were to be ranked. Measures are to be taken for cost overrun problem.

Keywords-cost escalation, cost overrun, SPSS, Questionnaire, influence factors

INTRODUCTION

Historically large construction projects have been plagued by cost and schedule overruns. In too many cases, the final project cost has been higher than the cost estimates prepared and released during initial

planning, preliminary engineering, final design, or even at the start of construction. Construction investments are sensitive to time and cost overrun.

Delay and cost escalation are considered two threats to project success. The problem of cost overrun, especially in the construction industry, is a worldwide phenomenon, and its effects are normally a source of friction between owners especially government owners, project managers, and contractors in terms of project cost variation subsequent to the owner's decision to build. For these problems, need to find out the major factors which influencing cost escalation and overrun in construction field

OBJECTIVES

The objective of this paper is 1) to determine the factors affecting cost escalation and cost overrun 2) to formulate the questionnaire with factors which affect the cost escalation and overrun 3) to identify the critical factors by ranking them 3) to recommend the measures to avoid the cost overrun.

SCOPE OF STUDY

The purpose of this study is

- 1) To identify the issues involved in cost overruns and cost escalation in construction projects.
- 2) Identifying certain factors through the literature review which impacts cost overrun and cost escalation.
- 3) The factors will be identified through a survey from construction firms.
- 4) To propose some recommendations and mitigation measures have been suggested to strategically cope up with these factors

Several literature studies have sought to determine the magnitude of the cost overrun and escalation problem. SPSS tool used to analyse the factors and Identification of these cost escalation and overrun factors supports efforts to understand the causes of project cost escalation.

METHODOLOGY

The methodology of the study is follows:

1. A thorough literature review was done and also the expert opinions from industry experts were taken, through which a number of cost overrun and escalation causes were identified in the local construction industry scenario. In total forty seven (47) factors were finalized to made part of the survey questionnaire. Out of these cost escalation factors (14) and cost overrun factors (33) are considered.

2. Questionnaire consisting of two parts A and B was developed. In Part A personal Information of the respondent (for e.g. work experience, organization, annual volume of construction work) was asked. Part B was aimed to obtain information about causes of cost overrun and escalation in construction industry, it was asked to rate those initially identified forty seven (47) factors according to their severity level on the given scale, information regarding low, very low, medium, high, very high cost overrun and escalation ranges experienced over projects were asked.

3. A survey was conducted through mail and personal interviews in which respondents were asked to rank and score these factors according to their experience.

4. Assessment of feedback from questionnaire survey using SPSS tool.

DATA ANALYSIS

STATISTICAL PACKAGE OF SOCIAL SCIENCES (SPSS)

SPSS is among the most widely used programs for statistical analysis in social science. It is used by market researchers, health researchers, survey companies, government, education researchers,

marketing organizations and others In addition to statistical analysis, data management and data documentation are features of the base software. Originally it is an acronym of Statistical Package for the Social Science but now it stands for Statistical Product and Service Solutions. One of the most popular statistical packages which can perform highly complex data manipulation and analysis with simple instructions. The approaches used under SPSS are 1.Descriptive analysis and 2.Frequency analysis

COMPANY PROFILES

In order to interpret the results of the surveys, the title of the person interviewed, the type and size of the company, and the type, size, and location of the project that was referred to during the interview were identified using SPSS.

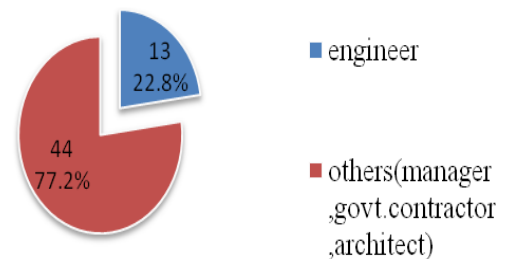


Fig 1 Title of Survey Participants

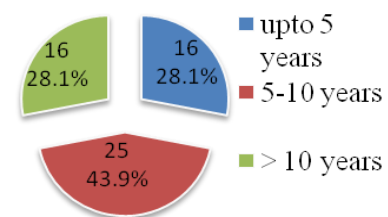


Fig 2 Participants Experience

FACTORS CONTRIBUTING TO COST ESCALATION

The respondents were asked to rank the factors which cause the cost escalation. Responses in this section are given on five point scale. Most frequent factors correspond to very high whereas the least frequent correspond to very low condition.

Factors	Very Low		Low		Medium		High		Very High	
	N	%	N	%	N	%	N	%	N	%
Inflation	3	5.3	27	47.4	17	29.8	5	8.8	5	8.8
Exchange Rate	4	7	6	10.5	31	54.4	15	26.3	1	1.8
Environmental Protection Freight And Transportation Cost	4	7	6	10.5	31	54.4	15	26.3	1	1.8
Demand And Supply	10	28.6	7	20	12	34.3	3	8.6	3	8.6
Government Policies	2	5.7	12	34.3	9	25.7	10	28.6	2	5.7
Taxes	5	14.3	3	8.6	8	22.9	8	22.9	11	31.4
Interest Rate	2	5.7	7	20	8	22.9	17	48.6	1	2.9
Power Tariff	6	17.1	4	11.4	14	40	9	25.7	2	5.7
Raw Material Input	7	20	9	25.7	10	28.6	8	22.9	1	2.9
Labour Cost	1	2.9	5	14.3	16	45.7	12	34.3	1	2.9
Technology Upgradation	6	17.1	9	25.7	5	14.3	10	28.6	5	14.3
Price Increase By Manufacturers	4	11.4	11	31.4	4	11.4	15	42.9	1	2.9
Market Volatility	2	5.7	7	20	17	48.6	7	20	2	5.7

Table 1-Factors contributing to cost escalation(frequency analysis)

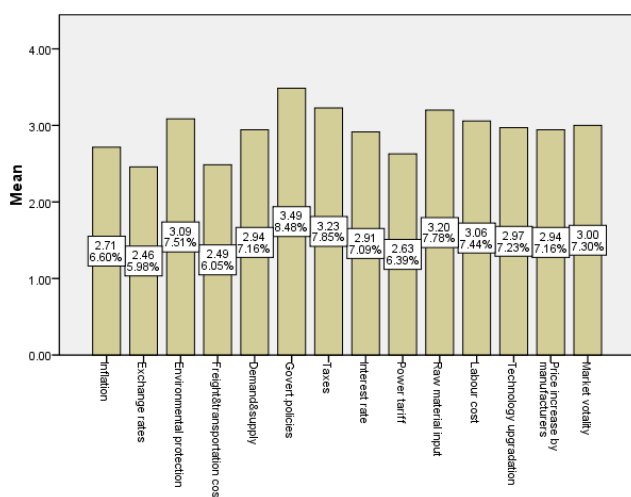


Fig 3 Factors Contributing To Cost Escalation (Descriptive Analysis)

FACTORS INFLUENCING COST OVERRUN

A number of variables influencing the cost overrun in construction industry were identified following a thorough literature review. The literature review was done through books, internet, leading construction management and engineering journals. A careful study of previous literature suggests cost overrun factors that can be grouped under five categories

- Client related factors
- Architect related factors
- Structural engineer related factors

- Contractor related factors
- External factors

Responses in this section are given on five point scale. Most frequent factors respond to 'very high' condition whereas the least frequent factors correspond to 'very low condition'.

The results of frequency analysis and descriptive analysis are tabulated.

Factors	Very Low		Low		Medium		High		Very High	
	N	%	N	%	N	%	N	%	N	%
Number of changes/extra work order	27	47.4	8	14	14	24.6	8	14		
Slow decision making	7	12.3	10	17.5	14	24.6	9	15.8	17	29.8
Delay in contract award	5	8.8	12	21.1	27	47.4	8	14	5	8.8
Delay in handling over of site	8	14	6	10.5	29	50.9	14	24.6		
Unrealistic schedule	19	33.3	14	24.6	10	17.5	5	8.8	9	15.8
Cash flow during construction	4	7	28	49.1	14	24.6	10	17.5	1	1.8

Table 2 client related factors

Factors	Very Low		Low		Medium		High		Very High	
	N	%	N	%	N	%	N	%	N	%
Deficiencies in cost	5	8.8	23	40.4	11	19.3	15	26.3	3	5.3
Estimation & specification prepared	24	42.1	6	10.5	14	24.6	9	15.8	4	7
Incomplete architectural drawing	24	42.1	8	14	10	17.5	11	19.3	4	7
Delay in work approval	7	12.3	8	14	10	17.5	9	15.8	23	40.4
Variation orders	18	31.6	17	29.8	15	26.3	5	8.8	2	3.5
Poor information & dissemination	7	12.3	13	22.8	32	56.1	5	8.8		
Inadequate supervision	4	7	20	35.1	13	22.8	8	14	12	21.1

Table 3 Architect related factors

Factors	Very Low		Low		Medium		High		Very High	
	N	%	N	%	N	%	N	%	N	%
Incomplete structural drawing	8	14	31	54.4	11	19.3	5	8.8	2	3.5
Structural design variations	5	8.8	20	35.1	23	40.4	6	10.5	3	5.34
Inadequate supervision	4	7	19	33.3	25	43.9	7	12.3	2	3.5
Late issuance of instruction	4	7	27	47.4	14	24.6	8	14	4	7
Poor services & design information	3	5.3	31	54.4	9	15.8	12	21.1	2	3.5

Table 4 Structural engineer related factors

Factors	Very Low		Low		Medium		High		Very High	
	N	%	N	%	N	%	N	%	N	%
Contract tender price higher than original estimate	4	7	11	19.3	12	21.1	27	47.4	3	5.3
Planning & scheduling deficiencies	9	15.8	17	29.8	20	35.1	9	15.8	2	3.5
Non availability of sufficient amount of skilled labour	18	31.6	14	24.6	12	21.1	11	19.3	2	3.5
Financial difficulties	2	3.5	9	15.8	34	59.6	8	14	4	7
Low bid	4	7	12	21.1	28	49.1	10	17.5	3	5.3
Lack of coordinates between project participants	21	36.8	10	17.5	15	26.3	8	14	3	5.3
Shortening of contract period	10	17.5	6	10.5	28	49.1	9	15.8	4	7

Table 5 Contractor related factors

Factors	Very Low		Low		Medium		High		Very High	
	N	%	N	%	N	%	N	%	N	%
Bad weather	22	38.6	12	21.1	15	26.3	6	10.5	2	3.5
Strike	24	42.1	23	40.4	6	10.5	3	5.3	1	1.8
Productivity	19	33.3	15	26.3	14	24.6	6	10.5	3	5.3
Environmental impact	25	43.9	12	21.1	8	14	9	15.8	3	5.3
Site conditions	16	28.1	10	17.5	23	40.4	6	10.5	2	3.5
Price changes	12	21.1	7	12.3	6	10.5	27	47.4	5	8.8
Fraudulent practices and kickbacks	2	3.5	13	22.8	12	21.1	27	47.4	3	5.3
Insurance	8	14	26	45.6	14	24.6	8	14	1	1.8

Table 6 External factors

TOP CRITICAL FACTORS	MEAN	RANK
Delay in work approval	3.58	1
Slow decision making	3.33	2
Fraudulent practices and kickbacks	3.28	3
Contract tender price higher than original estimate	3.25	4
Price changes	3.11	5
Inadequate supervision	3.07	6
Financial difficulties	3.05	7
Delay in contract award	2.93	8
Low bid	2.93	9
Delay in handing over of site	2.86	10

Table 7 Top factors influencing cost overrun

SUMMARY AND CONCLUSION

SUMMARY

The thesis is conducted in order to make an attempt to identify which critical factors influence cost overrun and cost escalation in construction projects. Based on the results of the survey critical success factors were

identified. Questionnaire was prepared and distributed to respondents. The respondents are asked to rank the factors. Based on the result of the survey, critical factors are identified and analysis done by SPSS software. This paper focuses on identifying critical factors which influence cost overrun and escalation in projects and with the result can take steps to avoid time and cost overrun in construction projects

CONCLUSION

The initial objectives of this research were to define critical factors which influence the project cost escalation and overrun. These general objectives were met through the accomplishments of the research. More importantly, list of specific factors were identified to avoid project cost escalation and overrun.

The top five cost escalation factors are

- 1) Government policies
- 2) Taxes
- 3) Raw material input
- 4) Environmental protection and
- 5) Labour cost.

The top five cost overrun factors are

- 1) Delay in work approval
- 2) Slow decision making
- 3) Fraudulent practices and kickbacks
- 4) Contract tender price higher than original estimate and
- 5) Price changes

REFERENCES

1. Azhar, N., (2008) "Cost Overrun Factors In Construction Industry of Pakistan," First International Conference on Construction In Developing Countries, vol.1, pg no.499-598
2. Bhargava, A., Anastasopoulos, P. Ch., Labi, S., Sinha, K. C., Hon, M. and Mannering, L. F., (2010) "Three-Stage Least-Squares Analysis of Time and Cost Overruns in Construction Contracts," Journal of Construction Engineering and Management, Vol. 136, No. 11

3.Creedy,G.D., Skitmore,M. and Wong,J.K.W.,(2010) "Evaluation of Risk Factors Leading to Cost Overrun in Delivery of Highway Construction Project,"*Journal of Construction Engineering and Management*, Vol. 136, No. 5

4.Flyvbjerg,B., Holm,M.K.S. and Buhl,S.L.,(2003) "How common and how large are cost overruns in transport infrastructure projects?," *Transport reviews*, vol. 23, no. 1, pg.no.71-88

5.Gkritza,K. and Labi,S.,(2008) "Estimating Cost Discrepancies in Highway Contracts: Multistep Econometric Approach,"*Journal of Construction Engineering and Management*, Vol. 134, No. 12

6.Hammad,A.A., Ali,S.M.A., Sweis,J.G. and Sweis,G.J.,(2010) "Statistical Analysis on the Cost and Duration of Public Building Projects," *Journal of Management in Engineering*, Vol. 26, No. 2

7.Knight,K. and Fayek,A.R.,(2000) "A preliminary study of the factors affecting the cost escalation of construction projects", Department of Civil and Environmental Engineering, University of Alberta, Edmonton.

8.Lee,J.K.,(2008) "Cost Overrun and Cause in Korean Social Overhead Capital Projects: Roads, Rails, Airports, and Ports," *Journal of Urban Planning and Development* ,Vol. 134, No. 2, pg.no.59-62

9.Memon,A.H.,Rahman,I.A.,Abdullah,M.R.and Azis,A.A.,(2010) "Factors Affecting Construction Cost in Mara Large Construction Project," *International Journal of Sustainable Construction Engineering & Technology* ,Vol. 1, No 2

10.Okpala,D.C. and Aniekwu,A.N.,(1998) "causes of high costs of construction in Nigeria," *Journal of Construction Engineering and Management*, Vol. 114, No. 2,pg.no.233-244

11.Shane,J.S.,Molenaar,K.R.andAnderson,S.,(2009) "Construction Project Cost Escalation Factors,"*Journal of Management in Engineering*, Vol. 25, No. 4

12.Touran,A. and Lopez,R.,(2006) "Modeling Cost Escalation in Large Infrastructure Projects," *Journal of Construction Engineering and Management*, Vol. 132, No. 8

13.Thal,A.E.,Cook,J.J.andWhite,E.D.,(2010)"Estimation of Cost Contingency for Air Force Construction Projects,"*Journal of Construction Engineering and Management*, Vol. 136, No. 11