

# Evaluation of the Factors Influencing Time and Cost Overrun in Construction

Mr. S. Manishankar<sup>1</sup> Mr. V. Praveen<sup>2</sup>

<sup>1</sup>Assistant Professor <sup>2</sup>PG Student

<sup>1,2</sup>Department of Civil Engineering

<sup>1,2</sup>Mahendra Engineering College, India

*Abstract*— Construction industry is considered as one of the most important and second largest industries in India after agriculture. It is well known that most construction projects in India, especially in Tamil Nadu are exposed to time and cost overrun or both. Time cost schedule is a crucial task in construction project management. This phenomenon may affect the progress of construction industry in Kerala as well as may expose many institutions of construction to be destroyed. For instance, it can materially help to identify the expected financial requirements. It is also an important tool for the time control process. Construction project time schedule is greatly affected by many uncertain but predictable factors. This research lists the main factors affecting time and cost overrun and discusses their influence on schedule performance. The main factors are analyzed using Statistical Package for the Social Science (SPSS 16.0). From the analysis, planning and scheduling deficiencies, financial unavailability, quality of materials, rain / inclement weather effect, inaccurate time estimates, design changes by owner are found to be most critical factors.

**Keywords:** Construction Industry, Cost and Time Overrun, Social Science (SPSS 16.0)

## I. INTRODUCTION

This thesis aims to identify the various factors influencing duration in construction based on type of projects. Normally the main goals of any successful construction project management system are to complete the project on time, within the planned budget, and with the required quality limits. The three goals are inter-related where each of them is affecting, and being affected by, the others. In order to meet the time deadline of a project, an accurate scheduling should be done. Due to the unique nature of construction projects, time contingency and project uncertainty are essential for accurate scheduling, which should be flexible enough to accommodate changes without negatively affecting the overall duration of the project. It is essential to allocate a contingency value to both cost and time. Yet, there are situations where there could be delays in activities that result in a delay in the overall project duration. These delays will consequently have a negative impact on the quality and budget of the project. Therefore, estimating time contingency is seen as a major factor for achieving success in construction projects. Although several industrial sectors developed and used software for estimating time and cost contingencies in order to minimize delays and over budget, yet limited efforts are reported in the literature in the area of predicting time contingency in the construction sector.

## II. CAUSES OF PROJECT DELAY

Delay and cost overrun are inherent parts of most projects despite the much acquired knowledge in project management.

Although some may argue that this is negligible, it is important to note that the physical and economic scale of projects today is such that it is driven under the platform of profit to the parent organization, and of national interest (for government projects) by the degree of success defined within the Iron triangle of cost, time, and scope. It is therefore much appreciated to look at some reasons of delays and cost overrun in project and their mitigation process, so as to increase the perception of project success.

Major factor that has been identified as reasons for cost overrun in most projects is design errors. It is important to note that proper representation of client's requirement and the blue print to achieving good technical input to project execution are usually mapped out based on project designs. Thus a design with errors practically means wrong or insufficient representation of project deliverables. This will lead to wrong application of techniques in achieving result, such that as the actual execution phase of the project unfolds these design errors, attempt to correct it will lead to delay and cost overrun. Another way design errors could lead to cost overrun and delay could be seen in the fact that project estimations are done based on the produced designs, as such, having errors in design in a form of omission or misrepresentation will mean that the estimation for the project cost will also include these omissions, thereby leading to extra works, change order etc., thus resulting in delay and cost overrun. Similarly, designs that are done without extensive investigation of site could contain potential errors. This is because such designs could lead to additional work, revision of scope of work, and contract revision as the actual site conditions begin to float up at the construction phase of the project. These will no doubt affect the overall project delivery time and cost. Causes of design errors cited in most projects are inadequate field investigation, error in design and specifications, plan errors, design changes etc. In controlling project delay and cost overrun due to design errors, the basic thing to be considered is the involvement of professional skills and application of competent tools throughout the project. Achieving error free design entails good communication with the entire design team and integrating a design process that is properly planned, giving enough time for corrections, extensive investigation and reviews. Similarly, an effective project planning, controlling and monitoring should be established to enhance project performance throughout the project life cycle. Proper site investigation should be done to ensure that all site conditions are noted in the design, and application of value management could be used to obtain the best cost effective design options. Delay and cost overrun in project could be as a result of scope change. Scope is the term that defines the entire deliverables that is expected at the end of a project. Therefore, logically, it can be said that all project plans, estimation, schedule, quality and base lines are usually designed based in the initial

project scope. Thus, any change in the project scope during execution will mean that the entire initial project plan will have to be reviewed such that a reviewed budget, schedule and quality will have to be developed. This means more time and resources will be needed as against the initial baseline. “With each scope change, precious project resources are diverted to activities that were not identified in the original project scope, leading to pressure on the project schedule and budget”. Project scope change could be as a result of wrong initial scope definition, inherent risk and uncertainties, sudden change of interest, project funding change, etc. this could lead to change request which in turn could lead to change in project deliverables, budget and/or even the entire project team. Poor scope change management could lead to dispute that may require spending time and money on arbitration and litigation for what the contractor or the client believes he is entitled to. This will no doubt lead to delay and cost overrun of the project. To achieve a proper control for scope change, it is important to first identify the fact that change is inevitable in project and could equally be beneficial to the entire project success. Thus the most important thing to do is to integrate a proper change management plan such that a proactive approach could be adopted involving the project stakeholders and incorporating their needs throughout the project lifecycle. During the planning phase of the project, it is important to identify the key success factor in conjunction with the client and establish KPI in the form of milestone that will measure the success for of attaining the project scope. Similarly, to avoid disputes, it is important to always seek approval for changes from sponsor and communicate changes in a timely way. on the expected deliverable.

### III. ANALYSIS AND PREDICTION OF COST AND TIME OVERRUN

The characteristics of the project were obtained and used to tabulate the estimated project duration, final project duration, estimated project cost and final project cost of the projects. The Statistical Package for Social Scientists (SPSS) 19.0 version was used to analyse the variables using Paired t-test. The paired t-test method of analysis compares two samples and determines the likelihood of the observed different between the samples occurring by change. The change is reported as the p-value. A p-value close to 1 means, it is likely that the hypothesized and sample means are the same, since it is very likely that such would happen by change, if the null hypotheses of no difference exist.

The choice of this model is informed by the fact that once the relationship has been determined, it can be used to mark any number of forecasts simply by inserting the value of x for which a forecast is necessary. Where change may have taken place, it is necessary to collect new set of data and recomputed the value of “a” and “b”

The following equation were also used in the analysis

Time overrun = actual project duration - estimated project duration

Cost overrun = actual project cost - estimated project cost.

%cost overrun = cost overrun x100 / estimated project cost.

%time overrun = time overrun x100 / estimated project duration.

## IV. RESULT

### A. Cost and Time Overrun of various projects

This chapter describes the result and discussion of questionnaire survey concerning contingency assessment from contractors, consultants and owner viewpoint in India. This chapter focuses on describing the respondent’s characteristics in addition to the discussion of the factors that influences time cost overrun.

It shows that the maximum percentage time and cost overrun are (58.33 & 48.89) while the minimum percentage time and cost overrun are (12.50 & 7.02). This indicates that the project has cost and time overrun. The paired t-test results show significant differences of 5% level of significant between contract duration and time overrun and contract cost and cost overrun for projects considered for this study.

In the comparison in Table 5.3, p-value of 0.00 <0.05 means that there is less than 5% chance of contract time overrun to be higher than the total project duration. This shows that for this project there is increase in project cost.

S.NO	Estimated Project duration (Months)	Actual Project duration (Months)	Time overrun (Months)	% Time overrun	Estimated cost of project (lakhs)	Final cost of project (lakhs)	Cost overrun (lakhs)	% Cost overrun
1	12.0	17.0	5.0	41.67	4.70	6.00	1.30	27.66
2	12.0	13.5	1.5	12.50	86.40	93.50	7.10	8.22
3	24.0	18.5	6.0	27.08	21.02	25.76	4.74	22.55
4	23.0	30.5	6.5	13.04	300.00	370.00	70.00	23.30
5	15.0	20.0	5.0	33.33	30.90	40.00	9.10	29.45
6	8.0	11.5	3.5	43.75	4.74	6.84	2.10	44.30
7	18.0	25.0	7.0	38.89	62.80	89.6	26.8	42.68
8	13.0	16.0	3.0	23.08	5.70	6.10	0.40	7.02
9	11.0	12.5	1.5	13.64	402.00	503.00	101.00	25.12
10	24.0	38.0	14.0	58.33	20.67	29.23	18.56	31.74
11	12.0	10.0	2.0	16.67	78.00	89.00	11.00	14.10
12	7.0	8.5	1.5	21.43	254.00	290.00	36.00	14.17
13	24.0	28.0	4.0	16.67	60.87	50.45	10.42	17.12
14	22.0	28.0	6.0	27.23	4.50	6.70	2.20	48.89
15	12.0	15.5	3.0	25.00	24.00	27.00	3.00	12.50

Table 1: Cost and Time Overrun of Various Projects

	Project Duration	Time overrun
Mean	16.2800	4.9000
Std. Deviation	6.58610	3.12916
Observation	25	25
Hypothesis	0	
Df	24	
t-start	11.480	
Sig. (2-tailed)	0.00	
P(T<=t)one	0.00	
t critical one	12.359	
P(T<=t)two	0.00	
t critical two	7.830	

Table 2: Paired t-test Results of Contract Duration and Time Overrun

### V. CONCLUSION

The project on the topic Time and Cost Overrun of Construction, various aspects of the time and cost overrun were studied and listed. The questionnaires to conduct survey in different projects and case studies were prepared. The main factors of time and cost overrun are listed as contractor's factors, client factors and owner related factors. The rest of the project is the questionnaire surveying, Case studies and ranking the findings as per importance index method. The questionnaire survey is executed in and analysis is done by using the SPSS software. Then the solutions from my point of view for these problems identified are listing and recommendations are enlighten. The following reasons were observed during this thesis work, which can be held responsible for time cost overrun in construction projects are ; financial unavailability ,planning and scheduling deficiencies ,quality of materials , rain / inclement weather effect ,inaccurate time estimates ,design changes by owner. So it is cleared that the top means of minimization of construction delays are effective strategic planning, frequent progress meeting, accurate initial cost estimates, proper project planning and scheduling, site management and supervision.

### A. Questionnaire Form

NAME	
DESIGNATION	
NO. OF YEARS EXPERIENCE	
NAME OF THE CONSTRUCTION	
LOCATION	
ADDRESS	
TELEPHONE	
EMAIL ID	
GENERAL :	
Sl No.	
1	Site area. Panchayath <input type="checkbox"/> Municipality <input type="checkbox"/> Corporation <input type="checkbox"/>
2	Project sector. Public <input type="checkbox"/> co-operative <input type="checkbox"/> private <input type="checkbox"/>
3	Level of success of the project. High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
4	Project completion is done with in the time and estimated cost. High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
HUMAN RESOURCE RELATED	
5	Payment to Labours. High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
6	The skill of Contractors and workers High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
7	Sufficient number of Staffs High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
8	Unrealistic owner requirement High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
9	The contractors past history was good High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
10	The experience of labours and clients. High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
11	Labour Supply for requirement High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
12	contractor relationship with owner and client High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
13	Any violations done by the contractor in ethical values to make more profit High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
14	waiting time for approval of offset and poor inspection High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>
15	Regular owner interference in the site High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> negligible <input type="checkbox"/>

### REFERENCES

- [1] Aftab Hameed Memona, Ismail Abdul Rahmanb, Noor Yasmin Zainunc, Ahmad Tarmizi Abd Karimd Web-based Risk Assessment Technique for Time and Cost Overrun (WRATTCO) – A Framework(Social and Behavioral Sciences 129 ( 2014 ) volume 2 issue 3 .
- [2] Augustine Purnus, Constanta Nicoleta Bodea – Correlation between time and cost in a qualitative risk analysis of construction projects Procedia Engineering 85 Volume 4, Issue 1, January 2014 .

- [3] Daniel .W.M . Chan , Mohan . M .Kumaraswamy (Alexandria Engineering Journal (2013) - Compressing construction durations:lessons learned from hong kong building projects.
- [4] Desai Megha , Dr Bhatt Rajiv.A - Methodology for Ranking of Causes of Delay for Residential Construction Projects in Indian Context (ISSN 2250-2459, ISO 9001:2008).

