

Analysis of Factors Causing Cost Overruns in Residential Building Construction Projects

Diksha Jadhav^{1*}, B. A. Konnur², Sanjana Patil³

^{1,3}PG Student, Department of Civil Engineering, Government College of Engineering, Karad, India

²Associate Professor, Department of Civil Engineering, Government College of Engineering, Karad, India

*Corresponding author: jadhav25diksha@gmail.com

Abstract: One of India's key industrial industries are the construction industry and the largest driving force in India's national economy. Efficient project management of the construction is based on three main factors, namely time, cost and quality. Cost is a key factor in the project management life cycle and can be viewed as one of the project's most important factors and the driving force behind the project's performance. Cost overruns are common in construction and infrastructure projects. Most projects are subject to cost overruns, and thus exceed the contract's original value. In India, residential building projects are growing in size. However, completion of the projects at the allotted cost is challenging. This paper mainly focuses on residential construction projects. Data obtained from the questionnaire survey is used to identify the main causes of Cost Overruns. The data analysis is performed using the relative importance index (RII) method, and the ranking method identifies the factors that cause significant cost overruns in residential building projects.

Keywords: Analysis, Cost overrun, Factors causing overruns, Relative importance index, Residential building construction project.

1. Introduction

Project delays and cost overruns are a major concern in developing countries, where project execution faces many uncertainties. This leads to a lack of financial shortage funds, delays in infrastructure provision, development and thus increase the construction costs. Despite global economic development driven by globalization and technology, there is a need for a scientific and structured project management approach to ensure that project targets are met within time and budget constraints.

Cost overrun, also known as cost rise or budget overrun, entails additional costs incurred in excess of the budgeted sums due to underestimation of actual costs during the budgeting process.

Cost is one of the important indicators for the performance of the project. It is true, particularly for building projects in developing countries, because building construction projects in these countries are being carried out with limited financial resources. Many of the literature reviews on construction projects indicated that the common factors for project performance are usually considered to be expense, time and quality [Arditi et al, 1997; Frimpong et al 2003]; Atkinson

(1999) referred to these factors as the 'iron triangle.' Songer and Molenaar (1997) found the project to be satisfactory if it had been completed on budget, on time, in compliance with customer standards, fulfilled the requirements, and achieved the standard of the workmanship.

Generally, a project is considered to be satisfactory if the project is completed within the specified cost or budget, if the project is performed by the target date, if the technical objective is met, and if the project participants are highly satisfied with the project outcome.

A. Definitions of Cost Overruns

- Cost overrun: A cost overrun, also known as a cost increase or budget overrun, involves unexpected costs incurred in excess of budgeted amounts due to an underestimation of the actual cost during budgeting. [User Guide, 2005].
- Cost overrun: The amount by which actual costs exceed the baseline or approved costs [Wideman, 2002].
- Cost overrun: The difference between the original cost and the actual cost when the project is completed [Avots, 1983]. Actually, Avots, (1983) used the word growth instead of cost overrun.

B. Causes of Cost Overruns

- Conflicts and changes in design, inadequate planning, unpredictable weather conditions climate factors, fluctuations in the cost of building materials, poor coordination.
- Poor site management, incomplete design at the time of tender, additional work at owner's request, changes in owner's brief, equipment-related delays can be due to poor equipment planning, site/poor soil conditions.
- Lack of control inaccurate management of personnel and the whole agency, attitude, low moral motivation, labor, machinery and equipment.
- Lack of cost reports during construction stage, delays in issuing information to the contractor during construction stage, improper construction methods.
- Contractual claims, such as, extension of time with cost claims, Improvements to standard drawings

during construction stage.

- Technical personnel- shortages, strikes, Lack of experience, slow mobilization, absenteeism, poor communication.
- Omissions and errors in the bills of quantities, Delays in costing variations and additional works, ignoring items of abnormal rates during tender evaluation.
- Labor-related delays- increase in labor wages, poor communication, absentees or low motivation.
- Site management and site safety, financial delay, inadequate supervision, too many responsibilities Shortage of personnel Lack of experience, Poor quality, Poor planning, Lack of experience of local regulation.
- Materials-related delays inefficient communication damage materials poor quality of materials late delivery, Delay in procuring and arrangement of construction equipment by contractors.

2. Objective of the Study

The main objective of this analysis is to identify the major causes of cost overruns of construction projects using a case study in Satara City. It is noted that clients, consultants, and contractors do not give any priority to assess the cost overruns at the project's end. There are also few study and studies in Satara on this field. The main objectives of this research are:

- To study the concept of cost overrun from the available literature and identify the causes of cost overruns.
- To collect data by conducting Questionnaire survey.
- To identify the main factors causing cost overruns in residential building construction project using data analysis.

3. Methodology and Data Collection

This research is conducted in a number of stages, including literature reviews and research papers, data collection, discussion and conclusion. From the literature review, we identified 29 factors causing for Cost Overruns in Satara city. For data collection, a total of one hundred and twenty (120) sets of questionnaires were sent to the people working in the organization of the selected five residential construction sites located in Satara. The respondent's included Contractors, Clients, Quantity Surveyors, Project Managers, Engineers and Architects. The evaluation of Cost Overrun factors was carried out using the 4-point Likert scale from 1 to 4 as follows:

1. Can be neglected
2. Low influence
3. Medium influence
4. High influence

Out of 120, eighty (80) completed sets were received back. This was considered adequate for the analysis based on the assumption by Moser and Kalton (1971) that the result of a

survey could be considered as biased and of little value if the return rate was lower than 30–40%. The respondents involved in the survey had several years of experience in handling several types of projects.

4. Data Analysis

Data analysis was carried out by calculating the Relative Importance Index (RII) using the following formula, adopted by Memon et al. in 2002, as the RII is the most suitable approach to perform the ranking analysis.

$$RII = \frac{\sum_{i=1}^4 W * X}{A * N}$$

Where, RII = Relative Importance Index

W = Weighting given by respondents to each factor and its ranges from 1 to 4

X = Reaction frequency for each factor

A = Maximum weight (i.e. 4 in case)

N = Participants total no.

The ranking for various factors was calculated from RII results to identify the major factors causing cost overruns in building projects.

Table 1 shows the data analysis of the factors causing Cost Overruns. The relative importance index (RII) is calculated for each factor. The ranks are given based on the obtained value of RII respectively.

Table 1
 Ranking of causes of cost overruns

S.No.	Causes of Cost Overruns	RII	Rank
1	Conflicts and changes in design.	0.631	10
2	Inadequate planning.	0.697	2
3	Unpredictable weather conditions climate factors.	0.569	21
4	Fluctuations in the cost of building materials	0.663	7
5	Poor coordination.	0.650	8
6	Poor site management.	0.678	5
7	Incomplete design at the time of tender.	0.566	22
8	Additional work at owner's request.	0.694	3
9	Changes in owner's brief.	0.634	9
10	Equipment-related delays can be due to poor equipment planning.	0.600	16
11	Site/poor soil conditions.	0.578	19
12	Lack of control inaccurate management of personnel and the whole agency, attitude, low moral motivation.	0.588	18
13	Labour, machinery & equipment.	0.622	11
14	Lack of cost reports during construction stage	0.578	20
15	Delays in issuing information to the contractor during construction stage	0.509	25
16	Improper construction methods.	0.594	17
17	Contractual claims, such as, extension of time with cost claims.	0.725	1
18	Improvements to standard drawings during construction stage.	0.616	13
19	Technical personnel- shortages, strikes, Lack of experience, slow mobilization, absenteeism, poor communication.	0.613	14
20	Omissions and errors in the bills of quantities	0.484	28

21	Delays in costing variations and additional works	0.472	29
22	Ignoring items of abnormal rates during tender evaluation.	0.519	24
23	Labour-related delays- increase in labour wages, poor communication, absentees or low motivation.	0.609	15
24	Site management and site safety.	0.497	27
25	Financial delay	0.500	26
26	Inadequate supervision, too many responsibilities Shortage of personnel Lack of experience, Poor quality, Poor planning.	0.619	12
27	Lack of experience of local regulation.	0.691	4
28	Materials-related delays inefficient communication damage materials poor quality of materials late delivery.	0.550	23
29	Delay in procuring & arrangement of construction equipment by contractors	0.672	6

5. Results and Discussions

From the data analysis, major eight factors having highest RII value were identified respectively. The results obtained from the study are shown in fig. 1 using bar chart representation.

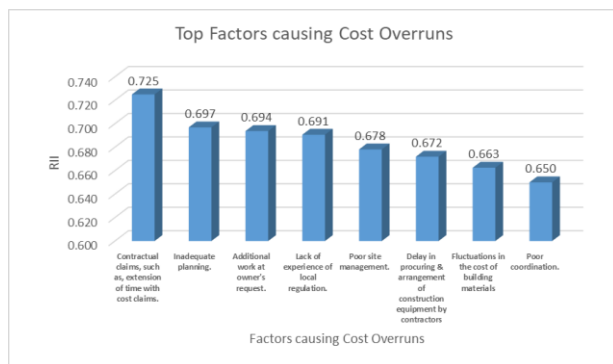


Fig. 1. Top factors causing cost overruns

The top factors causing Cost Overruns in the residential building construction projects from the survey are as follows.

1. Contractual claims, such as, extension of time with cost claims (RII-0.725) - Changes in construction projects can cause substantial adjustment to the contract duration and construction cost.
2. Inadequate planning (RII-0.697) – Poor planning can cause serious problems in many areas later in the project, including lack of business support and poor estimates.
3. Additional work at owner's request (RII-0.694) – This is the factor associated with the owner’s request related to additional design or construction work.
4. Lack of experience of local regulation (RII-0.691)-It can occur if the concerned working team fails to deal with the local working techniques.
5. Poor site management (RII-0.678) - A poor project management structure will have an impact at all stages of the construction process leading to lack of solid project plan, Lack of team coordination and poor

communication between members of the project team and the project sponsor.

6. Delay in procuring & arrangement of construction equipment by contractors (RII-0.672) – Due to lack of communication or other crises, the delay in arrangement of equipment’s can occur.
7. Fluctuations in the cost of building materials (RII-0.663)- During periods of high development where the level of construction activity is unusually high in a particular region, there may be shortages of some construction materials. Sometimes the local market may not be able to supply the full demand of these construction materials.
8. Poor coordination (RII-0.650) – This is the major cause of cost overrun found in majority of studies.

6. Conclusion

The results of the study are the same as those of the previous studies. The concept of Cost Overrun and the causes of Cost Overrun in construction projects were studied. Civil professionals have reported that most projects are delayed due to cost overrun problems. Civil workers stated that the most of the projects gets delayed due to cost overrun issues. Contractual claims, inadequate planning, additional work issues, delay in procuring and arrangement of construction equipment’s, poor site management, fluctuation in the cost of building materials are the major factors for Cost Overrun in residential building construction projects. The relative importance index (RII) can be used as an important cost overrun evaluation tool. The study offers knowledge and data to project managers and contractors to concentrate on key cost overrun factors in residential construction projects.

References

- [1] Aftab Memon, Ismail Rehman, Ade Asmi Abdul Azis (2012), “Time & Cost performance in Construction Projects in Southern and Central Region of Peninsular Malaysia”. International Journal of advances in applied sciences, Vol. 1, March 2012, pp. 45-52
- [2] Ahsan, K., & Gunawan, I. (2010). Analysis of cost and schedule performance of international development projects. International Journal of Project Management, 28, 68-78. Anderson, J. D. (2006). Qualitative and quantitative research (Imperial COE, 1-3).
- [3] Al-Khalil, M.I. & Al-Ghafly, M.A. (1999). “Important causes of delay in public utility projects in Saudi Arabia”. Construction Management and Economics, 17(5), pp. 647- 655.
- [4] Al-Momani, A.H. 2000. Construction delay: A quantitative analysis. International Journal of Project Management, 18(1), pp. 51-59.
- [5] Apolot, Ruth, Alinaitwe, Henry & Tindiwensi, Dan. (2012), “An Investigation into the Causes of Delay & Cost Overrun in Uganda’s Public Sector Construction Projects”, Second International Conference on Advances in Engineering and Technology, pp 305-311.
- [6] Assaf, S.A., Al-Khalil, M. & Al-Hazmi, M. (1995). Causes of delay in large building construction projects. Journal of Management in Engineering, 11(2), pp. 45-50.
- [7] Azhar, N., Farooqui, R. U., & Ahmed, S. M. (2008). Cost overrun factors in construction industry of Pakistan. Proceedings from First International Conference on Construction in Developing Countries.
- [8] Azis, A. A. A., Memon, A. H., Rahman, I. A., & Karim, A. T. A. (2012). Controlling cost overrun factors in construction projects in Malaysia.

- Research Journal of Applied Sciences, Engineering and Technology, 5(8), 2621-2629.
- [9] Baloyi, Lucius and Bekkar, Michiel (2011), "Causes of Construction Cost & Time Overruns: The 2010 FIFA World Cup Stadiums in South Africa, Acta Structilia Journal, Vol. 1, 51-67.
- [10] Kumaraswamy, M.M. & Chan, D.W.M. 1998. Contributors to construction delays. *Construction Management and Economics*, 16(1), pp. 17-29.
- [11] M. Haseeb, Aneesa Bibi, Wahab Rabbani (2011), Causes & Effects of delays in Large Construction Projects of Pakistan, Kuwait chapter of arabian journal of business & management review Vol. 1, No. 4 December 2011, pp 18- 42.
- [12] Sambasivan, M. and Soon, Y. (2007) 'Causes and effects of delays in Malaysian construction industry', *International Journal of Project Management*, 25 (5), 517-526.
- [13] S. Shanmugapriya (2013) Investigation of Significant Factors Influencing Time and Cost Overruns in Indian Construction Projects, *International Journal of emerging Technology & advanced engineering*, Vol. 3, Issue 10, October 2013.
- [14] T. Subramani, P. S. Sruthi, M. Kavitha (2014), Causes of Cost Overruns in Construction, *IOSR Journal of Engineering (IOSRJEN)*, 06(04), pp.01-07
- [15] Walid Kholif, Hossam Hosny & Abdelmonem Sanad, (2013) "Analysis of Time & Cost Overruns in Educational Building Projects in Egypt.", *International Journal of Engineering and Technical Research*, Vol. 1, Issue 10.
- [16] Yakubu Adisa Olawale (2010) "Cost and time control of construction projects: inhibiting factors and mitigating measures in practice" *Construction Management and Economics*, 28 (5), 509-526.