



Analysis of Cost Overrun Factors and Mitigation Strategies in Residential Construction Projects Using RII Method

Ramkumar S

Gnanamani College of Technology, Namakkal, Tamil Nadu, India

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ABSTRACT: Cost overrun is one of the most critical challenges faced by the construction industry, particularly in residential construction projects. It occurs when the actual project expenditure exceeds the originally estimated budget, leading to financial losses, project delays, and reduced stakeholder satisfaction.

The study helps project managers in improving cost control and reducing budget deviations in residential projects. This study aims to analyse the key causes of cost overruns in residential construction projects and propose effective mitigation strategies to improve cost management practices. Data were collected from construction professionals including engineers, contractors, architects, and quantity surveyors through structured questionnaires and interviews.

A total of 46 valid responses were obtained from professionals working in various construction sectors. Statistical techniques such as Percentage Analysis and Relative Importance Index (RII) were used to evaluate and rank the major factors contributing to cost overruns.

The results indicate that design changes during construction, inaccurate cost estimation, delays in material procurement, poor supervision, and price escalation of construction materials are the most significant factors influencing cost overruns in residential construction projects.

The study further suggests mitigation strategies such as improved estimation practices, effective project scheduling, adoption of digital technologies like Building Information Modeling (BIM), and better coordination among project stakeholders.

The findings of this research provide valuable insights for construction professionals and project managers in improving cost control and ensuring successful project delivery within the planned budget.

KEYWORDS: Cost Overrun, Residential Construction, Project Management, Cost Control, Relative Importance Index, Construction Planning.

I. INTRODUCTION

The construction industry plays a vital role in the economic development of any country. It contributes significantly to infrastructure development, employment generation, and economic growth. In India, residential construction has experienced rapid expansion due to urbanization, population growth, and increasing housing demand.

Despite this growth, residential construction projects frequently experience cost overruns. Cost overrun refers to the situation where the actual project cost exceeds the initially estimated budget. This problem affects project profitability, delays project completion, and may lead to conflicts between contractors and clients.

Several factors contribute to cost overruns in residential construction projects. Some of the major causes include inaccurate cost estimation, frequent design changes, fluctuations in material prices, poor project planning, and lack of coordination among project stakeholders.



In many residential construction projects, project managers rely on traditional management practices rather than modern project management tools. As a result, effective cost monitoring and control mechanisms are often not implemented properly.

Therefore, it is essential to analyze the causes of cost overruns and develop strategies to mitigate their impact. This research focuses on identifying the major factors responsible for cost overruns in residential construction projects and proposes practical solutions to improve cost management practices.

II. LITERATURE REVIEW

Cost overruns in construction projects have been widely studied by researchers around the world. Several studies have identified multiple factors contributing to budget escalation in construction projects.

According to Flyvbjerg (2002) reported that inaccurate cost estimation and inadequate planning are among the most common causes of cost overruns in infrastructure projects. Similarly, Love et al. (2005) highlighted that poor project management practices and design changes during construction significantly influence project costs.

According to Kaming et al. (1997) identified material price fluctuations and labor productivity issues as major factors contributing to cost overruns in construction projects. Mansfield (1994) also emphasized that delays in project scheduling and inefficient resource allocation are significant contributors to cost escalation.

In the context of developing countries, Sambasivan and Soon (2007) found that communication gaps among project stakeholders and poor coordination between contractors and consultants are major challenges affecting project cost performance.

Studies conducted in India also indicate that residential construction projects frequently face cost overruns due to design modifications, delays in approvals, and material price volatility.

Although numerous studies have identified the causes of cost overruns, there is still a need for more research focused specifically on residential construction projects. This study attempts to fill this research gap by analyzing cost overrun factors in residential construction projects and proposing suitable mitigation strategies.

III. RESEARCH METHODOLOGY

Research Design:- The research design adopted for this study combines both descriptive and analytical approaches. The descriptive approach is used to identify the factors contributing to cost overruns, while the analytical approach is used to evaluate the significance of these factors.

A structured questionnaire was developed using a 5-point Likert scale (1 = least significant, 5 = most significant) to evaluate the influence of various factors contributing to cost overruns. The identified factors were derived from an extensive review of relevant literature. Respondents were requested to rate each factor based on their professional experience in residential construction projects.

Data Collection

Two types of data were used in this study:

Primary Data

Primary data were collected through questionnaires and interviews with construction professionals such as:

- Project Managers
- Site Engineers
- Contractors
- Architects
- Quantity Surveyors

A total of 50 questionnaires were distributed, and 46 valid responses were received.



Secondary Data

Secondary data were collected from:

- Academic journals
- Construction management books
- Research papers
- Industry reports

Sampling

The respondents were selected from professionals actively involved in residential construction projects in regions such as:

- Chennai
- Salem
- Erode
- Hyderabad

The respondents had varying levels of experience ranging from less than 5 years to more than 15 years.

Data Analysis Methods

The collected data were analysed using the following statistical techniques:

Percentage Analysis

Used to analyse respondent demographics such as experience and designation.

Relative Importance Index (RII)

The Relative Importance Index was used to determine the importance of each factor contributing to cost overruns.

The RII formula is:

$$RII = \frac{\sum W}{A \times N}$$

Where:

W = Weight assigned by respondents

A = Highest weight (5)

N = Total number of respondents

The RII value ranges from 0 to 1. Higher values indicate greater importance.

IV. RESULTS AND DISCUSSION

RESPONDENT PROFILE

Experience Distribution

Experience	Percentage
< 5 years	20%
5–10 years	28%
10–15 years	30%
>15 years	22%

This distribution indicates that the respondents represent a balanced mix of junior and senior professionals.

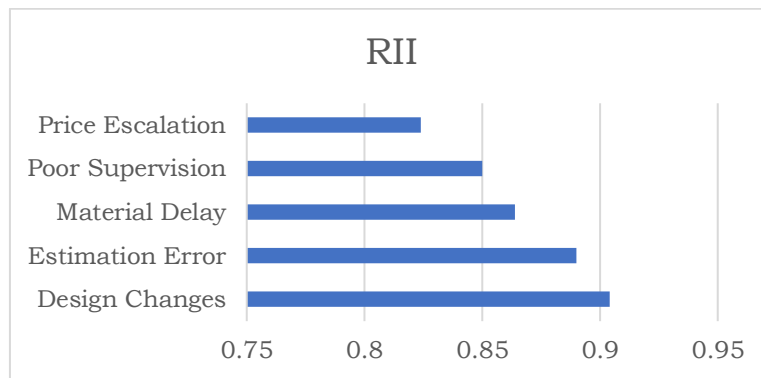
Designation Distribution

Designation	Percentage
Project Managers / Sr. Engineers	32%
Site Engineers	22%
Quantity Surveyors	22%
Architects	15%
Contractors	9%



Ranking of Cost Overrun Factors

Factor	RII	Rank
Design Changes	0.904	1
Estimation Error	0.89	2
Material Delay	0.864	3
Poor Supervision	0.85	4
Price Escalation	0.824	5



V. DISCUSSION

The results of the study indicate that **design changes during construction** are the most significant factor contributing to cost overruns. Design modifications often require additional materials, labor, and time, which increases the overall project cost.

Another important factor is **inaccurate cost estimation**. When project budgets are prepared without accurate quantity calculations or updated market prices, the project may exceed its initial budget.

Material delays and **price escalation of construction materials** also significantly affect project costs. Fluctuations in the prices of materials such as cement and steel can disrupt project budgets.

Poor supervision and communication gaps further contribute to cost overruns by causing construction errors and rework.

The results highlight the importance of proper planning, accurate estimation, and effective project coordination.

VI. MITIGATION STRATEGIES

Based on the findings of this study, several strategies can be implemented to reduce cost overruns in residential construction projects.

Improved Cost Estimation

Accurate cost estimation should be carried out using updated market data and proper quantity analysis.

Effective Project Planning

Detailed project planning and scheduling should be implemented to ensure efficient resource allocation.

Adoption of Digital Technologies

Technologies such as **Building Information Modeling (BIM)** can improve project planning and cost monitoring.

Regular Cost Monitoring

Project costs should be monitored regularly to detect financial deviations early.

Improved Communication

Better communication among project stakeholders can prevent misunderstandings and reduce rework.



VII. CONCLUSION

Cost overruns remain a significant challenge in residential construction projects. This study identified the major factors contributing to cost overruns, including design changes, inaccurate estimation, material delays, poor supervision, and price escalation.

The findings emphasize the need for improved project management practices to control project costs effectively. By adopting modern project management tools, improving cost estimation methods, and enhancing communication among stakeholders, construction professionals can significantly reduce the occurrence of cost overruns.

Future research may focus on integrating digital technologies such as BIM and artificial intelligence for real-time cost monitoring and predictive project management.

VIII. FUTURE WORK

This study identified the major factors that cause cost overruns in residential construction projects using the Relative Importance Index (RII) method. However, there are several areas that can be explored further in future research.

Future studies can include a larger number of respondents from different regions to get a broader understanding of cost overrun issues in the construction industry. Research can also focus on different types of projects such as commercial buildings, infrastructure projects, and industrial construction to compare the factors causing cost overruns.

Further studies can use advanced statistical methods and software tools to improve the accuracy of the analysis and prediction of cost overruns. Researchers can also study the impact of modern technologies such as Building Information Modeling (BIM), Artificial Intelligence (AI), and project management software in controlling project costs.

Another important area for future research is to develop better cost monitoring systems and risk management strategies to identify problems at an early stage of the project.

Future work can also focus on improving communication, coordination, and project planning practices among contractors, engineers, and clients to reduce cost overruns.

These future studies will help improve project management practices, cost estimation accuracy, and overall efficiency in the construction industry.

REFERENCES

1. Flyvbjerg B. (2002). Underestimating costs in public works projects. *Journal of the American Planning Association*.
2. Love P.E.D. (2005). Construction project cost overruns. *Journal of Construction Engineering and Management*.
3. Kaming P.F. (1997). Factors influencing construction cost overruns. *Construction Management and Economics*.
4. Doloi H. (2012). Understanding stakeholders' perspectives on cost overruns. *International Journal of Project Management*.
5. C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, *Electric Power Components and Systems*, Vol.39 (8), pp.780-793, May 2011. DOI: 10.1080/15325008.2010.541746
6. C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - *Journal of Electrical Engineering*, Vol.63 (6), pp.365-372, Dec.2012. DOI: 10.2478/v10187-012-0054-2
7. C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis' - Springer, *Electrical Engineering*, Vol.93 (3), pp.167-178, September 2011. DOI 10.1007/s00202-011-0203-9
8. S.Tamilselvi, R.Prakash, C.Nagarajan, "Solar System Integrated Smart Grid Utilizing Hybrid Coot-Genetic Algorithm Optimized ANN Controller" *Iranian Journal Of Science And Technology-Transactions Of Electrical Engineering*, DOI10.1007/s40998-025-00917-z,2025
9. S.Tamilselvi, R.Prakash, C.Nagarajan, " Adaptive sliding mode control of multilevel grid-connected inverters using reinforcement learning for enhanced LVRT performance" *Electric Power Systems Research* 253 (2026) 112428, doi.org/10.1016/j.epr.2025.112428



10. S.Thirunavukkarasu, C. Nagarajan, 2024, "Performance Investigation on OCF and SCF study in BLDC machine using FTANN Controller," Journal of Electrical Engineering And Technology, Volume 20, pages 2675–2688, (2025), doi.org/10.1007/s42835-024-02126-w
11. C. Nagarajan, M.Madheswaran and D.Ramasubramanian- 'Development of DSP based Robust Control Method for General Resonant Converter Topologies using Transfer Function Model'- Acta Electrotechnica et Informatica Journal , Vol.13 (2), pp.18-31, April-June.2013, DOI: 10.2478/aeeci-2013-0025.
12. C.Nagarajan and M.Madheswaran - 'DSP Based Fuzzy Controller for Series Parallel Resonant converter'- Springer, Frontiers of Electrical and Electronic Engineering, Vol. 7(4), pp. 438-446, Dec.12. DOI 10.1007/s11460-012-0212-0.
13. C.Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.
14. C.Nagarajan and M.Madheswaran, "Analysis and Simulation of LCL Series Resonant Full Bridge Converter Using PWM Technique with Load Independent Operation" has been presented in ICTES'08, a IEEE / IET International Conference organized by M.G.R.University, Chennai.Vol.no.1, pp.190-195, Dec.2007
15. Suganthi Mullainathan, Ramesh Natarajan, "An SPSS and CNN modelling based quality assessment using ceramic materials and membrane filtration techniques", Revista Materia (Rio J.) Vol. 30, 2025, DOI: <https://doi.org/10.1590/1517-7076-RMAT-2024-0721>
16. M Suganthi, N Ramesh, "Treatment of water using natural zeolite as membrane filter", Journal of Environmental Protection and Ecology, Volume 23, Issue 2, pp: 520-530,2022