

Empirical Evidence on Factors Influencing Time Overrun in Constructing Apartments: with Special Reference to Civil Workers in Tamil Nadu

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Abstract

Time overrun plays a crucial role in completion of construction projects. Ultimately in Tamil Nadu, Indian construction industry is facing huge problem in constructing apartments. Hence this study aims to examine the most significant factors that affect time overrun in constructing apartments in Tamil Nadu. A self administered survey was carried out to 460 civil workers employing in constructing apartments in Tamil Nadu. The study found that from the perspective of civil workers, owner delays in making progress payment to the contractor, errors and faults in design, contractors face financial complexities and cash flow at site factor, labour productivity, and lack of dexterity between parties are the most important factors that influences time overrun in construction projects.

Keywords: Time overrun, civil workers, cash flow, financial complexities, labour productivity.

1. INTRODUCTION

For any country, construction industry is one of the most important sector for ameliorating the standard of life (Abedi et al., 2011). The Indian construction industry is increasing at a normal rate of 9-11%. But Foreign Direct Investment (FDI) of 100% is permitted by Indian government in the infrastructure sectors and real estate has encouraged construction all over the country (EC Harris research, 2011). According to UN Population Bureau 2012, the Indian population is expected to arouse to 1.7 billion by 2050 and it is expecting to reach to 400 million higher than China which is presently the most colonized country. This has an effect on Indian construction industry. Regardless of this needed expansion and growth, India faces problems of

inefficiency, which might be a foremost issue in the future of construction business and the expansion of its infrastructure. The planning commission of India has proposed an investment of around US\$ 1 trillion, doubled since the Eleventh plan. This illustrates the demand and funds committed for development of the infrastructure in India, and the future growth in construction projects.

Nowadays construction industry visages chronic issues like time overrun which is a form of retardation that happens ahead of the baseline construction plan. The main target of any construction company is to mitigate cost and time overrun in construction projects. Conversely, time overrun prevails in all stages of construction process and thereby augments

project total period (Yang and Ou, 2008). In rare cases, the projects are finished on time (Assaf and Al-Hejji, 2006) and henceforth it is necessary to pay stern attention to manage time in construction projects as delay in each and every day adds to significant sum of revenue which is barely recovered. Hence the study intends to examine the most significant factors that affect time overrun in constructing apartments in Tamil Nadu.

2. LITERATURE REVIEW

Time overrun is one of the major issue faced by most of the construction industry in India. Memon et al. (2014) investigated the reasons for time overrun in large construction projects in Peninsular Malaysia. The study found that financial complexities and cash flow problems faced by contractor, inefficient contractor, deprived supervision and site management, financial complexities faced by owner and lack of workers are found to be the most important causes for time overrun in Malaysian construction projects. It is suggested that time overrun issue can be proscribed by perfectly planning the work, effective contact system, dedicated leadership and management. Larsen et al. (2015) examined the impact of cost overrun, time delay, and quality level on the construction projects from the perspective of project managers. The results revealed that the most dominant factor that impacts time overrun is unsettled or shortage of funds for the project and also exclusions or errors in consultant material is the most significant factor affecting cost overrun. The factor that significantly affects quality level is exclusions or errors in construction work. It is also obvious from the result that quality level, schedule delay, and budget are significantly and differently influenced. Future research can replicate this study by determining the effect of cost overrun, schedule delay, and quality level on construction

projects in other provinces of the world. To determine the effect of these factors at a higher range, further research can be carried out by employing case study, regression analysis, and factor analysis.

Mulla and Waghmare (2015) conducted a study in Pune-India to spot out the factors that impacts cost and time overruns in construction assignments. The study found that deprived execution of plans, deprived project formulation and appraisal, non-clearance of advances from other agencies and local authorities, inability to take prior action by the parties, decision making is retarded, deprived supervising and control over actions, inability to take proper remedy for accessibility and perfect flow of money, insecure contracts, and not making use of technology are the key reasons for time and overruns in construction assignments in Pune. Katre and Ghaitidak (2016) determined the reasons persuading cost and time overruns in construction assignments in India. The findings stated that decreased labor productivity, retarded bill payment, riots, deprived procurement programming of resources, improper maintenance of equipment, strikes, and other external facets are the vital reasons for project delay. The study also found that retardation in initial handing of the site is one of the most effective causes that persuades cost overrun. Also inflation of prices and contractor retards in delivery of equipment and material leads to cost overrun in India.

Subramani et al. (2016) aimed at identifying the most critical factors that causes time overrun in the construction projects in Chennai and investigated the construction time overrun factors in terms of the opinions of the workers and developers in residential as well as commercial projects. The study revealed that the major contributing factor to the time overrun is the low labour productivity. The study also

showed that the engineer, design and management are the other contributing factors to the causes of time overrun in the construction projects of Chennai. This study recommends proper monitoring of the labour work process, ensuring the availability of the resources before the commencement of the project, ensuring that the management makes the payment on time, contractors must ensure the proper fund flow, the planning and design should be simple and proper. Adam et al. (2017) conducted a study to determine the influence of time delays and cost overrun on huge building projects and elucidates how the current and past research looks upon the causes of time delays and cost overrun in huge building projects. The results revealed that the causes are ranked aggregately where it showed that management perspective is the root case for time delays and cost overrun. It is also found that financial concern is deemphasized in current trend which actually explains the time delays and cost overrun.

3. METHODOLOGY

The study espoused Descriptive Research Design to fulfill the purpose of the study. The sampling frame for quantitative study is the civil workers working in construction projects in Tamil Nadu. The type of sampling employed for this study is purposive sampling as it measures the time overrun factors from the perspective of civil workers involved in constructing apartments in Tamil Nadu. A total of 500 civil workers were contacted and questionnaires were self administered to those civil workers for obtaining responses. Out of 500 samples, 460 samples were taken for further analysis after eliminating the response bias. The representativeness of respondents does not depend always on employing stringent sampling method but also on employing other measures. Adding to this, the rationale behind using Non-

probability sampling technique is to mitigate the random errors (Calder et al., 1981).

The instrument encompasses of five parts such as time overrun related factors (a) owner/client responsibility related factors (b) resource related factors (c) contractor responsibility related factors (d) consultant responsibility related factors (e) other factors. The items for time overrun factors (owner/client responsibility related factors, resource related factors, contractor responsibility related factors, consultant responsibility related factors, other factors) is adopted from Memon et al. (2014). Once after confirming the factors, the Relative Importance Index (RII) analysis is performed to find out the items that carries a higher prominence in constructing apartments in Tamil Nadu. The ranking is done for each and every factor, to find out which item of that particular construct influences the time overrun in construction projects in Tamil Nadu.

4. DATA ANALYSIS AND RESULTS

4.1 RANKING FACTORS FOR FACTORS INFLUENCING TIME OVERRUN

The factors are ranked to know the importance of each and every factor and the impact it has on cost overrun in construction projects (i.e. apartments) in Tamil Nadu. The Relative Importance Index (RII) is calculated with a below mentioned formula.

$$\text{Relative Importance Index (RII)} = \frac{\sum w}{A*N}$$

$$= \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{A*N}$$

Where w = Weighting given to every factor by the civil workers

A = Highest weight (A=5)

N = Total number of civil workers (N=460)

n_1 = Number of respondents for not significant

n_2 = Number of respondents for slightly significant

n_3 = Number of respondents for moderately significant

n_4 = Number of respondents for very significant

n_5 = Number of respondents for extremely significant

4.1.1 RANKING FOR OWNER/CLIENT RESPONSIBILITY FACTORS

Table 4.1: Ranking for Owner/client responsibility related factors

Factors	RII	RANK
Change in the scope of the project.	0.799565	4
Delay in progress payment by owner.	0.908696	1
Financial difficulties of owner.	0.452174	6
Delays in decisions making.	0.825217	3
Owner interference.	0.830435	2
Unrealistic contract duration and requirements imposed.	0.796087	5

The table 4.38 shows the ranking of owner/client responsibility related factors influencing time overrun in constructing apartments in Tamil Nadu. As displayed from the table, topmost ranking is given to owner delays in making progress payment to the contractor factor (0.908696-Rank 1), followed by interference of owner factor (0.830435-Rank 2), retardation in decision making factor (0.825217-Rank 3), alteration in the extent of the project factor (0.799565-Rank 4), idealistic contract period and needs imposed factor (0.796087-Rank 5), and financial complexities of owner factor (0.452174-Rank 6) are the factors that influences time overrun in constructing apartments in Tamil Nadu.

4.1.2 RANKING FOR CONSULTANT RESPONSIBILITY FACTORS

Table 4.39: Ranking for Consultant responsibility related factors

Factors	RII	RANK
Delay in inspection and approval of completed works.	0.782609	4
Unrealistic contract duration and requirements imposed.	0.761739	5
Frequent design changes.	0.783043	3
Mistakes and Errors in design.	0.822609	1
Delay Preparation and approval of drawings.	0.810435	2

The table 4.39 shows the ranking of consultant responsibility related factors influencing time overrun in constructing apartments in Tamil Nadu. As displayed from the table, topmost ranking is given to errors and faults in design factor (0.822609-Rank 1), followed by retardation in sanction and preparation of drawings factor (0.810435-Rank 2), regular modifications in design factor (0.783043-Rank 3), retardation in inspection and sanction of finished works factor (0.782609-Rank 4), and idealistic contract period and needs imposed factor (0.761739-Rank 5) are the factors that impacts time overrun in constructing apartments in Tamil Nadu.

4.1.3 RANKING FOR CONTRACTOR RESPONSIBILITY FACTORS

Table 4.40: Ranking for Contractor responsibility related factors

Factors	RII	RANK
Inadequate planning and scheduling.	0.821304	6
Lack of experience.	0.898261	4
Poor site management and	0.878696	5

supervision.		
Incompetent subcontractors.	0.901739	2
Cash flow and financial difficulties faced by contractors.	0.913913	1
Mistakes during construction.	0.899565	3

The table 4.40 shows the ranking of contractor responsibility related factors influencing time overrun in constructing apartments in Tamil Nadu. As displayed from the table, topmost ranking is given to contractors face financial complexities and cash flow at site factor (0.913913-Rank 1), followed by incompetent subcontractors factor (0.901739-Rank 2), errors during construction factor (0.899565-Rank 3), lack of work experience factor (0.898261-Rank 4), deprived supervision and site management factor (0.878696-Rank 5), and improper planning and arrangement factor (0.821304-Rank 6).

4.1.4 RANKING FOR RESOURCE RELATED FACTORS

Table 4.41: Ranking for Resource related factors

Factors	RII	RANK
Shortages of materials.	0.830435	2
Late delivery of materials and equipment.	0.752609	5
Insufficient Numbers of equipment.	0.806087	3
Labour productivity.	0.831304	1
Shortage of site workers.	0.787826	4

The table 4.41 shows the ranking of resources related factors influencing time overrun in constructing apartments in Tamil Nadu. As displayed from the table, topmost ranking is given to labour productivity factor (0.831304-

Rank 1), followed by inadequate materials factor (0.830435-Rank 2), inadequate number of equipments at the site factor (0.806087-Rank 3), insufficient site workers factor (0.787826-Rank 4), and delay in equipment and materials delivery factor (0.752609-Rank 5) are the factors that persuades time overrun in constructing apartments in Tamil Nadu.

4.1.5 RANKING FOR OTHER FACTORS

Table 4.42: Ranking for Other factors

Factors	RII	RANK
Effect of weather.	0.82913	3
Unforeseen ground condition.	0.854348	2
Accidents on site.	0.726957	5
Lack of coordination between parties.	0.863478	1
Lack of communication between parties.	0.787391	4
Laws and regulatory framework.	0.716957	6

The table 4.42 shows the ranking of other factors influencing time overrun in constructing apartments in Tamil Nadu. As displayed from the table, topmost ranking is given to lack of dexterity between parties factor (0.863478-Rank 1), followed by unanticipated ground condition factor (0.854348-Rank 2), consequences of weather factor (0.82913-Rank 3), lack of contact between parties factor (0.787391-Rank 4), accidents at location factor (0.726957-Rank 5), and improper laws and regulatory structure factor (0.716957-Rank 6) are the factors that influences time overrun in constructing apartments in Tamil Nadu.

5. DISCUSSIONS

The study identified the most important owner/client responsibility related factors

affecting time overrun in constructing apartments in India. From the findings it is clear that, topmost ranking is given to owner delays in making progress payment to the contractor factor, followed by interference of owner factor, retardation in decision making factor, alteration in the extent of the project factor, idealistic contract period and needs imposed factor, and financial complexities of owner factor are the factors that influences time overrun in constructing apartments in Tamil Nadu. Also the study found the most important consultant responsibility related factors affecting time overrun in constructing apartments in India. From the findings it is clear that, topmost ranking is given to errors and faults in design factor, followed by retardation in sanction and preparation of drawings factor, regular modifications in design factor, retardation in inspection and sanction of finished works factor, and idealistic contract period and needs imposed factor are the factors that impacts time overrun in constructing apartments in Tamil Nadu.

The study determined the most important contractor responsibility related factors affecting time overrun in constructing apartments in India. From the findings it is clear that, topmost ranking is given to contractors face financial complexities and cash flow at site factor, followed by incompetent subcontractors factor, errors during construction factor, lack of work experience factor, deprived supervision and site management factor, and improper planning and arrangement factor. Also the study examined the most important resources related factors affecting time overrun in constructing apartments in India. From the findings it is clear that, topmost ranking is given to labour productivity factor, followed by inadequate materials factor, inadequate number of equipments at the site factor, insufficient site workers factor, and delay in equipment and materials delivery factor are the factors that

persuades time overrun in constructing apartments in Tamil Nadu. The study found the most other factors affecting time overrun in constructing apartments in India. From the findings it is clear that, topmost ranking is given to lack of dexterity between parties factor, followed by unanticipated ground condition factor, consequences of weather factor, lack of contact between parties factor, accidents at location factor, and improper laws and regulatory structure factor are the factors that influences time overrun in constructing apartments in Tamil Nadu.

6. CONCLUSIONS

The results obtained from the study are same as the findings of previous studies. Civil workers stated that the most of the projects gets delayed due to time overrun issues. There are factors that affect time overrun problems. From the perspective of civil workers, owner delays in making progress payment to the contractor, errors and faults in design, contractors face financial complexities and cash flow at site factor, labour productivity, and lack of dexterity between parties are the most important factors that influences time overrun in construction projects. Due to the influence of these factors, the project gets delayed and thereby results in incompleteness of the project. This ultimately affects the payment to be made to the civil workers.

7. MANAGERIAL IMPLICATIONS

The study findings provides implications to project managers and construction companies to better focus on the factor that highly affects time overrun in construction projects. The project managers and construction companies should assess whether owner is capable to make timely progress payment and should show the blueprint to the owner to get approval to proceed on with the project. This is done to avoid owner

interference in the middle of the project. If owner interferes in the project, it will lead to time overrun and henceforth affects project optimization in construction projects. Also they should ensure that the contractors and other parties should have alertness with the process of small companies and structured process of large companies. This process benefits the contractors to know where actually the project gets delayed and the reasons for project delay. Also before starting the project, the project managers should check whether the weather condition is good or bad, because for certain type of work, the weather condition should be good.

REFERENCES

- [1] Abedi, M., Fathi, M. S., & Mohammad, M. F. (2011). Major Causes of Construction Delays Under Client Category and Contractor Category. In *The First Iranian Students Scientific Conference in Malaysia* (Vol. 9).
- [2] Adam, A., Josephson, P. E. B., & Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects: Trends and implications. *Engineering, construction and architectural management*, 24(3), 393-406.
- [3] Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. *International journal of project management*, 24(4), 349-357.
- [4] Calder, B. J., Phillips, L. W., & Tybout, A. M. (1981). Designing research for application. *Journal of consumer research*, 8(2), 197-207.
- [5] EC Harris Research. (2013). International Construction Costs: A Change of Pace. *International Construction Cost Report*, 1-9.
- [6] Katre, V.Y., & Ghaitidak D.D. (2016). Elements of cost overruns delays and risk involved in construction management. *International Journal of Scientific Research*, 5(6), 515- 517.
- [7] Larsen, J. K., Shen, G. Q., Lindhard, S. M., & Brunoe, T. D. (2015). Factors affecting schedule delay, cost overrun, and quality level in public construction projects. *Journal of Management in Engineering*, 32(1), 04015032.
- [8] Memon, A. H., Rahman, I. A., Akram, M., & Ali, N. M. (2014). Significant factors causing time overrun in construction projects of Peninsular Malaysia. *Modern Applied Science*, 8(4), 16.
- [9] Mulla, S. S., & Waghmare, A. P. (2015). A study of factors caused for time & cost overruns in construction project & their remedial measures. *International Journal of Engineering Research and Applications*, 5(1), 48-53.
- [10] Subramani, G. S., Prabhu, S. M., & Dey, S. (2016). Identifying the Factors Causing Time Overrun in Construction Projects in Chennai and Suggesting for Possible Solutions. *International Journal of Civil Engineering and Technology*, 7(6).
- [11] Yang, J. B., & Ou, S. F. (2008). Using structural equation modeling to analyze relationships among key causes of delay in construction. *Canadian Journal of Civil Engineering*, 35(4), 321-332.