

Factors Influencing Time Overruns in Construction Projects

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Abstract: *The successful completion of a construction project within the scheduled time is a challenging task for the project management team. Time Overrun is one of the most significant issues in construction industry. It is the extension of time beyond scheduled completion date of construction project. The purpose of this research paper is to identifying, analyzing and ranking the various factors affecting time overruns. A detailed literature review was conducted to identify the potential time overruns factors in construction projects. The factors were grouped in to five categories such as factors related to Contractor, Client, Consultant, Labour and External factors. A questionnaire for the survey was developed based on 35 factors identified from literature review and distributed to 40 construction companies. The validity of the questionnaire data was tested using reliability test in SPSS. The data was analyzed statistically using Relative important index method to find out the most significant factors affecting Time overruns. The results of questionnaire survey were used to rank the time overrun factors. The most significant factors of construction time overruns were identified as Shortage of materials in the local market, Delay in obtaining work permits from authorities, Rises in the price of material, Poor delivery of construction materials, Delay in payments. A case study was conducted in an apartment construction project to find out the potential causes of time overruns. By comparing the result of questionnaire survey and case study similar factors could be summarized.*

Keywords: Causes of Time overruns, Construction project, Questionnaire Survey, Relative Important Index, Time overrun

1. Introduction

The successful completion of a construction project within the scheduled time is a challenging task for the project management team. One of the most important problems in the construction industry is Time overrun. In construction, time overrun is defined as period during which the project or part of it has been extended or not completed due to unexpected conditions.

Delay could be defined as the time overrun either beyond the scheduled completion date in a contract or beyond the date that the parties agreed upon for the delivery of a project. Construction time overrun is a major risk as well as a source of disputes. Therefore, a knowledge and understanding of the sources of time overrun is important in order to identify and effectively manage the various risks of time overrun, dispute, arbitration, total abandonment, and litigation involved in achieving the project objectives. A time overrun may occur concurrently with other time overrun and all of them may cause an impact on the project completion date. Completing projects on time is an indicator of efficiency, but the construction process involves many unpredictable factors, which result from many sources. These sources include the performance of the various construction parties, resource constraints, financial availability, environmental conditions and contractual relations. Assessing the frequency of time overrun, the extent to which time overrun may occur, and the factors influencing time overrun can provide insights for better planning and scheduling of a construction project, and improve the project performance.

2. Objective of the Study

The main objectives of this study include the following:

- To identify the most critical factors influencing time overruns in construction projects and to evaluate their relative importance
- To statistically analyze and rank the factors affecting time overrun from the questionnaire data

- To investigate the expected effects of these factors on the time overruns of a selected sample of the construction projects in nearby area.

3. Research Methodology

The research methodology for present study has adopted questionnaire survey to identify significant factors influencing time overruns in construction projects. To identify time overruns factors, literature reviews, books, conference proceedings and discussion with practitioners of all parties involved in construction industry were carried out. Questionnaire for the survey was developed based on 35 factors of time overruns and grouped in to 5 major groups. Such as contractor related, client related, consultant related, labour related and external factors. For each factor the respondents were requested to rate using a five point likert scale. It is categorized as follows 1=strongly disagree; 2= disagree; 3=neutral; 4=agree; and 5= strongly agree. Prior to formulating questionnaire, a field study was carried out to get feedback from experienced persons in construction industry on the factors identified from literature reviews.

3.1 Respondent's profile

The questionnaires were distributed to project managers, site engineers and contractors of various construction projects. The characteristics of the respondents participated in the questionnaire survey are summarized in below. Table 1 indicates that majority of the respondents are working with contractors organizations followed by client and consultant

Table 1: Respondents Demographics

Respondents Work Experience		
Experience in years	Number of respondents	percentage
0-5 yrs	7	17
6-10 yrs	10	25
11-15yrs	15	38
>15 yrs	8	20
Total	40	100
Type of organization		
Contractor	18	45
Client	13	32.5

Consultant	9	22.5
Total	40	100
Designation of Respondents		
project manager	24	60
site engineer	10	25
contractor	6	15
Total	40	100

Weather effect on construction activities	.73	9	External
Late supply of information and late decision making	.715	10	Client

3.2 Reliability analysis

Reliability test is conducted in SPSS v 21 to check the stability and consistency of a data. Here to test the reliability of the collected data, Cronbach’s alpha method was used. If cronbach alpha is <0.6, the data is not reliable and cannot be adopted and if it is >0.6, reliability is very high. The result of reliability test as shown in Table 2. Alpha value of all category factors greater than 0.6, which concluded that this research instrument is good and reliable.

Table 2: Reliability Test for Time Overruns Factors

Sl no	Factors	Cronbach’s alpha
1	Contractor related	0.862
2	Client related	0.802
3	Consultant related	0.857
4	Labour related	0.663
5	External factors	0.646
6	Overall Cronbach alpha value	0.913

3.3 Relative Importance Index (RII)

The questionnaires were analysed using Relative importance index method. The ranking of factors was calculated based on the corresponding RII value.

$$RII = \sum W / A N$$

RII = Relative Important Index

A = Highest weight

N = Total number of response

3.4 Ranking of factors of Time overruns

Hierarchal assessment of factors was carried out to determine ranking of the factors based on level of significance. It was assessed based on Relative important index (RII) value shown in Table 3. It shows that top 5 most significant factors of time overruns ranked by overall respondents are Shortage of materials in the local market, delay in obtaining work permits from authorities, rises in the price of material, poor delivery of construction materials and delay in payments etc

Table 3: Ranking of Top Ten Delay Factors

Factors affecting time overrun	RII	Rank	Factor group
Shortage of materials in the local market	.89	1	External
Delay in obtaining work permits from authorities	.885	2	External
Rises in the price of materials	.8	3	External
Poor delivery of construction materials	.79	4	Contractor
Delay in payments	.78	5	Client
Shortage of labour	.77	6	Labour
Delay in inspection and testing of completed works	.765	7	Consultant
Delay in providing services from utilities	.745	8	External

Table shows the RII of factors contributing to time overruns of construction projects. the result obtained shows that the most 10 significant factors influencing time overrun of construction project include Shortage of materials in the local market with RII (0.89), Delay in obtaining work permits from authorities(0.885), Rises in the price of material(0.8), Poor delivery of construction materials(0.79), Delay in payments(0.78), Shortage of labour(0.77), Delay in inspection and testing of completed works(0.765), Delay in providing services from utilities (water, electricity etc.)(0.745), Weather effect on construction activities (0.73), Late supply of information and late decision making (0.715) etc.

3.5 Case study

Time overrun is frequently experienced by most of the construction projects. This section shows the time overrun and factors causing time overrun in an apartment construction project in the locality. This is a 17 floor building contains 66 flat. The project duration was estimated to be 778 days by considering almost all activities. The selected construction project was not completed within estimated duration which was specified by planning and experienced time overrun. Various works carried out at the site were studied by visiting the construction site. The delay in each work beyond the estimated schedule and the factors causing the delay were understood from the information collected from the project manager. Shortage of materials had the most considerable effect on the project which affected six activities and caused delay in project duration, followed by late delivery of materials to site or poor procurement of construction materials that affected five activities. After these factors, delay in payment , Delay in inspection and testing of completed works, Late supply of information and late decision making etc were affecting two activities .Poor planning and scheduling, rises in the price of the material were also affect some activities. Inaccurate estimation of work duration and late delivery of previous activities were the other factors mentioned by the construction parties.

4. Conclusion

Time overruns can be minimized only when their causes are identified. Knowing the cause of any particular delay in a construction project would help avoiding the same. This research work was therefore, aimed at identifying the major causes of time overruns in construction projects .By comparing the results of case study and questionnaire survey, similar important factors could be summarized. It could be mentioned that results of the case study confirm the most important factors considered by respondents in questionnaire survey. According to the results most important factors were material shortage, delay in material delivery to site or poor delivery of construction material, delay in payment, rises in the price of the materials, poor planning and scheduling, delay in inspection and testing of completed works etc. These factors should be controlled and reduced before and during the construction project procedure to achieve completion of the project within scheduled time and avoid or minimize time overrun in project

and have effective construction time planning.

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