

Study of Delay Factors in Construction Management

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Abstract - In construction, delay could be defined as the time overrun either beyond completion date specified in a contract or beyond the date that the parts agreed upon for delivery of a project. It is a project slipping over its planned schedule and is considered as common problem in construction projects. To the promoters, delay means loss of revenue through lack of production facilities and rentable space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labour cost increases. Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parts, resources availability, environmental conditions, involvement of other parts, and contractual relations. However, it rarely happens that a project is completed within the specified time.

Keywords: Delay Factors, Construction Management, Efficiency

I. INTRODUCTION

In construction, delay could be defined as the time overrun either beyond completion date specified in a contract or beyond the date that the parts agreed upon for delivery of a project. It is a project slipping over its planned schedule and is considered as common problem in construction projects. To the promoters, delay means loss of revenue through lack of production facilities and rentable space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labour cost increases. Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parts, resources availability, environmental conditions, involvement of other parts, and contractual relations.

II. AIM AND OBJECTIVES OF THE STUDY

Construction is a dynamic, competitive, ever changing and challenging industry. This study was aimed at identifying the major causes of delay, effect of delay and methods of minimizing delays in construction. To achieve the aims, objectives have been identified as following:

The main objectives of this study include the following.

1. Identify delay factors in construction projects.

2. Categorize delay factors in construction projects into nine (9) major categories.
3. Analyze the delay factors using SPSS software to demonstrate the ranking of factors.
4. Discuss about the case study in construction projects.
5. Make recommendations in order to minimize or control delays in construction projects.

III. TYPES OF DELAY

There are four basic ways to categorize type of delays

1. Critical or noncritical
2. Excusable or non-excusable
3. Compensable or non-compensable
4. Concurrent or non-concurrent

In the process of determining the effect of a delay on the project, the analyst must determine whether the delay is critical or noncritical. The analyst must also assess if delay are concurrent. All delays that are identified in the analysis will be either excusable or non-excusable. Delay can be further categorized into compensable or non-compensable delays.

IV. METHODOLOGY

The general methodology of this study relies largely on the survey questionnaire which will be collected from the promoters, consultants and contractors by mail or by personnel meeting.



Fig. 1 Methodology

A thorough literature survey was initially conducted to identify the delay factor that affect the performance of construction industry as a whole. This study has adopted the more general and broad definition of delay. More delay factors from other literature. Also some interviews with industrial practitioners were conducted to produce to check effectiveness of questionnaire. The objective can be obtained by sequencing the flow of work into a typical methodology and adopted for successful completion of the project.

V. ANALYSIS OF RESULTS

The objective of conducting the analysis for this section is to establish the factors under the groups of causes identified from the literature review and the ranking according to their significant influence towards construction project delays. This analysis is used for identifying the major factors that contributing the construction delay and improved efficiency of project management. The research methodology for present study has adopted questionnaire survey to identify significant factors influencing Delay factor in Tamil Nadu construction projects. To identify delay 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 76 factors of delay factors grouped in to 9 major groups. For each factor the respondents were requested to rate using five point scale of 1 to 5 is adopted. It is categorized as follows 5=Not difficult at all; 4=somewhat difficult; 3=difficult; 2=very difficult; and 1=extremely difficult. Prior to formulating questionnaire, a field study was carried out to get feedback from experts in construction industry on the factors identified from literature reviews.

A. Major Causes of Delays

The objective of the study has been successfully identified. A total of 76 factors that causes delay were identified. Some of these factors were the top ten most important factors that contributed to the causes of delays are Rework due to errors, Inappropriate contractual procedure, Conflicts between consultant and design engineer, Misunderstanding of owner's requirements by design engineer, Poor site management and supervision, Ineffective project planning and scheduling, Inaccurate site investigation, Late delivery of materials and Accidents during construction.

B. Reliability Analysis

Reliability test is conducted to check the stability and consistency of a data by using cronbach alpha method that is widely adopted Reliability of the data is considered at low level when cronbach alpha is less than 0.3 which means the data is not reliable and cannot be adopted. Reliability is at high level when cronbach alpha is more than 0.7 (Wong and Cheung (2005). In this study, cronbach alpha was calculated using statistical software SPSS Version 20 as shown in Table I.

TABLE I RELIABILITY STATISTICS

Cronbach's Alpha ^a	Cronbach's Alpha Based on Standardized Items ^a	No of Items
0.895	0.895	76

TABLE II TOP 10 FACTORS OF PROMOTERS

Promoters	Rank
Inaccurate site investigation	1
Delay in performing final inspection	1
Inappropriate government policies	1
Poor communication and coordination between owner and contractor	4
Frequent equipment breakdowns	4
Unfavorable weather conditions	4
Complexity of project (project type, project scale, etc.)	4
Rework due to errors	9
Lack of design team experience in construction projects	9
Misunderstanding of owner's requirements by design engineer	9

TABLE III TOP 10 FACTORS OF PROMOTERS

Consultants	Rank
Inappropriate contractual procedure	1
Conflicts between consultant and design engineer	2
Incompetent project team	2
Poor site management and supervision	2
Complexity of project (project type, project scale, etc.)	2
Rework due to errors	6
Improper equipment.	6
Changes in government regulations and laws	6
Delay in obtaining permits from municipality	6
Unfavorable weather conditions	6

TABLE IV TOP 10 FACTORS OF CONTRACTORS

Contractors	Rank
Insufficient data collection and survey before design	1
Late delivery of materials	2
Poor procurement of construction materials	2
Mode of financing and payment for completed work	4
Slow mobilization of equipment	5
Late in reviewing and approving design documents	5
Ineffective project planning and scheduling	5
Unclear and inadequate details in drawings	9
Accidents during construction	9
Suspension of work by owner	9

TABLE V OVERALL RANKING OF TOP 10 DELAY FACTORS IN CONSTRUCTION INDUSTRY

S.No	Factors	Mean	Rank
1	Inappropriate contractual procedure	4.383333	1
2	Conflicts between consultant and design engineer	4.333333	2
3	Inaccurate site investigation	4.166667	3
4	Delay in performing final inspection	4.166667	3
5	Poor site management and supervision	4.1	5
6	Late delivery of materials	3.9	6
7	Ineffective project planning and scheduling	3.883333	7
8	Misunderstanding of owner's requirements by design engineer	3.866667	8
9	Rework due to errors	3.866667	8
10	Accidents during construction	3.85	10

VI. CONCLUSION

Delays occur in every construction project and the magnitude of these delays varies considerably from project to project. Some projects are only a few days behind the schedule; some are delayed over a year. So it is essential to define the actual causes of delay in order to minimize and avoid the delays in any construction project.

There are five objectives of this study which have been achieved.

1. Identify delay factors in construction projects.
2. Categorize delay factors in construction projects into nine (9) major categories.
3. To analyze the delay factors using SPSS and to demonstrate the ranking of factors and categories according to their mean values on delays.
4. Discuss about the case study in construction projects.
5. Make recommendations in order to control delays in construction projects.

VII. RECOMMENDATION

From this study, some recommendations are given as follows.

1. A construction delay occurs mostly during the construction phase. This is mostly caused by Rework due to errors, Poor site management and supervision not able to coordinate the project very well and also late delivery of materials used in the construction projects.

Therefore, contractor need to give awareness on these three factors stated above in order to control the construction delays' problems.

2. Ineffective project planning and scheduling, Inaccurate site investigation of contractors are the problems that faced by contractors which might cause construction delays. Therefore, contractors should organize some training programs for their workers in order to update their knowledge and improve their management skill.
3. Due to the dynamic nature of project environments, it is inevitable that conflicts among the project team will arise. All project participants should recognize that conflict are inevitable and actually can be beneficial if resolved in an appropriate manner. Therefore, the conflict management is a need to produce a good working environment.

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