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IDENTIFYING THE CAUSES AND EFFECTS OF DELAY IN RESIDENTIAL PROJECTS

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Abstract - *The delays are a most common phenomenon and are considered as one of the most occurring problems in the construction industry. The significant features of time, cost, quality, and safety for a project are highly affected by the impacts of delays. The main aim of this study is to identify the factors causing delays in residential units in India and the effects of delays on these residential projects. A questionnaire survey was conducted to determine the top ten factors causing delays and high effects of delays on the residential projects in India. Total 41 factors causing delays and seven effects were identified from the detailed study of literature and using these factors questionnaire was designed to identify the most important causes and effects of delay in residential projects in India. The survey was distributed to the professionals working in the industry. The Relative Importance Index method (RII) was used to rank these factors and the most important factors causing delay, and their effects were identified.*

Key Words: **Causes, Effects, Delays, Residential Projects**

1.INTRODUCTION

The occurrence of delays is being observed by the construction industry globally. Delays have become a major issue worldwide. That is why the risk and uncertainty are highly seen in the construction sector as compared to other areas. Since India is progressing towards industrialization, the role of the construction industry has grown significantly. Delays in construction projects have become a major issue in the Indian construction industry.

A building project is considered to be successful when it is completed on time and within the budget. Delay can be defined as the extension of time for the completion of the project. It can also be defined as failure to complete the project in targeted time.

When the project gets delayed, the parties involved have to postpone their early planning and also have to bear the cost overrun that will increase. According to Al-Khalil and Al-Ghafly (1999), delays have an adverse impact on parties involved in project, such as client, consultant, and contractor. It means financial loss to the customers and loss of profit for the contractors due to high overheads cost. Very few residential projects get delivered on time and within cost. The delays and cost overruns have become a characteristic of residential units in India. The failure to complete the projects within targeted time, cost and quality will result in various uncertain adverse effects on the construction of projects.

In order to make sure the residential projects are completed in targeted time and cost, identification of causes and effects of delay is a very important aspect. Once these causes and effects are clear, the parties involved in project can take measures to avoid such situations. Thus understanding and identifying factors will help the professionals to achieve the project objectives of time, cost and quality.

2.LITERATURE REVIEW

The delays have become the most significant problem in the industry, which has been a matter of concern and has led the construction professionals and researchers a topic of study. Many researchers have studied the causes and effects of delay in the construction industry. Menesi (2007) determined the causes of delays and classified it into following categories according to liability: i) Inexcusable, ii) Excusable- a) compensable b) non-compensable, iii) Concurrent

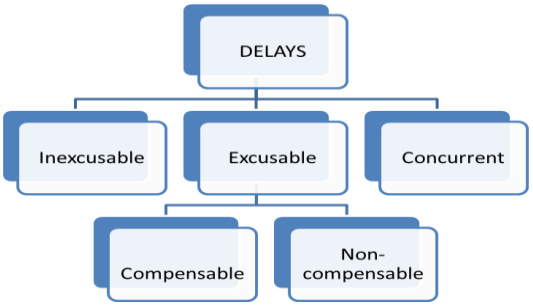

Fig 1. Types of Delays

Inexcusable delays are delays which result from the contractors' or subcontractors' actions or inactions. These delays might occur due to, improper planning and scheduling, poor site supervision, wrong construction

methods, equipment breakdowns, unreliable subcontractors or suppliers.

Excusable delays are those which occur due to unforeseen events. These events are beyond the contractor's control and are without fault or negligence on his/her part. Excusable delays are further classified into compensable and non-compensable. **Compensable Delays** are caused by the client's actions or inactions. **Non-compensable delays** are where neither the client nor the contractor is responsible for delays.

Concurrent delays are defined as when two or more delays occur at the same time or overlap to some degree would affect the ultimate completion date.

The contributions of some researchers to the construction delays are given in Table 1.

Author	Title of the paper	Findings
Hemanta et al	Analyzing Factors affecting delays in Indian construction projects	• Identified key factors impacting in delay • Factor analysis and regression modeling are used to examine the significance of the factors • The most critical factors identified were (1) lack of commitment (2) inefficient site management (3) poor site coordination (4) improper planning (5) lack of clarity in project scope (6) lack of communication (7) substandard contract.
Murali Sambasivan, & Yaw-Wen Soon	Causes and effects of delay in Malaysian construction industry	• Identified the delay factors and their impact on project completion. • Ten most causes identified were: (1) contractor's improper planning, (2) contractor's poor site management, (3) contractor's inadequate experience, (4) delay in payment by client, (5) problem with subcontractors, (6) lack of material, (7) labor supply, (8) equipment availability and breakdown, (9) lack of communication, (10) mistakes and rework. Moreover, six main effects were: (1) time overrun, (2) cost overrun, (3) disputes, (4) arbitration, (5) litigation, (6) total abandonment. • Established an empirical relationship between cause and effect
S.Shujaa et al	Time Extension Factors in construction industry of Pakistan	• Identified the delays that result in time extension factors for project completion • Factors were investigated by taking advice from experts and based on it questionnaire was prepared • Domestic issues of country were the major factors
Djoen San Santoso and Sothy Soeng	Analyzing delays of road construction projects in Cambodia: causes and effects	• Identified delay factors in road construction projects in Cambodia • The top ten was dominated by factors related to the contractor and the project. Moreover, two external factors rain and flood were on the list • Relationship between the delay factors and the three project objectives (project time, cost, quality) was discussed
Mukuka et al	Effects of construction projects schedule overruns: A case of the Gauteng Province, South Africa	• Identified the causes and assessed the effects of schedule overrun • Data received from questionnaire was analyzed using descriptive statistics procedure • The study concluded that (1) extension of time (2) cost overrun (3) loss of profit (4) disputes (5) poor quality of work (6) bad reputation of the contractor, were the major effects seen in Gauteng, South Africa due to schedule overrun.

Table 1. Literature review

3.RESEARCH OBJECTIVES

The residential projects in India or rather the construction industry of India is no exception to the delays. Data given by ProEquity about 1.47 million housing units across the main cities in India are delayed, which has affected not only to buyers but also to the developers. The main aim of this study is to determine the principal causes of delay resulting in the time overrun. Further, the study is aimed to identify the most important causes of delay in residential projects. It will help the parties involved in projects to focus on the factors causing delays and take necessary remedial measures to enhance the performance of the projects.

4. RESEARCH METHODOLOGY

The literature was reviewed to identify the factors causing delays. A total of 41 factors were determined which caused delays in residential projects in India. Based on these factors, a questionnaire was designed to know the contributions of these factors in the time overrun grants in residential projects in India. The questionnaire was distributed to the professionals of the industry; the professionals included clients, consultants, and contractors. These professionals were visited personally for their participation in this survey. As the sample size of this study was 67, total 67 professionals were visited in this questionnaire survey. For

result analysis and discussions these 41 factors were considered:

1. Relaxed decision making by client
2. Late payment by client
3. Alterations in plan and design by client
4. Clients unable to understand technical terms
5. Extra work request by client
6. Inappropriate planning by contractor
7. Low monetary capability of contractor
8. Incorrect construction methods by contractor
9. Poor experience of contractor
10. Rework due to errors by contractor
11. Improper site management by contractor
12. Delay in preparation & sanction of drawings by consultant
13. Consultant's less coordination with the client
14. Delay in approval of test and inspection by consultant
15. Consultant's unwillingness for change
16. Poor experience of consultant
17. Scarcity of material
18. Poor storage of materials
19. Escalation of material prices
20. Delay in procurement of materials
21. Increase in transportation cost of material
22. Undependable suppliers
23. Lack of skilled workforce and labor
24. Equipment non-availability
25. Low output of labor and equipment
26. Minimum use of high-tech equipment
27. Breakdown of equipment
28. Labor quarrels and strikes
29. Nonattendance of labor
30. Scarcity of equipment spare parts
31. Lawful disputes
32. Poor contract management
33. Inappropriate forecasting of contractor during bidding stage
34. Major disputes and negotiations
35. Claims
36. Unfavourable weather condition
37. Miscommunication between parties
38. Accidents and injuries on site
39. Poor site condition
40. Amendment in government policies
41. Non-availability of utilities on site (e.g. water)

The effects of delay were identified as follow:

1. Time overrun
2. Cost overrun
3. Loss of profit
4. Inferior quality of completed project
5. Total abandonment
6. Dispute
7. Arbitration

The participants were asked to rate the factors on the five-point Likert scale in the questionnaire survey. The relative importance index method was used to determine the value of various causes and effects of delay. The RII is evaluated as follow:

$RII = \sum W / (A \times N)$

Where: W = Weightage assigned to each factor by the respondents, A = Highest weight (i.e. 5 in this case), N = the total number of those surveyed.

3. DATA ANALYSIS AND DISCUSSIONS

In this section, we will present and discuss the results of the study. The data collected by questionnaire survey was analyzed by using RII method. These RII indices are used to rank the each factor and effect. The results are shown below:

Sr.no	Factors	RII	Rank
23	Lack of skilled workforce and labor	0.857	1
06	Inappropriate planning by contractor	0.849	2
11	Improper site management by contractor	0.843	3
02	Late payment by client	0.800	4
16	Poor experience of consultant	0.791	5

Table 2. Top Five factors causing delays

Sr.no	Effects	RII	Rank
1	Time overrun	0.910	1
2	Cost overrun	0.815	2
3	Loss of profit	0.669	3
6	Dispute	0.655	4
4	Inferior quality of completed project	0.572	5

Table 3. Effects of delays

From the above results, it has been observed that contractor related two factors are among the top five causes of delays. Moreover, no factors are from external related. Thus it has been concluded that the contractor related factors are the most contributing factors to delays in residential projects in India. Moreover, external factors are least contributing factors to delays.

4.CONCLUSIONS AND RECOMMENDATION

The objective of this study was to identify the factors and effects of delays in residential projects in India. This objective is achieved successfully by using relative importance index method. Contractor related factors are the factors which cause more delay in the projects. Contractors should have proper planning, proper site management and have sound project management skills. Clients should not always appoint the contractor with the low bid. Consultants should check the financial capability of the contractor and

his reputation in the market before awarding work to a contractor.

Thus this study determined the most important causes and effects of delay in residential projects, which will help the professionals of industry in project management.

LIMITATION

Factors are considered by literature. The residential projects are only taken into account for this study. The professionals from Pune, India were only visited during the questionnaire survey.

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