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A study on the analysis and evaluation of delays in private construction Projects in Kerala

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Abstract - *Construction industry is one of the very prominent industries in India due to its huge contribution to the economic development of the country. Due to the geographical, political, social and financial situations, many of the construction projects in the country are prone to delays. These delay factors can only be avoided by identifying factors and their sources.*

The main objectives of this research are to find out the main causes of delays in the construction projects in the State of Kerala. The research design was quantitative where data was collected from owners, designers, and contractors. The questionnaire was prepared using Google form, included a list of reasons for delays factors, each of which respondents were asked to rank on a 5-point scale. Acquired data were analyzed using SPSS, the statistical program for social scientists. Questionnaire survey was conducted in order to find the top 15 delays occurred in the private projects in Kerala. Finally, recommendations are made to void delays in construction projects.

Key Words: construction management, construction delays, construction industry, effects of delays, India, Kerala

1. INTRODUCTION

Construction sector is one of the most important economic sectors that play an important role in economic development of a country. However, many projects had significant delays that exceeded original time and cost estimates. Construction delays are applied in terms of time, cost, quality and safety as project success. If the project duration (the actual duration of the work) is either above the final end date specified in the contract document or above the date the project owner and contractors agreed to transfer the project and exceeds the expected time, it is identified as a time delay. This is when project work is out of date and requires higher construction costs and additional labor time than what is agreed to be planned on the contract document. For project holders, the delay can be defined by the loss of income in the absence of construction services and rentable premises or dependence on side services. For contractors or developers of projects, the delay is a big financial loss due to the fact that the work takes a long time to progress, higher price of construction material due to inflation, increase in labor costs. Usually delays in the construction industry many factors related to time, quality and cost. A construction project is generally accepted as successful when it is completed on time, within budget, according to specifications and to the satisfaction of the parties involved. Delay increases work slippage and late project completion, client and contractor disagreement. This can cause project progress disruptions and loss of services, also increases time-bound costs and ultimately can result in the termination of project construction work and its contract.

1.1 Type of delays

The type of delay may also impact activities that require a more detailed analysis to determine whether or not an additional extension is warranted. There are four basic ways to categorize delay types:

1.11 Critical or non-critical

1.12 Excusable or non-excusable

- Excusable delay with compensation
- Excusable delay without compensation
- Non-excusable delay

1.13 Compensable or non-compensable

1.14 Concurrent or non-concurrent

1.11 Critical or non-critical

Delays that affect the completion of the project or, in some cases, the milestone date are considered critical delays, and delays that do not affect the completion of the project or the milestone date are non-critical delays

1.12 Excusable or non-excusable

An excusable delay is a delay that is caused by an unforeseeable event beyond the control of the contractor or subcontractor. For example, general strikes, fires and acts of God. Inexcusable delays are events that are within the supplier's control or that are foreseeable.

1.13 Compensable or non-compensable

A compensable delay is a delay in which the contractor is entitled to an extension of the deadline and additional compensation. Regarding excusable and inexcusable delays, only excusable delays can be compensated. Irreparable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any additional compensation arising from the excusable delay.

1.14 Concurrent or non-concurrent

concurrent delays refer to delay situations where two or more delays occur at the same time or overlap to a certain extent. For example, if the owner denies access to the project site for two weeks and a severe storm prevents itone of these two weeks will work on the project simultaneously for one week.

1.2 Effects of delay

The 7 effects of delays are

1. Time over runs.

2. Cost overruns have significantly reduced the contractors' profits.

3. Loss of owner unproductivity due to long stays in the construction phase.

4. Distrust the contractor and damage the company's reputation.

5. Do not rely on owners to delay payments leading to contractor cash flow.

6. A project stakeholder is in dispute, in arbitration, or in litigation.

7. Finish the project.

2. OBJECTIVES

The purpose of this study is to identify and identify various factors that cause delays in construction projects, their impact, and solutions to delays. This research aims to identify the main causes of delays. To achieve the goal, it is identified as:

1. Determine the root cause of a project.

2. Effect of delay.

3. Recommendations for minimizing and controlling construction projects.

3. LITERATURE REVIEW

[1] N. Hamezah, M.A. Khoiry, I. Arshad, N.M. Tawil "Theoretical Framework for Construction Delays" In this article, the formwork is developed by three different authors. Here are the results of his research: Financial difficulties and economic problems, financial problems, late supervision and slow decision-making, late instructions, lack of materials on the market, poor construction management, lack of materials on the construction site, construction errors work defects, delays in delivery of materials to the site, and slow decision-making.

[2] Cairo. Mohamed, M. Marzouk, Tarek, I., El Rasas (2014) also examined the causes of construction delays in Egypt and, according to his analysis, the main groups responsible for delays were: project ownership; consultants; developers; materials; workers and, machines; projects, external related delay factors.

[3] Mega Desai and Rajiv Bhatt; 59 delay factors have been identified in residential projects. These factors are divided into nine main areas related to delays: projects, promoters (users), consultants, design, design materials, equipment, workers, external factors based on their nature and mode of existence, and project-related.

Based on the literature review, this study has identified various causes of delays in construction projects nowadays. The results of the literature search showed the ten most important factors in particular are; very poor site management; lack of skilled labor; unrealistic project planning; workers absence; design changes/rework due to design defects; accidents due to poor site safety; delays of subcontractors; lack of materials on site; late delivery of building materials and the effect of bad weather on construction activity. With these factors, the following methods are recommended to reduce project delays, providing detailed and realistic schedule of site works to coordinate construction activities and stages; timely delivery of construction materials; improving the workforce and workforce through ongoing training; selection of appropriate experts to control certain activities; using technology to track workforce performance; proper planning of activities so that they prevail even in adverse weather conditions; defining plans and goals to limit design changes; employment of subcontractors with adequate experience and increased qualifications; improvement of construction site conditions to reduce the number of construction accidents and sufficient funding from clients.

4. METHODOLOGY

First, a literature review was conducted to find factors causing construction project delays. This helped conduct a survey of his professionals in the professional and other participants in his construction industry in India to find out the causes related to the situation in India. Achieving these goals requires a research methodology. These are the main stages for conducting this study.

- Identifying the problem
- Specifying scope and research objectives
- Data collection
- Literature review
- Questionnaire
- Data analysis
- Results and Conclusion

4.1 Designing and collecting data through a questionnaire survey

A questionnaire survey was conducted as a source of primary data. There are two ways to collect data from surveys. One is called cross elevation and other one is called longitudinal elevation. Cross-sectional studies are designed to collect data over a short period of time, while longitudinal studies are designed to collect data over a long period of time. A cross-sectional survey method was chosen due to the time limitation of this study.

4.2 Data collection

The survey was sent to 40 people, 30 peoples are responded within three weeks of time, so the response rate is 75%, these 30 people's response used for the analysis. So completed with 75% validity rate.

4.3 Rating scale

Each statement in these questions should be rated on a scale from strongly agree to strongly disagree, starting with the rating system was given as follow; Strongly agree – 5 Agree – 4 Satisfactory – 3 Disagree – 2 strongly disagree – 1

Table -1: Questionnaire Survey

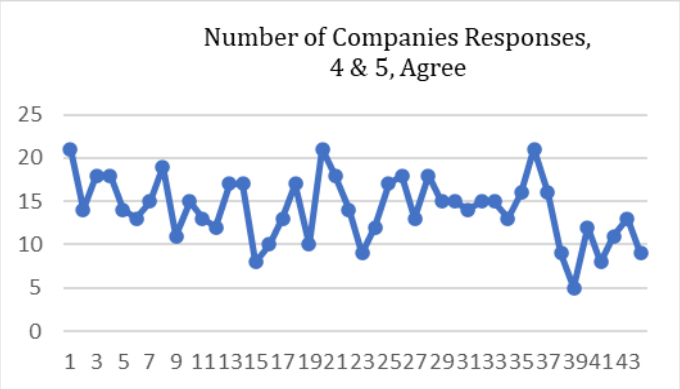
CATEGORY	FACTORS CAUSING DELAYS
OWNER	1.Delay in progress payments
	2.Delay to furnish and deliver the site
	3. Change orders (plan/design) & extra orders by owner during construction
	4.Late in revising and approving design documents
	5.Slowness in decision-making process
	6.Owner's lack of experience and involvement
	7.Delay in handing over the site for mobilization
	8.Freequent repeated works
CONTRACTOR	9.Difficulties in financing project
	10. Rework due to errors during construction
	11. Ineffective & inadequate early Planning and Scheduling of project
	12. Inadequate contractor's work & experience & also Poor risk management and ignorance
	13. Poor supervision & managerial skills and lack of training personnel
	14. Poor estimation of project time and quantities of material required before contracting
	15.Lack of arranging the resources (manpower, materials, machines)
	16.Error in the works
DESIGNER	17. Insufficient data collection and survey before design
	18. Inadequate design team experience & delay in producing design documents
	19.Using poor / old engineering design software
	20.Financial problems
	21. Misunderstanding of owner's requirements by design engineer
LABOR	23.Shortage of labors
	24. Low skilled/productivity level or unqualified labors
	25. High labor wages insists to hire low amount of labors
	26.Labor strikes at site
	27. Language of labors
	28. Lack of motivation
MATERIALS	29. Shortage of construction materials in market
	30. Changes in material types during construction
	31. Damage of sorted materials while they are needed urgently due to improper shortage of materials
	32. Delay in manufacturing special-building materials
	33. Price fluctuation / inflation in material

	prices
	34. Sudden increase in quantity needed
EQUIPMENT	35. Equipment breakdown and their idle time and lack of tool in market
	36. Shortage of heavy equipment when needed
	37. Low level of equipment-operator's skill
	38. Low productivity and efficiency of equipment
EXTERNAL FACTOR	39. Delay in obtaining permits from municipality
	40. Weather, climate (hot or cold) & rain effects on construction activities
	41. Heavy traffic, over-crowded & other restriction at site
	42. Accident during construction
	43. Slow site clearance
	44. Security
	45. Problem with neighbor's
	46. Improper project document management

5. RESULT AND ANALYSIS

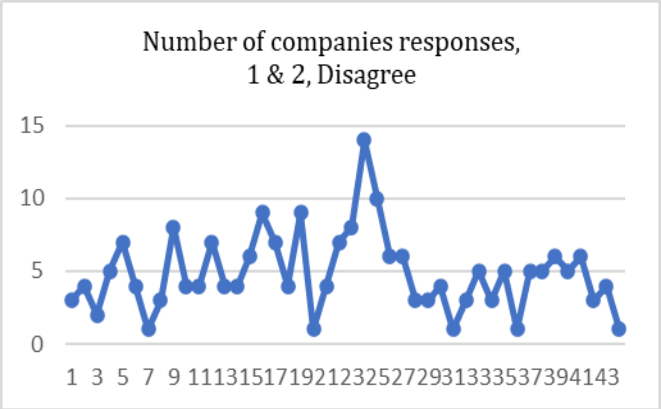
Table-2: Result and Analysis Chart

Question No.	Number of companies responds 4 & 5, Agree	Number of companies responds 3, Satisfactory	Number of companies responds 1 & 2, Disagree
1	21	6	3
2	14	12	4
3	18	10	2
4	18	7	5
5	14	9	7
7	13	13	4
9	15	14	1
10	19	8	3
11	11	11	8
12	15	11	4
13	13	13	4
14	12	11	7
15	17	9	4
17	17	9	4
18	8	16	6
19	10	11	9
20	13	10	7
21	17	9	4
22	10	11	9
23	21	8	1
24	18	8	4
25	14	9	7
26	9	13	8
27	12	4	14
28	17	3	10
29	18	6	6
30	13	11	6
31	18	9	3
32	15	12	3
33	15	11	4
34	14	15	1
35	15	12	3
36	15	10	5
37	13	14	3
38	16	9	5
39	21	8	1
40	16	9	4
41	9	16	5
42	5	16	6
43	12	13	5
44	8	15	6
45	11	16	3
46	13	13	4
47	9	20	1

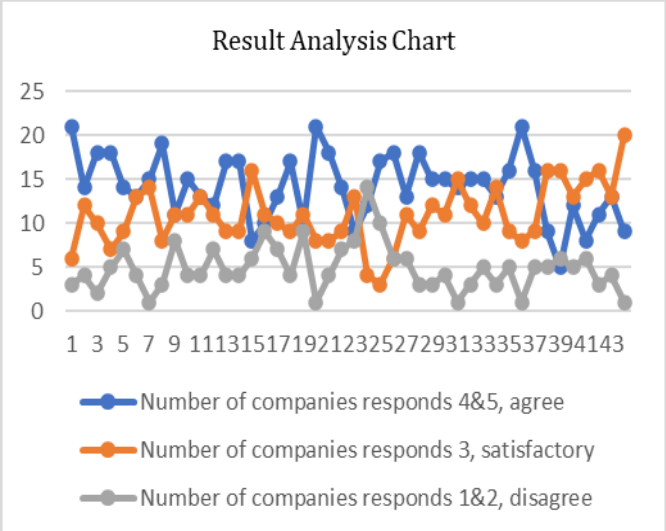


Graph 1 - Number of Responses, 4 & 5

Graph 2 - Number of Responses, 3



Graph 3 - Number of Responses, 1 & 2



Graph 4 - Overall Result Analysis

6. CONCLUSION AND RECOMMENDATION

6.1 Conclusion:

The purpose of this study was to identify the factors responsible for delays in construction projects in the state of Kerala and their effects and solution. The study identified the factors causing delays in construction projects across various stakeholders and categories including owner, contractor, designer, labor, materials, equipment and external factors. Based on the research carried out in Kerala, 15 common causes of delays were identified as below:

1) Delay in progress due to the payment issues by the owner, 2) Delay in revising and approving design document, 3) Change in orders (plan/design) & extra orders by owner during construction, 4) Rework due to errors during construction, 5) Lack of arranging the resources (manpower, materials, machines), 6) Insufficient data collection and survey before design, 7) Misunderstanding of owner's requirements by design engineers, 8)Low skilled/productivity level or unqualified labours, 9) Lack of motivation - Shortage of construction materials in market, 10) Damage of sorted material while they are needed urgently due to improper storage of materials, 11) Damage of sorted material while they are needed urgently due to improper storage of materials,12) Price fluctuation/inflation in material prices, 13)Low productivity and efficiency of equipment, 14) Weather, climate (hot or cold) & rain effect on construction activities, 15) Delay in obtaining permits from municipality.

Regarding the impact of delays in the Kerala construction industry, the five most common impacts are: Cost overruns, Acceleration of losses, Time overruns, Negative social impacts, litigation.

Regarding the impact of delays in the Kerala construction industry, the five most common impacts are:

- Cost overruns
- Acceleration of losses
- Time overruns
- Negative social impacts
- Litigation

As mentioned earlier, different countries have different causes of construction delays, different impacts and different risks, and different measures suitable for each country are taken to eliminate these risks. To eliminate the construction delays the project participants are recommended some points and that points are:

- Proper sharing of information

- Total quality management
- Proper arrangement of materials
- Proper management of labors
- Continuous trainings
- Early involvement of contractor and subcontractor
- Quality cycles

6.2 Recommendation:

Construction delays are an unavoidable phenomenon that occurs in almost every country due to the combination of factors considered above. However, construction delays are very common in most developing countries. Therefore, considering all the above and in order to reduce or mitigate these factors, the following measures may be implemented in Kerala:

• Indigenous domestic building material production plant at local level: This will reduce some chances of delay occurring of shortage of material. There is some chance of reducing the cost of materials because there will no tax on imports and excised duties.

• The government, in collaboration with other stake holders, should invest heavily in human capital development by training construction workers in the appropriate technical skills to make them efficient. By this we can construct quality infrastructure.

Factors that owners can consider;

- Owners / Clients are required to make progressive payments to contractors on time.
- Owners consider minimizing the change in orders during construction for avoiding delays.
- Factors that contractors can consider:
- Effective planning and scheduling of project by considering all the risk factors may occur.
- Contractors should find an effective material management system.
- Contractor should have a better communication and coordination skills, then only they can manage the labors and their productivity.

Factors that designer can consider:

- Designer should be a quick problem solver, which can solve the problems arriving during execution and finish the project on time.
- Designer make sure that all the documents are approved properly otherwise the work progress will affect
- Designer also make an eye for proper arrangement of documents.
- Designer have to monitor the work frequently or make inspections frequent times.

Delay in approval of contractor submission by the engineer and that is the very important sector that the contractor complaints from, and its second most important reason in the contractor's point of view. In general, the contractor cannot start any work or finish any work without approval of the engineer. So, in general that process delay of the project. In some cases, out of 30 responses, we noticed that in some contractors the engineers got specific time to give the approval to the contractor for example 24hrs and that is a cause a lot delay in the project because the contractor can't work before getting the approval. And in some of the cases the contractors have started the work without the approval of the engineer and in that case the engineer has right to make the contractor does that work again as per the contract condition.

Shortage of materials was one of the frequent causes according to the data which is collected out of 30 responses where contractor consultant and owner and it's the most frequent reason among the owner's point of view and owners have indicated that this is the reason why there was a delay in the construction as material was not delivered on the right time and because of that work was not carried out as per the project which is planned and schedule before the start of the work.

The main objective of this research work was to find out the causes of delays that produced greatest effects and extend to which these effects can be compensated in the private construction projects in Kerala. The detailed data was collected from around 30 companies which have indicated the critical areas where the delay have taken place. The important index of these each cause is calculated as an average of the frequency indices of each cause. 47 causes of delays were identified throughout this project work. The identified causes are combined and data collected are analysed and it has found that whatever the critical reasons of delay which were identified in our project can be solved in latest stage or in the future by proper consultation with the material suppliers, sub-contractors, contractors, client, client representative and engineers and all this delay can be mitigated if not fully controlled or fully nullified.

During all the 30 projects were started after proper planning and scheduling. However, as a planning was flexible and there are many unforeseen problems and

unforeseen parameters have taken into consideration but however in spite of having there are some critical issues because of which delay has taken place. Hence whenever there is a delay can be compensated by increasing the work hour for example if the scheduled is 8 hrs so this can be compensated by working 2 hrs extra in a day or by employing more resources so that the overall delay for example if the delay is 100 days the overall delay can be brought to less than 50 days because every day when you work for 2hrs extra or when you work on holydays or even when you work with the more resources more man power more machine's more materials then automatically the works will progress and the overall delay at the end of the project can be controlled.

REFERENCES

[1] N. Hamzah, M.A. Khoiry, I. Arshad, N.M. Tawil, and A.I. Che Ani (2011) "Causes of Construction Delay" "Theoretical Frame work", Procedia Engineering.

[2] Mohamed M. Marzouk *, Tarek I. El-Rasas, "Analysing delay causes in Egyptian construction projects", Journal of Advanced Research (2014) 5,49–55.

[3] Megha Desai, Rajiv Bhatt P.G. Student, "Critical Causes of Delay in Residential Construction Projects", International Journal of Emerging Technology and Advanced Engineering, (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 3, March 2013).

[4] Ajibade Ayodeji Aibinu and Agboola Odeyinka (2006) "Construction Delays and their causative factors in Nigeria", Journal of Construction Engineering and Management, Vol.132, No.8, Page No.667-677

[5] Assaf SA, Al-Khalil M, Al-Hazmi M. "Causes of delays in large building construction projects." ASCE J Manage Eng. 1995; 11(2):45–50.

[6] M.E. Abd EI-Razek, H.A. Bassioni, And A.M. Mobarak (2008) "Causes of Delay in Building Construction Projects in Egypt" Journal of Construction Engineering and Management, Vol.134, No.11, Page No. 831-841.

[7] Pablo Gonzalez, Vicente Gonzalez, Keith Molenaar Ph.D. M ASCE and Francisco Orozco Ph.D. (2013) "Analysis of causes of delay and times performance in construction projects", Journal of Construction Engineering and Management.

[8] Thillai A. Rajan, Govind Gopinath and Monalisa Behera (2013) "PPPs and Project Overruns: Evidence from Road Projects in India" Journal of Construction Engineering and Management.

[9] Cecilia Gravina da Racha and Sergio Luiz Kemmer (2013) "Method of Implement Delayed product Differentiation in Construction of High-Rise Apartment Building Projects" Journal of Construction Engineering and Management.

[10] Hemant Doloi, Anil Sawhney, K.C. Iyer, Sameer Rentala "Analysing factors affecting delays in Indian construction projects", International Journal of Project Management 30 (2012) 479–4.

BIOGRAPHIES

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