

Study on the analysis and evaluation of delays in public sector construction projects in Kerala.

Ashiq K M¹, Shrinath Rao K², Dr. Ramakrishna Hegde³

¹ M.Tech (Construction Management) Student, Dept of Civil Engineering, Srinivas University Institute of Engineering and Technology. Mukka, Mangalore

² Associate Professor, Dept of Civil Engineering, Srinivas University Institute of Engineering and Technology. Mukka, Mangalore

³ Professor and HOD, Dept of Civil Engineering, Srinivas University Institute of Engineering and Technology. Mukka, Mangalore

Abstract - The Indian construction sector is the country's economic engine. Because strong infrastructure provides the foundation for all other initiatives, the Indian construction industry is responsible for accelerating the country's overall growth, and it receives top priority from the government. However, due to the geographical, social, political and financial situation many construction projects in the country are prone to delays. These delays can be avoided by identifying factors and their sources. The main objectives of this paper are to find out the main causes of delays in public construction projects in Kerala. The research design was quantitative where data was collected from owners, contractors, and designers. The questionnaire is prepared using Google form, added a list of reasons for delays factor's, each of which respondents were asked to rank on a 5-point scale. Acquired data were checked using the statistical program for social scientists, SPSS. Questionnaire survey was conducted in order to find the delays occurred in public projects in Kerala. Recommendations are suggested to avoid delays in public sector construction projects.

Key Words: Construction Management, Construction, Delays, Construction Industry, Civil Engineering.

1. INTRODUCTION

The construction industry quite often encourages a significant part of a country's GDP, reflecting of the impact it has on its economy as well as working as a strong indicator for its growth. So it is one of the most economic sectors. However, delays frequently take place in the construction industry. Construction delay is time exceeds either after the contract date, that the components involved and have agreed upon for the delivery of the project. In both case delay is always usually a costly situation. Construction projects are complex activities, associated with large costs and long period. A large number of interconnected activities are carried out by different project participants are to be carried out during execution of a construction project. Even when the plans are prepared with due, uncertainties and

unexpected events appear on project execution. Often, such events lead to delays that have an adverse effect upon the execution and performance of the project, all construction project stakeholders (final users also included) may suffer when a delay occurs.

Delays occur due to a variety of reasons (have various origins); can be compensated or not; and they may appear concurrently or subsequently. The impact caused on the project condition may be direct or else indirect. Their appearance direct to additional cost generation, conflicts among project peoples and in worst-case scenario, litigation where extra costs may be generated. Often, delays may appear already in the initial stages of the construction, such as the stage of the preparation of the plans, or design, obtaining the building permit etc. As a outcome, the construction itself is often delayed already at its start, due to this happening of delays in previous stages of the project. Special notice should be always taken to the preparation stage and ensure that enough detailed documentation is available at the starting stage of the project. When dealing with the delays, it is not only significant to identify delays and quantify the delay impacts on project condition but also to identify and quantify the impacts of delays already done upon further project development. In order to determine responsibility, enable to learning from undesirable events, the primary causes as well as origin of delays should be identified as well.

The responsibility for the happening of a particular delay can be allocated to one project stakeholders. If those responsibilities are not identified before starting of the particular project, there can be risk of conflicts among project stakeholders regarding the responsibility allocation that can lead even to litigation. Responsibility allocation matrix is defined prior to the project condition that can therefore be an very useful in conflict management tool as it implies the roles and responsibilities of all the stakeholders therefore related to the construction projects. On this basis, the financial reward for harmful events can be identified before.

1.1 TYPES OF DELAYS

Type of delays generally comes under four categories.

Delay is measured a major cause of construction claim. The four types of delay namely:

- 1.11 Excusable delays
- 1.12 Non-excusable
- 1.13 Delays compensable delays
- 1.14 Concurrent delays

1.11 Excusable Delays

Excusable delays are those attributable to the contractor's actions or inactions, and typically include a unforeseen events. It allows the contractor to obtain a time extension to complete the project without being penalized

1.12 Non-Excusable Delays

This type of delay presents no supports to a time extension or delay damages for the contractor if the delay can be proved to have affected the whole contract. The owner however could be the enforcer to the damages

1.13 Compensable Delays

Compensable delay is when the contractor will get a payment due to the additional cost of delay and as well as to a time extension for contract performance if there is any change in scope of work, late supply of owner materials or information, delayed site access, differing site conditions and letdown to provide timely and review shop drawings

1.14 Concurrent Delay

Concurrent delays mention to delay situations when two or more delays occur at the same time or join to some degree. For example, if an owner denies access to a project site for two weeks, and a severe tempest prevents the contractor from working on the contract for one of those two weeks as well, there will be a parallel delay of one week.

1.2 Effects of Delay

The common effects of delays in construction projects are

- Time overruns
- Cost overruns
- Dispute
- Arbitration
- Total abandonment
- Litigation
- Poor coordination (e.g. within site & with subcontractors)
- Fatigue/morale problems

- Mistakes due to overwork
- lost opportunities for work elsewhere
- Indirect effects can cause costs, further delays.

2. OBJECTIVES

The purpose of this study is to find the 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. Effect of delay
2. Determine the root cause of a project.
3. Recommendations for minimizing and controlling construction projects.

3. LITERATURE REVIEW

[1] Aleksander Srdić et al (2015) conducted research and results showed that delays are a part of the daily routine during construction project execution. It can be concluded that more attention should be paid to the processes that are taking place prior to construction, such as producing adequate design drawings and documents. The results of the presented research identify the needs of the construction industry from the viewpoint of time management and delays that occur in projects, and could be used as the base for the preparation strategy for time managing for all construction stakeholders.

[2] Jesper Kranker Larsen et al (2015) concluded in their research that project schedule, budget, quality level are affected in considerably different ways. Therefore, a project manager cannot switch such critical issues by focusing only on agenda or budget complications; nor can he or she assume that time, cost, and quality are equally affected.

[3] Sadi A. Assaf et al (2006) conducted study on delays in construction projects in Saudi Arabia. Clients specified that causes of delay are related to contractor and labors. Study indicated that owners and consultants realize that awarding to the lowest bidder is the highest frequent factor of delay, while, contractors considered severe causes of delay are related to owners.

Based on literature review, it has identified that delay in any construction project is inevitable. The contractor under the construction project or contract is required to carry out and complete the project within a specific time period and cost. This requirement is often accompanied by a requirement to produce an effective program schedule and cash flow analysis in the entire project which have to be strictly followed, to ensure a minimum variation connecting critical activities unless changes are inescapable which is however covered with proper contingencies as a normal practice of

agreeing a percentage of the project cost as contingencies allowance. Importance is thus laid on timely delivery of project within the budget and to the level of standard specified by the owner is an index of successful project delivery. Failure to accomplish the targeted cost will however effect in various unexpected negative effects on the projects. One of such effects is the cost overruns, which are attributed to finance, and payment arrangement, materials shortages, poor contract management, inaccurate estimating and overall price fluctuations. Bottlenecks in the execution of the projects can also reduced by the need for a clear intention and understanding of the technical specifications

4. METHODOLOGY

First, a literature review was conducted in order to find the factors causing construction project delays. This helped to conduct a survey to collect information and to find out the causes related to the delays in public sector projects in Kerala.

Following are the main stages of conducting this study:

1. Identifying the problems
2. Specifying research objectives
3. Specifying research scope
4. Data collection
5. Literature research
6. Questionnaire
7. Data analysis
8. Results

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 was used for the analysis. Hence, completed the data collection 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

4.4 Questionnaires for causes of delay

CATEGORY	FACTORS CAUSING DELAYS
OWNER	1) Delay in decision making
	2) Suspension of work
	3) Delay in revising and approving documents by owner
	4) Delay in delivering construction site to contractor
	5) Delay of financing and payments by owner
	6) Changes to the project by owner
	7) Type of project bidding and award
	8) Unrealistic enforced contract duration
	9) Lack of experience of owner in construction project
	10) Delay by owner in handing over process or approval of completed work
CONTRACTOR	11) Difficulties in financing the project by Contractor
	12) Poor site management and supervision
	13) Deficiency in scheduling and planning of project
	14) Rework due to errors during construction
	15) Delays related to sub-contractors work
	16) Lack of experience of contractor
	17) Inappropriate construction method
	18) Poor communication and coordination with other parties
	19) Unsafe practice at site
CONSULTANTS	20) Lack of experience of consultants
	22) Drawing, shop drawings and sample materials etc
	23) Mistakes or discrepancies in documents or specifications issued by consultants

	24) Poor communication and coordination with other parties
	25) Delay in inspection
	27) Unqualified workforce
	28) Low productivity of labour
MATERIALS	29) Shortage of construction materials
	30) Delays due to material delivery
	31) Changes in material types and
	32) Specifications during construction
	33) Inflation and escalation of material prices
EQUIPMENT	34) Shortage of equipment and or equipment Failure
	35) Unforeseen site conditions
	36)Restriction at job site (poor site access,traffic congestion)
	37)Lack of site utilities or services such as water, electricity, etc.
	38) Accident during construction
	39) Problem with nearby structure or facilities
EXTERNAL FACTORS	40) Weather effect (heat, rain, etc.)
	41) Changes in government regulation and laws
	42) Delay in performing final inspection and certification by a third party
	43)Global financial crisis
	44)Force majeure (earthquake ,etc.)
	45) changes in the govt regulations and laws
	46. Weather effect (heat, rain, etc.)
	47. Changes in government regulation and laws
	48. Dispute between Govt agencies or departments
	49. Legal disputed of the project owner (client) and others (relatives or partners)

Table-1: Questionnaire Survey

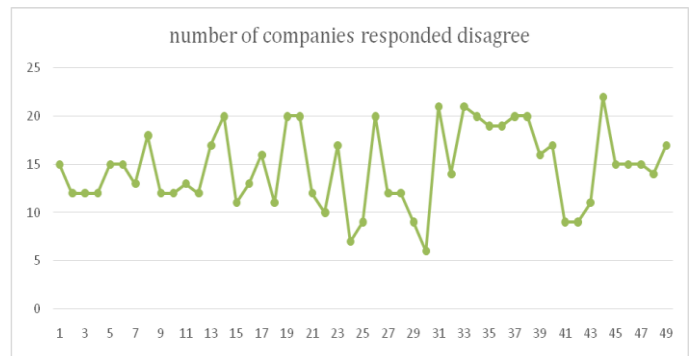
5. RESULT AND ANALYSIS

5.1 Result analysis chart

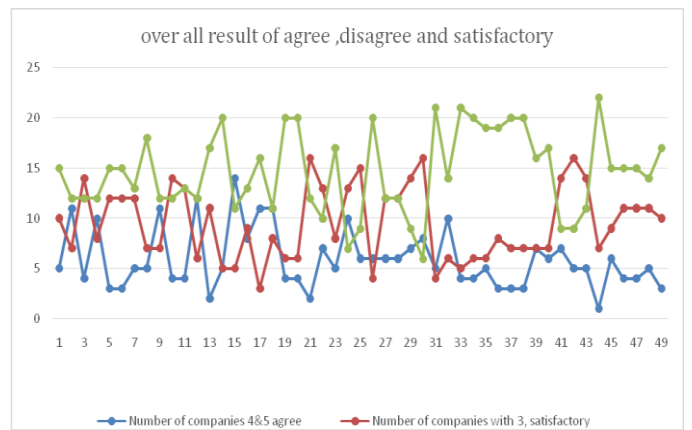
Question No.	Number of companies responded 4&5, Agree	Number of companies responded 3, Satisfactory	Number of companies responded 1&2, Disagree
1	5	10	15
2	11	7	12
3	4	14	12
4	10	8	12
5	3	12	15
6	3	12	15
7	5	12	13
8	5	7	18
9	11	7	12
10	4	14	12
11	4	13	13
12	12	6	12
13	2	11	17
14	5	5	20
15	14	5	11
16	8	9	13
17	11	3	16
18	11	8	11
19	4	6	20
20	4	6	20
21	2	16	12
22	7	13	10
23	5	8	17
24	10	13	7
25	6	15	9
26	6	4	20
27	6	12	12
28	6	12	12
29	7	14	9
30	8	16	6
31	5	4	21

32	10	6	14
33	4	5	21
34	4	6	20
35	5	6	19
36	3	8	19
37	3	7	20
38	3	7	20
39	7	7	16
40	6	7	17
41	7	14	9
42	5	16	9
43	5	14	11
44	1	7	22
45	6	9	15
46	4	11	15
47	4	11	15
48	5	11	14
49	3	10	17

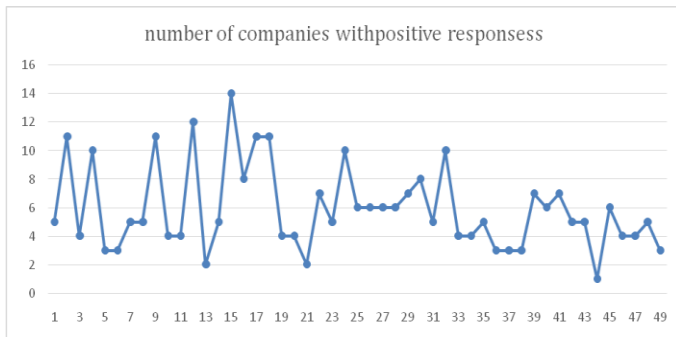
Table-2: Result Analysis Chart



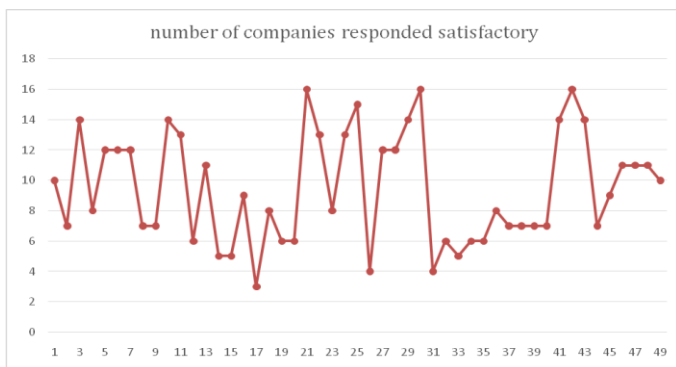
Graph 3 - Number of companies responded Disagree



Graph 4 - Overall Result Analysis



Graph 1 - Number of companies with positive response



Graph 2 - Number of companies responded Satisfactory

6. CONCLUSION AND RECOMMENDATION

The purpose of this study was to identify the factors responsible for delays in public sector 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. These categories are owner, contractor, designer, labor, materials, equipment and external factors.

Based on the research in the Kerala public construction industry, the following top 6 common causes of delays were identified:

- 1) Suspension of work
- 2) Unrealistic enforced contract duration
- 3) Delay in handing over the site for mobilization
- 4) Difficulties in financing the project by contractor
- 5) Poor site management and supervision
- 6) Deficiency in planning and scheduling of project.

Following 6 common impacts of delays in the public sector construction industry in Kerala were identified:

- 1) Time overruns
- 2) Cost overruns

- 3) Dispute
- 4) Arbitration
- 5) Total abandonment
- 6) Litigation.

6.1 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:

- Sufficient planning and the establishment of quality control mechanisms should be put in place to avoid design changes. appropriate time should be made to careful production of design , complete the tender documents, so as to get better the quality of contract documents with minimum numbers of errors and inconsistencies and reduce delay during several construction stages.
- Design related problems such as changes in drawings, incomplete and wrong specification; clients initiated changes and general change can have very bad effect on project delivery which always leads to delay and cost overruns. These are reasons that should be controlled by a good design process and excellent decision making.
- The govt, in collaboration with other stake holders, should invest in human capital development by training construction workers in appropriate technical skills to make them good. By this country can construct quality infrastructure.
- Govt should also make sure that project tenders are based on experience and expertise in a particular construction field and not full of cronyism. If this made sure, it means that the best company will get the project and complete it without delay.
- Client to reject low bids have not been taken proper account of the risks involved and make sure suitable provisions have been permitted for in the tender prices for the completion of statutory and contractual responsibilities
- Client to exercise healthy change control with particular importance on comprehensive project planning and risk assessment at project .
- Clients to make sure appropriate allocation of responsibilities among project clients and to enforce a clear responsibility structure within their own organization.
- To bring in past performance as one of the main quality criteria for prequalification and bid assessment for public works consultancy, and expand a quantitative means for checking the past performance of consultants
- To improve the "Contractor system" for public projects and the Works Bureau to consider allowing those with consistently good performance to take part in the pre-qualification exercise for major public works projects.
- Client organization should provide wider use of direct labour by contractual requirements.
- To develop an effective disciplinary mechanism to tackle non-performance by sharing information among Clients on the performance of their consultants and contractors.
- Client and project team to safe teamwork, good practice and good commitment from all parties at a project level through a joint developed project pact.
- Client to ensure more developed input from different disciplines.
- Client to avoid total sub-letting and exercise good control over the performance and management of sub contractors.
- To think again the recommendation of the consultancy study on the General form of Contract for Public Works Projects with the objective of resulting a more equitable allocation of risks between contracting parties.

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BIOGRAPHIES



Ashiq K. M. is pursuing M.Tech Construction Management at Srinivas University Institute of Engineering & Technology, Mukka, Mangaluru. After Bachelor Degree in Civil Engineering, Ashiq K. M. has worked as Manager at Century Park, Kasaragod, Kerala for 2 years.



Shrinath Rao K is working as Associate Professor in the Dept of Civil Engg at Srinivas University Institute of Engineering & Technology, Mukka, Mangaluru. He has 7 years of work experience at Abroad and 14 years at India including Teaching, Review & Re-Design of Syllabus, Quality Assurance in Higher Educational Institutions and Construction Industry.