

HOLDING PATTERN OF CONSTRUCTION PROJECT

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Abstract : Delay is one of the most common problems in construction project disputes and complaints. In essence, the delay is the time elapsed either from the date of execution indicated in the contract or from the date set for the assignment of the commitment. Most large businesses complete after these set dates for a variety of reasons. These delays can have extreme financial effects on the company. Basically, the delays are obvious. The delay can be divided into compensable or non-compensable delays. Unfortunate circumstance: all rallies lose somehow and there are no real champions. Reputation is also at stake.

A project team comes together to deliver a unique breakthrough at a specific site under conditions that will never change. They are exceptionally confusing and require the joint designation of authorizations, individuals, products, plants and materials.

Index Terms - Inefficient management, Environmental catastrophes, Construction implementation failures, Design issues, Economical changes, Failure in co – ordination between time schedule and execution.

I. INTRODUCTION

The construction industry is one of the main sectors that provide important ingredient for the development of an economy. However, many projects experience extensive delays and thereby exceed initial time and cost estimates. Construction delays are considered to be one of project success in term of time, cost, quality, and safety.

Construction projects are one-off strives with many distinctive features like a long period, abominable environment, complicated processes, financial intensity, and such technological and organizational complexity creates enormous risks which resulted in the form of delays in construction projects in completion and cost overrun.

In construction, the delay can be defined as the extra time required or incurred either beyond the stipulated completion date or beyond the date that the project stakeholders agreed upon for the completion of the project. Successful completion of the project on time is an indication of the efficiency of all stakeholders involved in the project but the construction process is subject to many variables and unpredictable factors, which result from many sources.

In construction projects, too indifferent projects where a timeline is used to design the work, delays constantly occur. It is what is late that decides whether a project or another deadline date, such as a benchmark, will be completed late.

Before deciding on the effect of a delay on your project, you need to decide whether the delay is critical or not critical.

Furthermore, all delays are understandable or not surmountable. Reasonable and non-exceed able deadlines can be characterized as simultaneous or non-simultaneous. Construction projects tend to be one-off.

II. HOLDING PATTERN OF CONSTRUCTION PROJECT – AHMEDABAD METRO RAIL

World over, transportation infrastructure projects face delays in commissioning and India is no exception. This study is carried out with an objective to specifically identify the critical delay factors in the commissioning of metro rail projects in India.

The urban population of India stood at 31.16 % as per the 2011 census of India. It is projected to rise to 60 percent by the year 2050. To respond to this shifting trend, in the last decade, 8 metro rail projects have been commissioned in India to augment the provisions for public transport. Regardless of the importance and demand for metro rail projects as a means of public transport, issues like untimely completion and delays are common to the planning and execution of these projects. Poor project delivery in terms of time and cost adherence, in almost all the cases of metro projects, proves the case of volatile project performance. The factors of time, cost and quality with respect to Indian construction projects in different regions have been investigated from time to time. Whereas the performance evaluation of metro rail projects in the transportation sector, which equally fails to comply with the project performance standards, has not received the desired attention.

Time and cost overrun are also commonly observed in case of metro rail projects in India. Delhi metro project, commissioned in 2002, was the first modern metro project in India. The first phase of the project performed well in terms of schedule and cost compliance. The other commissioned projects in the last decade include Namma Metro, Rapid Metro, Mumbai Metro, Jaipur Metro, Chennai Metro, Kochi Metro and Hyderabad Metro. Almost all of these metro rail projects have faced delays and ended up with substantial schedule overruns. With reference to such scale and frequency of delays in metro rail projects, it becomes significant to investigate the projects for identifying the factors responsible for the delay.

DEMOGRAPHIC CHARACTERISTIC	FREQUENCY	PERCENT
SEX		
Male	345	88.69
Female	44	11.31
STAKEHOLDER		
Owner	216	55.53
Contractor	93	23.53
Consultant	80	20.57
OCCUPATIONAL LEVEL		
Engineer	161	41.39
Architect	24	6.17
Administrative	36	9.25
Managerial	168	43.19
WORKING EXPERIENCE		
Less than 5 years	112	28.79
5-10 years	148	38.05
10-20 years	74	19.02
More than 20 years	55	14.14

Metro rail projects are helpful in augmentation of public transport infrastructure. These projects are frequently characterized by time and cost overruns. The aspect of time overrun is undertaken for investigation in this research. Progress of a metro rail project is typically influenced by multiple impediments. These impediments can be an outcome of factors related to owner, contractor, consultant, materials issues, labor issues, technology related aspects and external agents. A systematic evaluation of the causes of delay is expected to identify the project delay factors in the overall planning, construction and commissioning phases of a project.

Construction work has picked up the pace for the Ahmedabad Metro Phase-1 which was progressing at snail's pace due to the Covid-19 second wave since March.

Phase-1 of Ahmedabad Metro is expected to become fully operational by August 2022 as India celebrates its 75th Independence Day. Phase-1 consisting of two corridors has a total length of 40.03 km and work is only left for a section of the length of 6.36 km. The two lines for this phase are the North-South corridor of length 18.87 km connecting APMC to Motera with 15 elevated stations and the East-west corridor of length 21.16 km connecting Thaltej Gam to Vastral Gam with a total of 17 stations, out of which four are underground stations with an underground stretch of 6.53 km.



Phase 1: Ahmedabad metro rail project Sabarmati - (August'22)



Civil construction work has already started for Phase-2 (28.25 km) of Ahmedabad Metro and is expected to be completed by March 2024. Phase-2 consist of 2 corridors i.e-1 from Motera to Mahatma Mandir with a length of 22.838 km (20 stations) and Line-2 from GNLU to GIFT City with a length of 5.41 km (3 stations). Both the corridors are fully elevated.





Phase 2: Ahmedabad metro rail project Motera - (November'22)

III. Causes for Construction delay:

1. Change in project scope
2. Project complexity
3. Inadequate Planning
4. Inappropriate Project Schedule
5. Design variation
6. Inaccurate engineering estimate
7. Inefficient material and equipment management
8. Improper post execution phase management

Change in Project scope:

The scope of work in a construction project defines as the deliverables that are expected at the end of a project. Poor scope definition at the start can be a result of cost overrun and time delay of any construction project. Therefore all the project plans, schedule, cost, and quantity estimation, procurement and quality mechanism are usually calculated from the initial project scope.

Project Complexity:

The project complexity can be a major factor for time delay and cost overrun. **Complexity** might be outlined in terms of the scale of the project, most mega construction projects i.e., dams, motorways, skyscrapers, nuclear power stations, etc. tend to possess a comparatively long implementation duration in comparison to the small construction project i.e., residential houses, shops, non-commercial buildings, etc. This might result in a change in material prices, changes in exchange rates, and inflation rates such that the initial proposed/allocated budget needs to be supplemented for the project to be completed.

Inadequate Planning:

Planning is one of those aspects that affect the outcome of so many different things in life. The term planning is being used in many ways and different contexts but it can be explained as planning the human and machinery inputs in a way that to avail the maximum output is called planning. To plan a project means to identify/distinguish the tasks or work activities to be performed to obtain the desired outcome in minimum time and cost, this starts the day the idea to put up a project is conceived. A planner or responsible person should have adequate knowledge of these settling times to ensure while planning. With proposed planning deliverables and inadequate planning outcomes in delayed project completion, cost overruns, and poor quality work among other things. It is so necessary that the team

responsible for the project accurately and plans before the execution of activities to confirm the sleek flow of works, the value of money, and timely completion.

Improper Project Schedule:

Scheduling is a method in which the work activities are arranged in a sequential logical order to achieve the project within the stipulated time frame. Scheduling shows not only the logical order in which the activities are intended to be carried out, but also enables the participants of that project to monitor progress. In addition, the schedule depicts the project's future work while providing historical data that could be useful in analysing the past. To properly lead and work on a project the scheduling is an integral part to maximally utilize the available manpower and resources.

Design variation:

Design variation/error is a major factor for delay and cost overrun in a construction project. It is vital to notice that accurate representation of the employer's demand and therefore the blueprint to achieving better technical input to project execution are typically sorted out base on project designs and specifications. A faulty design means insufficient or inaccurate project deliverables during the execution of the project.

Inaccurate Engineering Estimate:

Before the execution of any project, the Employer assesses the initial size of the investment required to incur in the project by an engineer estimate. Based upon the Engineer Estimate all economic benefits and calculations are done that's why the engineer estimate needs realistic cost figures. Similarly, effective communication with design sections and the Client is required to enhance the chances of the most accurate engineering estimation.

Inefficient Material and Equipment Management:

Material and equipment management is also an integral component during the execution of the project. Both represent a major cost expense in construction project and material accounts for **60% to 70%** of the direct cost of a building project. So, minimizing the total procurement/purchase or rental cost can hugely influence the overall cost of the project. Poor management can also result in large and avoidable costs during construction and delay in the completion of the critical works due to the non-availability of the material and equipment at a crucial time. Good management in construction must vigorously pursue the efficient utilization of the material and equipment. The use of modern technologies and innovative ways has created potential wholesale changes in construction technologies.

Improper Post Execution Phase Management:

Finally, the closure or post-execution phase of any construction project is an extremely crucial stage that contains several potential factors that can ultimately lead to cost overrun and delay. As it's the last phase of any project life cycle and often ignored or less valued by even large organizations.

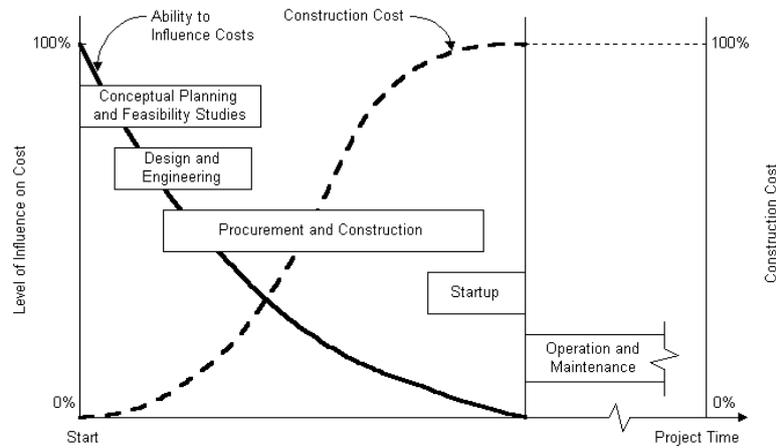
IV. Impacts of construction project

The effect of construction delays carries a rippling effect on the contracting parties and the citizens in an economy. Unlike the causes that may have some geographical restrictions, the impact is universal in nature. In the survey conducted by Sambas Ivan and Scon (2007), they ranked the feedback from the respondents in terms of the frequency of responses received for individual effects identified. It turned out that all the respondents chose time and cost overrun giving it the highest ranking.

Another effect of construction delays is the total abandonment of projects. Delays in construction projects can lead to the parties abandoning the project entirely. If a construction project gets abandoned, it reduces employment opportunities, slows down economic activities, government loses revenue and foreign investors get deterred from funding construction projects in the economy. Aside these, there is a serious damage to the reputation of the parties to the construction contract.

V. Factors in construction projects

1. Consultant related delay
2. Contractor related delay
3. Client related delay
4. External related delay



Project Management Software:

MS Project is a PM software product developed and sold by Microsoft. It is designed to assist a project manager to develop an idea, allocate resources to tasks, track progress, manage the budget, and analyze workloads. Microsoft Project was the company's 3rd MS Windows application and in a few years after its introduction, it became the dominant PC-based project management software.

PROGRAMMING IN THE MS PROJECT:

Before preparing the schedule, the various activities and resources necessary for the project are first identified. It was found that around 160 activities are needed for this project. The critical path method is the project planning method used in MS Project to link all activities. The total reference duration of the project was found to be 432 days.

VI. Use of Project Management Software:

Cost control:

Cost control is that the process that helps us to research differences in costs from the baseline and taking more correct actions, like increasing the assigned budget or reducing the scope of work, to correct that change. Cost control is a continuous process carried out throughout the entire life cycle of the project. The emphasis here is as much on clear and timely reporting as it is on the action.

Project Soft Software:

Cost management, & many other factors of project management, become difficult with many other variables at play. The process itself is elaborate, requires attention to detail and a rigorous approach. Using project management software can greatly simplify this process.

Top Four Construction Software Capabilities Requested By Buyers



VII. REASONS BEHIND DELAY:

There are four basic reasons of classifying the types of delays:

1. Critical or Non-critical.
2. Excusable or Non-excusable.
3. Compensable or Non-compensable.
4. Concurrent or Non-concurrent.

Critical or Non-critical:

1. The contractor's plan and timing (especially the critical path).
2. The contractual requirement for sequence and phase.
3. The physical constraints for the project, or how to build the work from perspective.

Excusable or Non-excusable:

Excusable Delays is a delay that is due to an unforeseeable event beyond the contractors or the subcontractor's control. Normally, based on common general provisions in public agency specifications, delay resulting from the following events would be considered excusable:

- General labor strikes. • Fires. • Floods. • Acts of God. • Owner- directed changes. • Errors & omissions in the plans and specifications.
- Differing site conditions or concealed conditions. • Usually sever weathers. • Intervention by outside agencies. • Lack of action by government bodies, such as building inspection.

Compensable or Non-compensable

A compensable delay is a delay where the Contractor is entitled to a time extension and to additional compensation.

A non- compensable delay means that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay.

Concurrent or Non- concurrent

Two or more delays that occur or overlap within the same period, either of which occurring alone would have affected the ultimate completion date. • Where two or more independent causes of delay occur during the same time period. The same time period being referred to is not always literally within the exact period of time but can be related by circumstance, even though the circumstance may not have occurred during the exact same period. • True concurrent delay is the occurrence of two or more delay events at the same time, one an employer risk event, the other a contractor risk event and the effects of which are felt at the same time.

VIII. DIFFERENT MYTHOLOGIES:

1. Research Methodology
2. Correction Methodology
3. Calendar preparation using software
4. Design of the questionnaire

Research Methodology:

In this study, Microsoft Project was used for planning and scheduling and for delay analysis. The planned vs-built technique was used. Various data was collected in the form of bar graphs and site drawings. The bar charts are converted over the network by the MSP and a critical path is discovered.

Correction Methodology:

Initially, all relevant data such as drawings, specifications, resource types, quantities, planned calendar, photographs, etc.

Calendar preparation using software:

Before preparing the schedule, the various activities are identified using the data provided by the organization and resources required for the project by the tariff analysis.

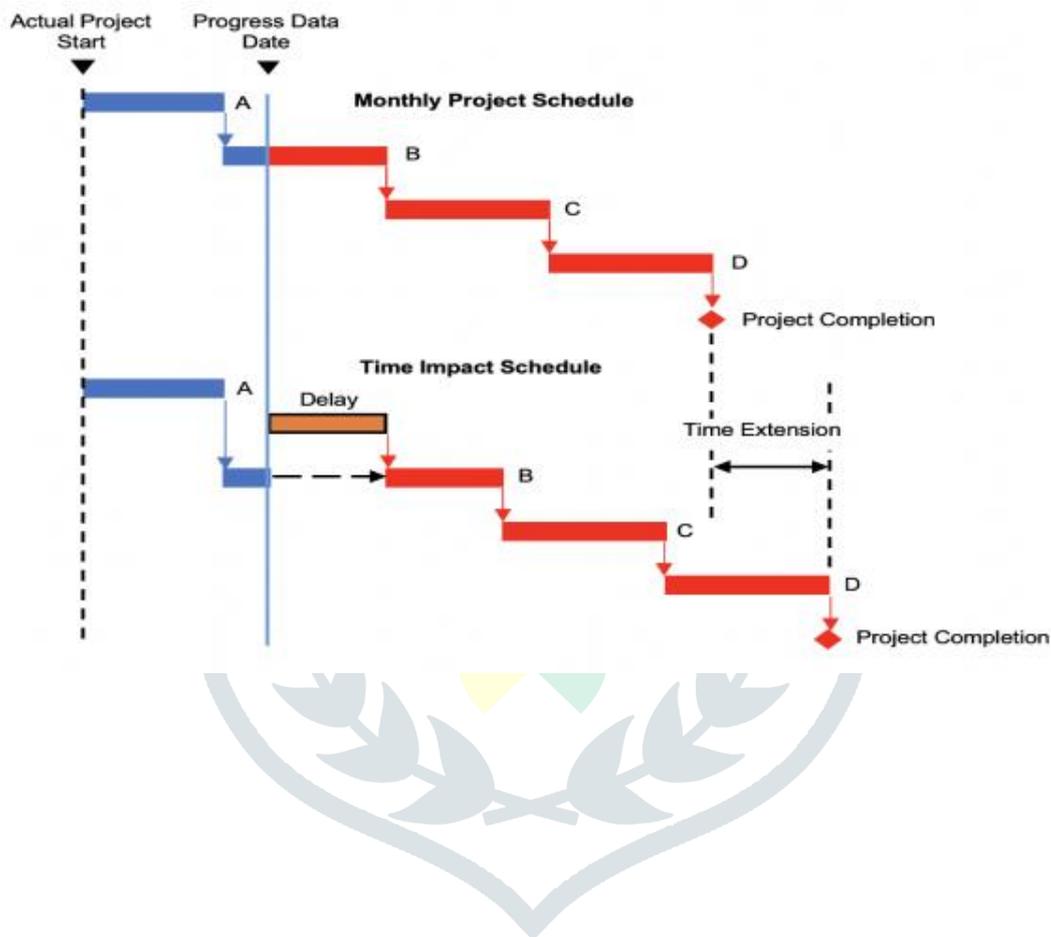
Design of the questionnaire:

A questionnaire is an analytical tool consisting of a set of questions in order to collect information from respondents.

IX. Analysis techniques of delay:

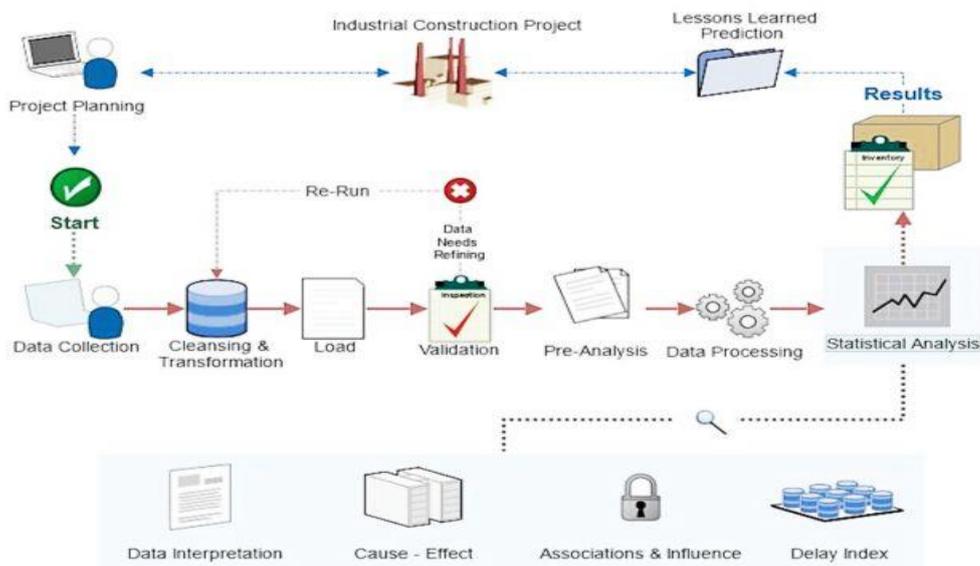
Delay is compensable depends primarily on the terms of the agreement. In most cases, the agreement takes into account in particular the types of non-compensable delays, for which the contract worker does not do so not get additional money, but an extension of the period may instead be allowed. There are five delays normally used strategies:

1. Method as planned affected
2. Method of analysis of the temporal impact
3. Compressed analysis method as constructed or “but for”
4. Snapshot/ window / time interval analysis method
5. Method of analysing windows as planned versus built ones.



Statically data:

Cause of delay	Occurrence					Severity	
1. Delay in Payments	5.9	54.5	21.1	15.9	2.6	1.5	42.2
2. Scope Change	4.4	41.4	39.3	14.1	0.8	0.3	19.8
3. Rework due to errors	31.1	78.9	15.2	2.6	0.3	1.3	51.4
4. Inadequate management and supervision	39.6	49.1	10.3	0.8	0.3	7.7	73.8
5. Delay in approving overall design	32.1	59.6	4.9	2.6	0.8	32.6	51.9
6. Lack of data collection and survey before design	23.1	45.2	25.4	5.7	0.5	1.0	51.9
7. Shortage of labour	24.2	41.6	23.1	11.1	10.0	6.4	53.2
8. Delay in material delivery especially while importing	28.0	49.6	21.6	0.8	0.0	0.5	61.7
9. Use of obsolete construction technology	42.4	55.3	1.8	0.3	0.3	4.6	68.1
10. Weather, climate and rain effects on construction activities	35.5	49.1	13.4	1.8	0.3	9.3	71.5



X. CONCLUSION

Delays are inevitable; however, they can be avoided or minimized when their causes are effectively identified and analysed. In summary, delays in construction projects are a widely researched area for which more researches are constantly being carried out. Due to the wide coverage of construction projects in terms of size, type, geography and so on, there is still the need to investigate the causes and assess the effect of delays on various construction projects at various levels. This may eventually lead to the much-needed development in the industry. Critical elements affected by project planning are listed from the results of the software analysis.

Contracts are prescribed and recommended so that the honest spirit is taken in organizing and booking the project phase. It is essential to obtain expert contractors in improvement projects for profitable implementation of the project they do not authorize the subcontractor's change of visits to the intermediate activities of the project.

Owners are advised not to delay down payments from contractors' contractors, as this weakens the contract ability of workers to finance work.

Designers should not make mistakes and produce late design documents as this creates delays in the design.

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