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A Study On Causes Of Delays In Transportation Infrastructure

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Abstract: Delays in transportation infrastructure projects are a significant challenge in India, adversely affecting economic growth and development. This study aims to investigate the key factors contributing to project delays in the Indian context, including technical, financial, regulatory, and managerial issues. The research employs a mixed-methods approach, combining quantitative data from case studies of delayed projects and qualitative insights from interviews with industry experts, government officials, and contractors. Key findings indicate that delays are often caused by land acquisition disputes, environmental clearance bottlenecks, lack of coordination between stakeholders, inadequate project planning, and financial mismanagement. Additionally, external factors such as adverse weather conditions and unexpected geological challenges exacerbate delays. The study highlights the need for adopting integrated project management practices, streamlining regulatory processes, and leveraging advanced technologies such as Building Information Modeling (BIM) to mitigate delays. By addressing these issues, India can enhance the efficiency of its transportation infrastructure projects and accelerate the country's economic progress.

Keywords: Resource Management, Construction, High Rise Building, Material management

I. INTRODUCTION

Transportation infrastructure is a cornerstone of economic development, enabling trade, mobility, and regional integration. In India, the demand for high-quality transportation networks has surged in tandem with rapid urbanization and economic growth. The Indian government has launched ambitious programs like the Bharatmala Pariyojana, with an outlay of ₹5.35 lakh crore aimed at constructing 34,800 kilometers of national highways, and the Sagarmala Project, focusing on port modernization to enhance maritime connectivity. Despite these initiatives, delays in infrastructure projects remain a pervasive issue, affecting the country's growth trajectory.

Reports by the Ministry of Statistics and Programme Implementation (MoSPI) indicate that over 40% of transportation infrastructure projects in India are delayed, with cost overruns exceeding ₹4.36 lakh crore as of recent data. Key examples include the Mumbai Trans Harbour Link, which has seen repeated delays due to land acquisition challenges, and the Dedicated Freight Corridor (DFC), which has been impacted by funding and technical issues. These delays disrupt economic activities, increase project costs, and impede the timely delivery of public benefits.

The causes of these delays are diverse and interconnected. Land acquisition disputes account for nearly 25% of delays, while regulatory bottlenecks, such as delays in obtaining environmental clearances, contribute significantly. Additionally, poor project planning, lack of coordination among stakeholders, and financial mismanagement exacerbate the problem. External factors, including adverse weather conditions and unexpected geological challenges, further complicate timely project execution.

This study investigates the root causes of delays in transportation infrastructure projects in India, using a data-driven approach supported by case studies and expert insights. By identifying critical issues and offering actionable recommendations, the research aims to contribute to more efficient project delivery and sustainable infrastructure development in the country.

II. OBJECTIVES

The main objectives of the study basically to answer the following questions:

1. To identify the causes of delays in infrastructure construction in India.
2. To study the differences in perceptions of the three major parties in any constructions, namely, i.e. owners, contractors and consultants.
3. To know the aim to develop a broad knowledge of the primary causes of delays in road construction projects.
4. To find the critical path of project, any changes or disruptions to the original schedule.

II. LITERATURE REVIEW

The past researchers research in all aspects is covered in this literature review

Arun Solanki (2022) has studied different factors like power failure, weather, rider load, festive season, etc. which are responsible for the delay of Delhi Metro. Due to these factors, Metro got delayed and run at a reduced speed causing much inconvenience to the people, who are hoping to reach their offices on time. Delhi Metro data are received from different sources which may be structured (timings, speed, traffic), semi-structured (images and video) and unstructured (maintenance records) form. So, there is heterogeneity in data.

Ram Singh, special article Economic and political Weekly (2010) concluded on, "Delays and Cost Overruns in Infrastructure Projects: Extent, Causes and Remedies". He found that, delays are one of the crucial causes behind the cost overruns. Bigger projects have experienced much higher cost overruns compared to smaller ones. Compared to other sectors, projects in road, railways, urban-development sectors, as well as those in civil aviation, shipping and ports, and power sectors have experienced much longer delays. Analysis shows that, due to imperfect techniques and contractual incompleteness some delays and cost overruns are inevitable. However, delays are too frequent and too large to be accounted for by imperfect techniques, contractual incompleteness and inflationary fluctuations.

Yash Kumar Mittal, et al. (2010) had studied with an objective to specifically identify the critical delay factors in the commissioning of metro rail projects in India. Ahsan & Gunawan[5] studied the time performance of projects in a selected group of countries in Asia and found the time performance of Indian construction projects to be the poorest, with an average schedule overrun of 55%.

Sambasivan, et.al (2007) had studied the factors of project delay and its repercussions on project completion in the Malaysian construction industry. The ten most significant causes of delay identified from a set of twenty eight different causes were

- (1) Contractor's Improper Planning,
- (2) Contractor's Poor Site Management,
- (3) Inadequate Contractor Experience,
- (4) Inadequate Client's Finance and Payments for Completed Work,
- (5) Problems With Subcontractors,
- (6) Shortage In Material,
- (7) Labor Supply,
- (8) Equipment Availability and Failure,
- (9) Lack Of Communication Between Parties, And
- (10) Mistakes During the Construction Stage.

Vijayamohan Pillai & K P (2001) studied 24 power projects in India and analysed the extent of time and cost overruns. The projects were reported with an average time overrun of more than 150%.

IV. RESEARCH METHODOLOGY

- This study adopts a mixed-methods approach to investigate the causes of delays in transportation infrastructure projects in India. The research integrates both qualitative and quantitative methods to ensure a comprehensive analysis.
- Primary data is collected through structured interviews and surveys with key stakeholders, including government officials, project managers, contractors, and industry experts.
- Secondary data is sourced from government reports, project case studies, and academic literature to provide contextual background and validate findings.
- The study also incorporates a comparative analysis with international best practices to identify potential solutions that can be adapted to the Indian context.
- This methodological framework enables the identification of actionable strategies to mitigate delays and improve the efficiency of transportation infrastructure development in India.

V. CASE STUDY

For present Research work In Pune has been consider case study which are mentioned as below: -

Case study

1. Client: - Pune Municipal Corporation
2. Project Management Consultant: - S.N. Bhohe & Associates Pvt.
3. Contractor: - JKumar Infraproject Ltd
4. Tender Cost: - Rs 24,99,39,211
5. Accepted Tender cost: - Rs 24,70,14,922
6. Time Limit: -24 months (Including monsoon)

To improve traffic condition in the city at various junctions to construct flyovers/ grade separator is one of measure in comprehensive mobility plan (CMP) 2008 prepared by Pune Municipal Corporation

Pune Municipal Corporation is one of city in India which is implementing BRTS for mass public transport. For implementing BRTS & Other infrastructural projects are suggested in CMP for improving mobility of the city.

PMC has established its own funds by loan/ grand under scheme of JNNURM Different works are proposed according to its need in CMP, Construction of flyover at Saswad Phata is one of the projects considered in 1" phase (on priority)

The proposed flyover is located on a crowded road in the heart of the suburbs of Pune. In addition to thickly populated area around the same, there is a big marketplace, BRTS Bus Terminal, schools, offices etc. The area is residential as well commercial place. This has resulted in highly increased Intensity of vehicular traffic and pedestrian traffic Specially, large traffic of Heavy vehicles like trucks, Buses ply on this road on account it is National Highway (Pune - Shölapur) and of timber market on the side. Pune Municipal Corporation has taken up a programmed to construct grade separated facility on priority



Fig. Google image of the Junction

5.1.1 Silent Feature of the work:

1. Length of flyover (Viaduct): -Pune to Saswad - 525 M Saswad to Pune – 192M
2. Length of Ramp: - Pune to Saswad - 87 M Saswad to Pune - 107 M
3. Estimated Cost put to Tender:- Rs 24, 99, 39,211/- Revised Cost of Project :- Rs 26,52.97 441/-
4. Period of Construction. 24 Months Up to 27/07/2013,
5. First EOT Sanctioned: Upto 30/10/2015 (ie 15 months
6. Second ACT Sanctioned: - Upto 31/08/2015 (ie. 10 Months)
7. Third EOT Sanctioned. Upto 19/01/2016 Cie. 4 Months)
8. Final EOT Required: Upto 31/03/2016 (t.e. 2 months 11 Day

5.2.1 Detail analysis of delay: -

- Few shops at Saswad approach must be removed, Encroachment win not removed. From the Date up to 20" May 2016 permission was still not granted for a span of 20m Shops could tved totally. Plinth wall was constructed on the back side of approach way. Shops neat Bunter school compound must be removed. There was total 142 shops. After shifting the was on the hack side of plinth wall then the road widening was done.
- There was total of about 33 trees that had to be removed from the path of the flyover. Hence for this sake permission was not granted by the High Court. This took another two years to grant Permission. So, there was a delay of two years because of removal of trees.
- On the curve portion there was a previously situated police station. Hence objection was taken by the police station authorities on the curve portion since the flyover had to be constructed over the police station.
- The launching of girder on the curve took about one and a half years. Therefore, there was a delay of one and a half years because of the objection of the police station and launching of girder From Pune to Solapur there was a water supply pipelines of 450mm, 500mm, 150mm the alignment foundation has to be changed. It was shifted to RIO which caused initial delay of six month the piers Le from P9 to P13 there is construction of box girder. Therefore, shuttering hasto be done.
- Be use of the curve there is a development of negative forces which could not be solved This caused a further delay. The launching of steal guider took a time of one and a half year hence because of the launching of steel girder there was one year delay. Changes in design were frequent. From box-guider to girder
- As per the variation in the underlying strata pole foundation was not suitable everywhere at the initial stage pile foundation was adopted throughout but because of varying strata conditions this what not possible y

• Heavy traffic affects efficiency of roads. Hence the traffic was diverted through the BRTs from the alternative roads. For the widening of roads and smooth construction it was necessary to divert the traffic in that area.

VI. SUGGESTION AND RECOMMENDATION

6.1. Communication Related Recommendations:

- Proper communication and coordination system between owner and contractor should be developed. Changes and alterations in planning execution should be discussed and pre informed so that it will not lead delay. Payments should be done on time so that project performance will not get affected
- Communication as well as document system should be developed so that drawings and their mistakes (if any) can be corrected as soon as possible. Implementation of practical knowledge also for junior consultant's proper training course should be developed. The role of this training programmer should include leadership skill development, coordination system improvement.
- Decision and steps taken during project life cycle should be beneficial for project performance. Use of MSP, Primavera or any other planning & scheduling software must be compulsory. As the construction projects include huge number of participants, lean approach should be developed Contractor should employ different teams like technical team: finance team research team etc and each team will have their specific goal or purpose. Technical staff should be assigned to project according to their area of expertise or capability This will be helpful to reduce the rework as well as overcome the problem of inadequate handling of project progress. Meeting between all teams should be arranged to build up effective management between project teams
- For the implementation of material management and quality assurance a dedicated team should be deployed. The role of this team should be material procurement. vendor selection, inspection. Thus, it will be helpful in stores management as well as overcome the factor of untimely delivery. In project cost estimation this team will be helpful for alerting the factor of price escalation

VII. CONCLUSION

- Delays in transportation infrastructure projects remain a critical challenge in India, significantly impacting project costs, timelines, and societal benefits. This study identifies and analyzes the key factors contributing to such delays, including land acquisition disputes, regulatory bottlenecks, inadequate project planning, financial mismanagement, and external challenges like adverse weather and geological conditions.
- Through case studies such as the Pune flyover project, the study highlights the interconnected nature of delay causes, ranging from stakeholder miscommunication to technical and environmental constraints. These findings emphasize the need for:
 1. Streamlined regulatory frameworks, particularly for land acquisition and environmental clearances.
 2. Advanced project management tools like Building Information Modeling (BIM) and scheduling software.
 3. Enhanced coordination mechanisms among stakeholders to foster better communication and decision-making.
 4. Development of specialized teams for material management, quality assurance, and financial oversight.
- Top ranked are gathered and analyzed to propose list of recommendations to mitigate effect to delay in Indian construction industry. It is recommendation to change in planning and control in the used general contract in India to be coincide by defining time frame to submit original program and to force contractors to submit project. It is recommended to define prerequisite skills for project planner such as experience, working in similar projects, having adequate educational and technical skills to monitor project. It is highly recommended to enhance planning and controlling skills especially for owner side.

- This study aims to investigate the important causes of delay in transportation infrastructure projects. The literature is reviewed thoroughly and a questionnaire which contains sixty-four possible causes of construction delays in transportation infrastructure projects is formed. The results revealed that the problem of construction delays in transportation infrastructure projects is frequent and notable. The top five important causes of construction delays in transportation infrastructure projects are mainly Land Acquisition, Environmental Impact of the project, financial closure, Change orders by the client, Poor site management and supervision by contractor.
- In summary, delays in construction projects are a widely researched area for which more research are constantly being carried out. The analyses of the results were carried out based on the chosen methodology for this study.
- Data on the background of the respondents were considered in the initial stages of the analysis. This was followed by the presentation of the major factors of delay as identified in existing literature's which the researcher has examined thoroughly. The responses on the major factors causing delay were ranked in order of importance from the perspective of the consultants, contractors and subcontractors. Finally, the effects of delays were also analyzed and the responses were ranked.

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