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Effect of Equipment Management on Delay of Infrastructure Highway Projects

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Abstract: ***Effective equipment management is critical to minimizing delays in road construction projects. This study comprehensively examines the impact of improper equipment management, identifying key challenges such as inadequate planning, procurement delays, misallocation, poor coordination, and lack of maintenance. Using the Relative Importance Index (RII), procurement delays (RII = 0.78), poor coordination (RII = 0.73), and maintenance issues (RII = 0.72) were found to be the most critical delay factors. These findings were further validated through the Analytic Hierarchy Process (AHP) confirming the strong correlation between equipment management inefficiencies and project delays. To mitigate these challenges, the study recommends comprehensive equipment planning, digital tracking systems, efficient procurement strategies, improved coordination, and preventive maintenance programs. Implementing these measures can enhance operational efficiency, reduce costs, and ensure timely project completion. The findings provide valuable insights for policymakers, project managers, and industry stakeholders, offering a framework for optimizing equipment management in road construction, ultimately leading to more sustainable and cost-effective infrastructure development.***

Keywords: Delay, RII, AHP, Analysis, Recommendation, Equipment Management etc.

I. INTRODUCTION

The construction industry plays a vital role in a nation's economic development, with road infrastructure being one of its most crucial components. Road projects enhance connectivity, facilitate trade, and contribute to economic growth. However, delays in road construction projects have been a persistent challenge, leading to increased costs, reduced efficiency, and negative socio-economic impacts. One of the significant factors contributing to these delays is improper equipment management. Effective management of construction equipment is critical to maintaining project schedules and ensuring timely completion.

Construction equipment, including earthmoving machinery, paving equipment, and transportation vehicles, plays a crucial role in road construction. However, factors such as inadequate maintenance, equipment breakdowns, inefficient scheduling, and poor procurement strategies often lead to delays. In developing countries like India, where large-scale infrastructure projects are being undertaken, equipment-related inefficiencies have a profound impact on project execution. This study aims to empirically analyze the extent to which improper equipment management contributes to delays in road construction projects.

Road infrastructure is a cornerstone of economic development, social connectivity, and national growth. Efficient transportation networks facilitate trade, improve access to education and healthcare, and enhance regional integration. Governments and private entities worldwide invest heavily in road construction projects to meet urbanization demands, support industrialization, and address population growth. However, the timely completion of these projects remains a persistent challenge. Delays in road construction projects are a global phenomenon, with repercussions ranging from cost overruns and contractual disputes to reduced public trust and economic stagnation.

The construction industry is inherently complex, involving multidisciplinary stakeholders, dynamic environments, and interdependent processes. Among the critical factors influencing project timelines, equipment management stands out as a pivotal yet often underestimated component. Construction equipment ranging from excavators and bulldozers to asphalt pavers and compactors plays a vital role in executing road projects efficiently. Proper equipment management encompasses procurement, deployment, maintenance, and optimization of machinery to align with project schedules. Conversely, improper equipment management marked by poor planning, inadequate maintenance, underutilization, or logistical inefficiencies can derail even well-designed projects.

II. LITERATURE REVIEW

Cuadros et al. (2024) – Prioritizing risk factors is crucial in project scheduling. Monte Carlo Simulation (MCS) helps quantify risks, but expert judgment influences outcomes. Uncommon events like prolonged suspensions can skew results, highlighting the need for flexibility in risk assessment.

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Das et al. (2024) – Examines safety challenges in road construction using the Theory of Planned Behavior (TPB). Proposes tailored training, systemic safety management, and stakeholder collaboration to improve occupational health and safety.

Malunjkar and Aher (2023) - Analyzed delay factors in road construction projects using the RII method and found that material shortages, poor coordination, delayed payments, and inadequate planning significantly affected project completion and overall construction efficiency.

Cavalli (2023) – Reviews advancements in road materials, structures, construction techniques, and detection technologies, summarizing global trends and challenges in road engineering.

Sha et al. (2022) – Highlights challenges of highway construction on the Qinghai-Tibet Plateau due to extreme environmental conditions. Recommends advanced stabilization methods and modified asphalt binders for improved durability.

Boakye & Ada (2022) – Uses RII and EFA to assess on-site workers' perspectives on environmental impacts, identifying dust and noise pollution as critical concerns. Suggests mitigation strategies for improved environmental management.

Ayarkwa (2022) – Identifies challenges in adopting sustainable building practices, such as lack of training and high costs. Proposes stakeholder education and personnel with green building expertise as key strategies.

Erdogan et al. (2020) – Discusses multi-criteria decision-making (MCDM) in construction management. Introduces a nine-stage model for contractor selection, applied to a swimming pool project using AHP and Expert Choice, yielding an optimal contractor selection.

Patil. S. K. et al. (2013) - Identified land acquisition, environmental clearance, financial issues, and poor planning as major causes of delays in transportation infrastructure projects. The study recommended effective project management and timely decision-making to minimize delays and improve project performance.

III. CASE STUDY

The Kagal-Satara National Highway is a crucial roadway segment in Maharashtra, forming a vital link in the national highway network. It plays a significant role in transportation, commerce, and regional development. However, like many highway projects in India, it has faced challenges related to delays, cost overruns, and execution inefficiencies. This case study examines the causes of delays, their impacts, and potential mitigation strategies based on real- world observations and data.

- Project Name: Kagal-Satara National Highway (NH-48)
- Location: Maharashtra, India
- Length: Approximately 133 km
- Project Scope: Widening and upgrading of the existing highway to six lanes
- Executing Authority: National Highways Authority of India (NHAI)
- Contractors Involved: Multiple national and regional contractors
- Project Cost: Estimated at INR 3,500 crore
- Planned Completion Date: Initially scheduled for 2022
- Current Status: Ongoing with delays

IV. QUESTIONNAIRE SURVEY

This questionnaire is designed to assess the impact of improper equipment management on delays in road construction projects. It aims to identify critical factors contributing to project setbacks due to inefficiencies in equipment planning, allocation, maintenance, operator training, availability, logistics, and financial constraints. Respondents are requested to rate the impact of each factor on project delays on a scale of 1 to 5, ranging from not important to very important. Key focus areas include equipment planning and allocation, which evaluates whether poor forecasting and mismanagement contribute to inefficiencies. Maintenance practices and operator training are examined to determine if inadequate upkeep and lack of skilled personnel lead to project slowdowns. Additionally, the availability of equipment, transportation logistics, and the condition of machinery are analyzed to understand how bottlenecks occur. Factors like communication gaps, financial constraints, and external influences such as weather and regulations are also considered, providing a holistic view of how equipment-related challenges impact project timelines. The findings from this study will help construction professionals and policymakers develop effective strategies to improve equipment management and minimize construction delays, ensuring projects are completed on time and within budget. Your participation and insights are highly valued in shaping solutions for better infrastructure development. For each of the following factors, please rate their impact on project delays due to improper equipment management on a scale of 1 to 5,

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where:
1 = Not Important
2 = Slightly Important
3 = Moderately Important
4 = Important
5 = Very Important

1) *Equipment Planning:*
- Inadequate planning of equipment needs
- Delays in procurement of necessary equipment

2) *Equipment Allocation:*
- Misallocation of equipment to tasks
- Poor coordination in equipment usage across different project areas

3) *Maintenance Practices:*
- Lack of regular maintenance leading to breakdowns
- Unplanned downtime due to equipment failures

4) *Operator Training:*
- Insufficient training of equipment operators
- Lack of skilled operators for specialized equipment

5) *Equipment Availability:*
- Delays due to unavailability of required equipment
- Inadequate quantity of equipment leading to bottlenecks

6) *Logistics and Transportation:*
- Delays in transporting equipment to the site
- Issues with moving equipment within the site

7) *Equipment Age and Condition:*
- Use of outdated or worn-out equipment
- Higher breakdown rates due to equipment age

8) *Communication and Coordination:*
- Poor communication between equipment management teams and project managers
- Lack of clear scheduling and coordination of equipment usage

9) *Financial Constraints:*
- Budget limitations affecting equipment procurement and maintenance
- Delays due to cost-cutting measures impacting equipment availability

10) *External Factors:*
- Delays due to weather conditions affecting equipment usage
- Impact of regulatory issues on equipment usage

V. STATISTICAL ANALYSIS

A. *Relative Importance Index*

According to (Aibinu & Jagboro 2002), the Relative Importance Index (RII) approach used to describe the relative importance of the specific causes and effects based on the likelihood of occurrence and effect on the project using the Likert scale of five scales. In addition, the higher value of the index of relative importance (RII) is the critical cause or impact component and is determined by equation (1)

$$RII = \Sigma W / A*N$$

Where:

RII – is Relative Importance Index

W – is the weight given to each factor by the respondents from 1, 2, 3, 4 and 5 for very low, low, moderate, high and very high, respectively

A – is the highest weight (i.e., 5 in this case) N – is the total number of respondents

TABLE I - RII for Performance Factor

	Lack of clear scheduling and coordination of equipment usage	Inadequate planning of equipment needs	Lack of regular maintenance leading to breakdowns	Delays in procurement of necessary equipment	Delays in transporting equipment to the site	Misallocation of equipment to tasks	Poor coordination in equipment usage across different project areas
RII	0.46	0.85	0.72	0.78	0.55	0.78	0.73
Ranking	16	1	5	2	11	3	4

	Misallocation of equipment to tasks	Higher breakdown rates due to equipment age	Delays due to unavailability of required equipment	Poor communication between equipment management teams and project managers	Delays due to weather conditions affecting equipment usage	Impact of regulatory issues on equipment usage
RII	0.78	0.48	0.6	0.47	0.45	0.44
Ranking	3	14	8	15	19	20

	Delays due to cost-cutting measures impacting equipment availability	Lack of skilled operators for specialized equipment	Inadequate quantity of equipment leading to bottlenecks	Insufficient training of equipment operators	Use of outdated or worn- out equipment	Unplanned downtime due to equipment failures	Issues with moving equipment within the site
RII	0.45	0.6	0.55	0.58	0.5	0.64	0.53
Ranking	18	7	10	9	13	6	12

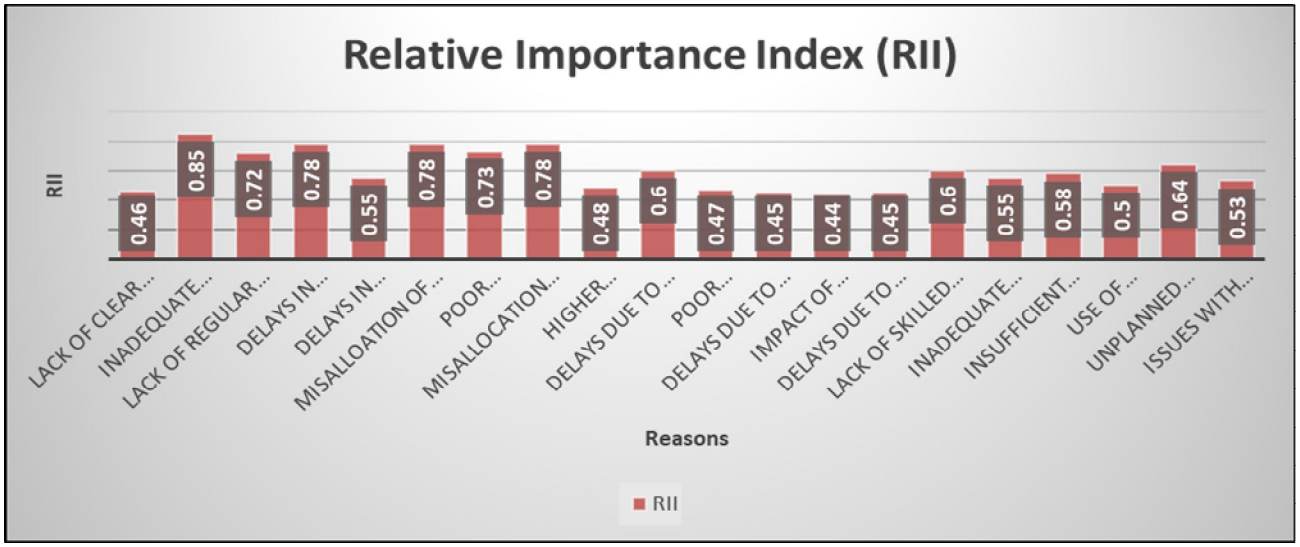


Figure 1 - Comparative analysis of RII

The Relative Importance Index (RII) analysis provides insights into the critical factors causing delays in road construction projects due to improper equipment management. Each factor has been assigned an RII value, which indicates its significance in contributing to project delays. The higher the RII value, the more critical the factor is in affecting project timelines.

1) Critical Factors Causing Delays (Highest RII Values)

The most significant factor identified in this study is inadequate planning of equipment needs, with an RII value of 0.85. Poor forecasting and planning often result in unavailability or shortages of essential machinery at critical project stages, leading to significant delays.

Without proper planning, construction teams may face interruptions due to equipment being unavailable or mismatched with project requirements. Another major cause of delay delays in procurement of necessary equipment, which has an RII value of 0.78. Inefficiencies in the procurement process, supplier issues, and late decision-making contribute to the failure to secure essential equipment on time. This leads to stalled construction activities, cost overruns, and potential contract penalties.

Similarly, misallocation of equipment to tasks also scores an RII of 0.78, indicating its severe impact on project schedules. When equipment is not distributed efficiently across different work areas, productivity declines, and tasks take longer to complete. Poor coordination between project managers and equipment operators often results in machinery being underutilized in some areas while other sections of the project face shortages. Poor coordination in equipment usage across different project areas follows closely, with an RII of 0.73. When multiple teams are working on different sections of a project, lack of communication and planning regarding equipment usage can create conflicts, leading to idle time, inefficiencies, and further project delays.

2) Moderately Significant Factors

Unplanned downtime due to equipment failures (RII = 0.64) is another major cause of project delay. When construction machinery suddenly breaks down, it disrupts workflow, causing project teams to pause activities until repairs are completed. This problem is often exacerbated by a lack of regular maintenance leading to breakdowns (RII = 0.72), emphasizing the importance of preventive maintenance practices. The delays due to unavailability of required equipment (RII = 0.6) highlight the challenge of insufficient resources. When critical equipment is missing or not ready for use, work cannot proceed as planned. Similarly, lack of skilled operators for specialized equipment (RII = 0.6) suggests that a shortage of properly trained personnel can limit productivity and lead to project inefficiencies. Inadequate quantity of equipment leading to bottlenecks (RII = 0.55) and delays in transporting equipment to the site (RII = 0.55) further emphasize logistical and resource management challenges. If construction teams do not have enough machinery to meet demand, or if delays occur in getting equipment to the site, overall progress is slowed.

3) Less Significant Factors (Lowest RII Values)

Factors such as impact of regulatory issues on equipment usage (RII = 0.44) and delays due to weather conditions affecting equipment usage (RII = 0.45) have lower RII values, indicating that while they do contribute to delays, their impact is less severe compared to internal project management issues. Additionally, delays due to cost-cutting measures impacting equipment availability (RII = 0.45) suggest that budget constraints do play a role, but they are not as critical as operational inefficiencies such as misallocation, maintenance, or procurement issues. The RII analysis confirms that poor equipment management significantly impacts road construction project timelines. The three most critical issues inadequate planning of equipment needs, delays in procurement, and misallocation of equipment to tasks highlight the need for improved project planning, proactive procurement strategies, and better coordination among teams. Addressing these factors through proper forecasting, training, and logistical improvements can help mitigate delays and enhance the efficiency of construction projects.

B. Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is a multicriteria decision-making (MCDM) tool used to analyze complex problems by breaking them down into a structured hierarchy. In this study, AHP is applied to prioritize the factors causing delays in road construction projects due to improper equipment management. The method helps in assigning weights to different delay factors based on expert judgments, enabling better decision-making for mitigation strategies.

Steps Involved in AHP for this Study-

1) Problem Definition

The goal of the AHP analysis is to determine the most critical factors contributing to equipment-related delays in road construction projects.

2) Developing the Hierarchy Structure

AHP structures the problem into three levels:

- Level 1: The overall objective – identifying key equipment-related delay factors.
- Level 2: Main categories of delay factors, such as planning, maintenance, availability, and coordination.
- Level 3: Specific sub-factors under each category (e.g., inadequate planning, procurement delays, equipment breakdowns).

3) Pairwise Comparison of Criteria

Experts were asked to compare factors in pairs based on their relative importance using Saaty's 9-point scale:

TABLE II - Pairwise Comparison of Criteria

Importance Level	Explanation
1	Equal Importance
3	Moderate Importance
5	Strong Importance
7	Very Strong Importance
9	Extreme Importance
2, 4, 6, 8	Intermediate Values

Each factor is compared with others, and a pairwise comparison matrix is developed.

4) Normalization and Weight Calculation

- The values from the comparison matrix are normalized to ensure consistency.
- The priority weights of each factor are determined by calculating the eigenvector of the matrix.
- Consistency Ratio (CR) is checked to ensure logical consistency in expert judgments (CR $\leq$ 0.1 is acceptable).

5) Ranking of Delay Factors

The final weights assigned to each factor determine their relative importance. The higher the weight, the more critical the factor in contributing to project delays.

C. Developing a Model

After interviewing various authorities to eliminate duplication and ensure compliance with parameters, 20 parameters were identified as contributing to delays in road construction projects due to improper equipment management. Following the identification of these parameters, a questionnaire was developed. The questionnaire was finalized with guidance from three working professionals and two academicians. From the questionnaire, responses were collected to determine the top five parameters contributing to delays:

- Inadequate planning of equipment needs
- Delays in procurement of necessary equipment
- Misallocation of equipment to tasks
- Poor coordination in equipment usage across different project areas
- Lack of regular maintenance leading to breakdowns

1) Deriving Priorities (Weights) for the Criteria

TABLE III - Fundamental Scale of Pairwise Comparison

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Moderate Importance	Experience and judgment slightly favor one activity over another
5	Strong Importance	Experience and judgment strongly favor one activity over another
7	Very Strong Importance	An activity is strongly favored and its dominance is demonstrated in practice
9	Extreme Importance	The evidence favoring one activity over another is of the highest possible order
2,4,6,8	Intermediate Values	Used when compromise is needed between adjacent judgments

A pairwise comparison matrix was created to evaluate the relative relevance of each parameter.

TABLE IV - Pairwise Comparison Matrix

Parameter	Inadequate Planning	Delays in Procurement	Misallocation of Equipment	Poor Coordination	Lack of Maintenance
Inadequate Planning	1	0.2	3	0.5	5
Delays in Procurement	5	1	7	1	7
Misallocation of Equipment	0.33	0.14	1	0.25	3
Poor Coordination	2	1	4	1	7
Lack of Maintenance	0.2	0.14	0.33	0.14	1

TABLE V - Sum of Each Column

Parameter	Sum
Inadequate Planning	8.53
Delays in Procurement	2.49
Misallocation of Equipment	15.33
Poor Coordination	2.89
Lack of Maintenance	23

TABLE VI - Normalized Pairwise Comparison Matrix & Criteria Weights

Parameter	Inadequate Planning	Delays in Procurement	Misallocation of Equipment	Poor Coordination	Lack of Maintenance	Criteria Weight
Inadequate Planning	0.12	0.08	0.20	0.17	0.22	0.16
Delays in Procurement	0.59	0.40	0.46	0.35	0.30	0.42
Misallocation of Equipment	0.04	0.06	0.07	0.09	0.13	0.08
Poor Coordination	0.23	0.40	0.26	0.35	0.30	0.31
Lack of Maintenance	0.02	0.06	0.02	0.05	0.04	0.04

TABLE VII - Calculation of Weighted Sum and Criteria Weight

Parameter	Weighted Sum	Criteria Weight	W.S / C.W
Inadequate Planning	0.82	0.16	5.22
Delays in Procurement	2.32	0.42	5.53
Misallocation of Equipment	0.38	0.08	5.05
Poor Coordination	1.62	0.31	5.23
Lack of Maintenance	0.20	0.04	5.11

2) Consistency Verification

To ensure consistency in judgments, the consistency ratio (CR) was calculated as follows:

- Compute Eigenvalue (λmax):
- Compute Consistency Index (CI):
- Compute Consistency Ratio (CR): Given that the Random Index (RI) for a 5x5 matrix is 1.11:

Since CR < 0.1, the results are consistent, meaning that the identified delay factors are reliable.

3) Final Weightage and Ranking of AHP Approach

TABLE VIII - Final Weightage and Ranking of AHP

Parameter	Weight	Rank
Delays in Procurement of Necessary Equipment	5.53	1
Poor Coordination in Equipment Usage	5.23	2
Inadequate Planning of Equipment Needs	5.22	3
Lack of Regular Maintenance	5.11	4
Misallocation of Equipment to Tasks	5.05	5

The primary factors contributing to delays in road construction projects have been identified as follows:

- Delays in procurement of necessary equipment (highest weight, 5.53)
- Poor coordination in equipment usage (5.23)
- Inadequate planning of equipment needs (5.22)
- Lack of regular maintenance leading to breakdowns (5.11)
- Misallocation of equipment to tasks (5.05)

Consequently, the primary factors contributing to delays in the road Project have been identified as follows: Inadequate planning of equipment needs, Delays in procurement of necessary equipment, Misallocation of equipment to tasks, Poor coordination in equipment usage across different project areas, Lack of regular maintenance leading to breakdowns. These parameters emerge as the foremost causes of delay across a significant number of projects.

An AHP ranking yields a list of parameters ordered by their total performance ratings, which are determined by considering each parameter's individual weights. The parameter with the highest rating is considered the most influential, while those with lower scores are perceived as less preferable. Above table clearly indicates that " Delays in procurement of necessary equipment " holds the highest weight of 5.53, whereas "Misallocation of equipment to tasks" with weights of 5.05, are the least preferred parameters in terms of causing delays among the five identified factors

VI. CONCLUSION

This study analyzed the impact of improper equipment management on road construction delays, identifying key issues such as procurement delays (RII = 0.78), poor coordination (RII = 0.73), and lack of maintenance (RII = 0.72). Using RII & AHP the research confirmed that addressing these factors significantly improves project efficiency. Recommended solutions include advanced equipment planning, digital tracking, efficient procurement, better coordination, and regular maintenance. Implementing these strategies can enhance efficiency, reduce costs, and ensure timely project completion. Additionally, fostering collaboration among stakeholders and adopting modern construction technologies can further optimize resource utilization. This research provides a framework for improving equipment management, ultimately contributing to more sustainable and cost-effective road infrastructure development. The findings and conclusions of this study are limited to the Kagal-Karad Highway Widening Project in Maharashtra, India and may not be universally applicable to other projects due to variations in geographical conditions, project characteristics, and operational circumstances

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पुढारी

कराडचा उड्डाण पूल पावसाळ्यात खुला होणे धूसर

पुलावरील तब्बल 39 जॉईंट बसवण्याचे काम कासवगतीने; ॲप्रोच रस्त्याचे काम अंतिम टप्प्यात

कराड : चंद्रजित पाटील

कामाची मुदत संपून 16 महिने होत आले तरी पुणे-बंगळूर राष्ट्रीय महामार्गावरील कराडजवळील नवीन उड्डाणपूल वाहतुकीसाठी पावसाळ्यापूर्वी खुला होण्याची चिन्हे मावळत चालली आहेत. उड्डाण पुलावरील वाहतूक सुरू होण्यासाठी जॉईंट जोडणे गरजेचे असून, केवळ 7 जॉईंट जोडून पूर्ण झाले आहेत. अजूनही तब्बल 39 जॉईंट जोडण्याचे काम बाकी आहे. एक जॉईंट जोडण्यासाठी किमान चार दिवस लागत आहेत. त्यामुळे पंढरपूर पावसाळ्यात सुद्धा वाहन चालकांना साचलेल्या पाण्यातूनच मार्गक्रमण करावे लागेल, अशीच सद्यस्थिती आहे.

जानेवारी 2023 मध्ये कराडजवळील जुना उड्डाणपूल पाडण्याचे काम हाती घेण्यात आले होते. जवळपास सहा ते सात महिने हे काम सुरू होते. त्यानंतर नवीन उड्डाण पुलाच्या कामास प्रारंभ झाला होता. जुलै 2024 पर्यंत महामार्गाच्या सहापदरीकरणाचे आणि कराड जवळील उड्डाणपुलाचे काम अत्यंत गतीने सुरू होते. मात्र, ठेकेदार कंपनीच्या कारभाराचा फटका संबंधित मंत्र्यांना, मुख्य ठेकेदार कंपनी आदानी आणि सबठेकेदार कंपनी दीपी [illegible] यांच्यातील आर्थिक मतभेद यास कारणीभूत ठरले आहेत.

उड्डाण पुलासाठी वापरलेले तयार गाळे (सेगमेंट) जोडण्याचे काम पूर्ण झालेले नाही. हा पूल वाहतुकीसाठी खुला होण्यासाठी सर्व गाळे जोडून होणे आवश्यक आहे. पिलर क्रमांक 1 ते पिलर क्रमांक 46 पर्यंत जॉईंट जोडण्यासाठी सद्यस्थितीत तीन वेगवेगळ्या टीम कार्यरत आहेत. सातारा बाजूकडून कोल्हापूरच्या दिशेने जाणाऱ्या उड्डाणपुलाच्या लेनवरील सहा जॉईंट जोडण्याचे काम पूर्णत्वास गेले आहे. मात्र, अजूनही 39 जॉईंट जोडणे आवश्यक आहे. सध्या हे काम पावसाळ्यापूर्वी होणे अशक्य आहे.

असे रखडत गेले पुलाचे काम

- कराडजवळील साडेतीन कि.मी. अंतराच्या या उड्डाण पुलासाठी 485 कोटी खर्च येईल, असे सांगण्यात आले.
- तसेच डिसेंबर 2024 मध्ये तो पूर्ण होऊन वाहतूक सुरू होईल, असेही त्यावेळी सांगण्यात आले होते.
- मात्र आता जवळपास 16 महिन्यांचा ज्यादा अवधी पूर्ण होऊनही उड्डाणपूल वाहतुकीसाठी सुरू झालेला नाही.
- मुदतीत काम पूर्ण होणार नसल्याने उड्डाणपुलाच्या कामासाठी पहिल्यांदा 17 जून 2025 पर्यंत मुदतवाढ दिली.
- त्यानंतर नोव्हेंबरपर्यंत काम पूर्ण केले जाईल, असे ठेकेदार कंपनीने लोकप्रतिनिधींना सांगितले होते.
- त्यानंतर एप्रिल 2026 पर्यंत काम पूर्ण करू, असे सांगण्यात आले होते; मात्र अजूनही काम अपूर्णच आहे.

मलकापूर : कराडजवळील नव्याने होणाऱ्या उड्डाण पुलाचे सध्यास्थितीतील छायाचित्र. (छाया : विशाल कोटे, कराड)

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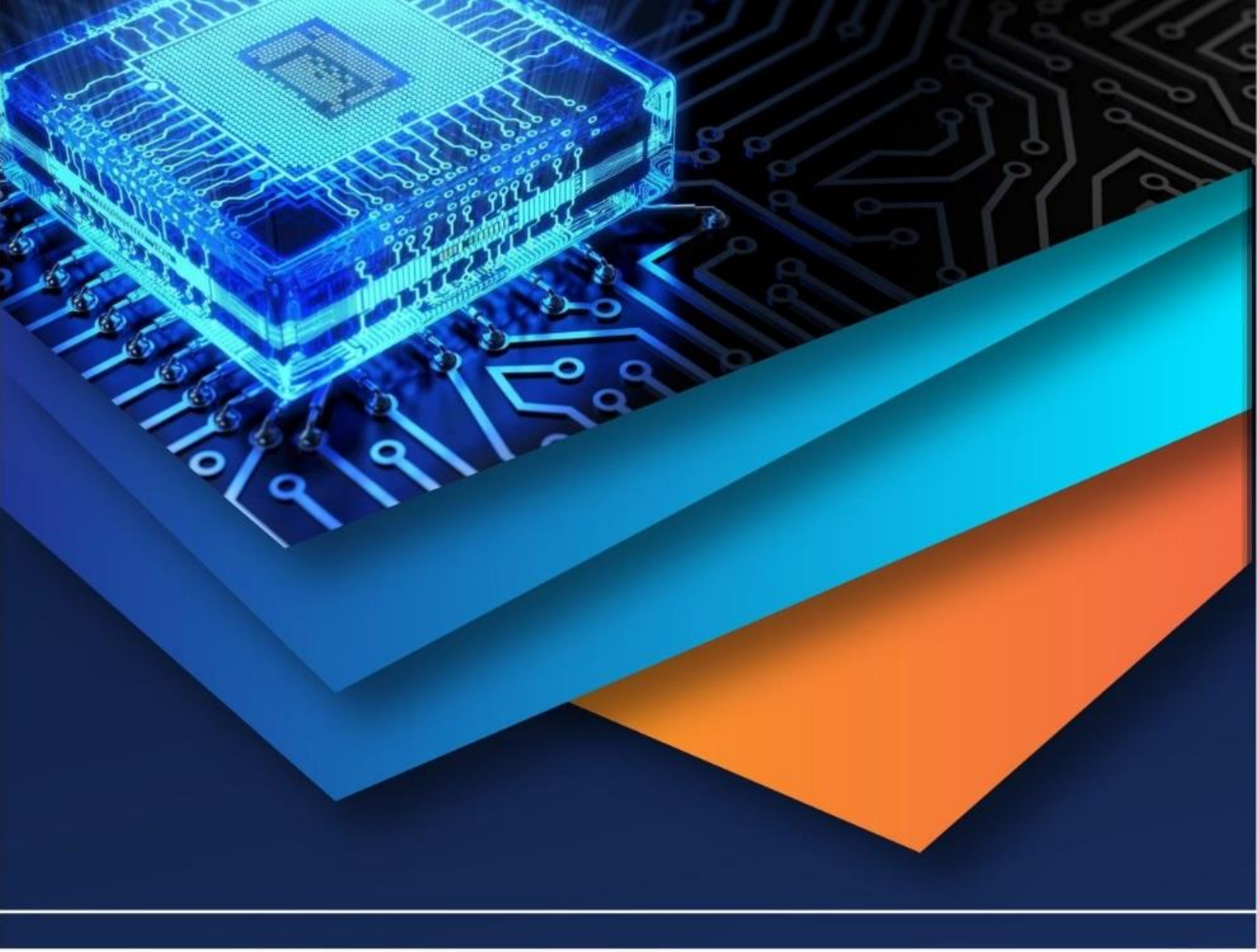
The findings of the present study are further validated by the news report published in ***Pudhari*** newspaper on 29 April 2026, which highlights similar causes responsible for the project delay.

REFERENCES

[1] Ali, Y. Y., Al-Swei, A. M., & Erdebilli, B. (2019). A conceptual model of delay factors affecting road construction projects in Libya. Journal of Engineering Science and Technology, 14(6), 3286–3298.
[2] Ayarkwa, J., Boateng, P., & Osei-Asibey, D. (2022). Sustainable building processes' challenges and strategies: The relative importance index approach. Cleaner Engineering and Technology, 7, Article 100455.
[3] Aziz, R. F., & Abdel-Hakam, A. A. (2016). Exploring delay causes of road construction projects in Egypt. Alexandria Engineering Journal, 55(2), 1515–1539.
[4] Boakye, M. K., & Adanu, S. K. (2022). On-site building construction workers perspective on environmental impacts of construction-related activities: A relative importance index (RII) and exploratory factor analysis (EFA) approach. Sustainable Environment, 8(1), Article 2028349.
[5] Cavalli, M. C., Chen, D., Chen, Q., Chen, Y., Cannone Falchetto, A., Fang, M., Gu, H., Han, Z., He, Z., Hu, J., Huang, Y., Jiang, W., Li, Xuan, Liu, C., Liu, P., Liu, Q., Lu, G., Ma, Y., Poulikakos, L.,... Wang, C. (2023). Review of advanced road materials, structures, equipment, and detection technologies. Journal of Road Engineering, 3(4), 370–468.
[6] Cuadros, A., & Ramirez, D. (2024). Improvement of risk management in the project scheduling of road construction projects – Case study. Procedia Computer Science, 239, 767–772.
[7] Das, D. K., & Sharma, A. (2024). A systemic archetype for enhancing occupational safety in road construction projects through worker behavior. Transportation Research Interdisciplinary Perspectives, 26, Article 101154.
[8] Deep, S., Asim, M., & Khan, M. K. (2017). Review of various delay causing factors and their resolution by application of lean principles in India. Baltic Journal of Real Estate Economics and Construction Management, 5(1), 101–117.
[9] Erdogan, S. A., Šaparauskas, J., & Turskis, Z. (2019). Decision making in construction management: AHP and Expert Choice approach. Procedia Engineering, 172, 270–276
[10] Kaliba, C., Muya, M., & Mumba, K. (2009). Cost escalation and schedule delays in road construction projects in Zambia. International Journal of Project Management, 27(5), 522–531

[11] Malunjkar, H., & Aher, M. (2023). Delay analysis of road construction projects using RII method. International Journal for Research in Applied Science & Engineering Technology (IJRASET), 11(5).
[12] Patil, S. K., Gupta, A. K., Desai, D. B., & Sajane, A. S. (2013). Causes of delay in Indian transportation infrastructure projects. International Journal of Research in Engineering and Technology (IJRET), 2(11), 71–80.
[13] Razi, P. Z., Ali, M. I., & Ramli, N. I. (2019). Overview of analytical hierarchy process decision making method for construction risk management. IOP Conference Series: Earth and Environmental Science, 244(1), Article 012034.
[14] Sha, A., Ma, B., Wang, H., Hu, L., Mao, X., Zhi, X., Chen, H., & Liu, Y. (2022). Highway constructions on the Qinghai-Tibet Plateau: Challenge, research and practice. Journal of Road Engineering, 2(1), 1–60

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