

Exploring Familiarity and Challenges in Environmental Impact Assessment Implementation for Major Highway Projects

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Abstract

Even though they are essential for improving transportation infrastructure, highway construction projects can have major effects on the environment. The efficient execution of Environmental Impact Assessments (EIAs) is of utmost importance in today's world of sustainable development, where societal and economic advancement go hand in hand. Through a survey of local practitioners, this study discovers how well-known EIA is for large-scale highway projects in Tamil Nadu, as well as the most typical obstacles to its implementation. According to the findings, the problem is with the way the EIA process is separated from the different phases of the project. Additionally, it shows that there are issues related to practitioners' lack of competence and abilities and the restricted data availability that prevents them from doing the necessary evaluation for specific effect categories.

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I. Introduction

Because they allow people, products, and services to travel great distances, highways are an essential part of modern civilizations. Major highway projects are developed in response to the increasing need for efficient transportation networks caused by growing populations, faster urbanization, and expanding economies. While these initiatives undoubtedly lead to better connectivity and economic growth, they frequently have major impacts on the environment. The global community has begun to pay more attention to reducing the negative environmental effects of highway development and extension as a result of the growing awareness of the need of sustainable development. An important instrument in this pursuit is the Environmental Impact Assessment (EIA), a methodical procedure meant to detect, assess, and lessen the possible negative consequences of planned developments on the environment. Environmental impact assessments (EIAs) play a crucial role in large-scale highway projects by helping to balance the need for new infrastructure with concerns for protecting the environment and people's health.

The conflict between advancing economic growth and protecting the environment is central to discussions over large transportation projects. In order to promote economic growth, improve commerce, facilitate the efficient movement of people and commodities, and stimulate regional development, highways play a crucial role. Air and water pollution, disruption of noise, altered land use patterns, habitat fragmentation, and biodiversity loss are just a few of the negative environmental consequences that can result from highway construction and operation. In addition, when many highway projects are added together, they might worsen environmental degradation, which in turn can have long-term ecological

implications and weaken the resilience of natural systems. In light of this, it is clear that conducting thorough EIAs is essential for negotiating the delicate balance between development priorities and ecological preservation.

Integrating environmental factors into decision-making processes, the Environmental Impact Assessment process is a cornerstone of the quest to achieve sustainable development. Environmental impact assessments (EIAs) are crucial in the context of large highway projects because they help to identify possible environmental hazards, assess how serious they are, and develop plans to lessen or eliminate negative consequences. Environmental aspects such as air and water quality, biodiversity, soil stability, cultural legacy, and socioeconomic dynamics are usually part of the process's comprehensive review. Environmental Impact Assessments (EIAs) help decision-makers by giving them a full picture of how planned highway projects would affect the environment. This, in turn, allows them to optimize the designs of the projects, lessen the negative effects, and make them more sustainable.

Nevertheless, there are several obstacles and complications that must be overcome in order to execute EIAs for large highway projects, despite the fact that they are valuable in fostering sustainable development. Striking a balance between economic development and environmental conservation aims is one of the most pressing concerns. There is a lot of demand to speed up approvals and simplify regulatory processes for highway projects because many think they would spur economic growth, job creation, and regional connection. In this setting, there is a risk of putting short-term profits ahead of long-term environmental sustainability, which can cause people to ignore or downplay environmental problems or fail to take enough steps to reduce them.

Furthermore, it is extremely difficult to forecast and quantify environmental consequences due to the inherent uncertainty in doing so, especially considering the ever-changing dynamics of climate change and the intricate nature of the ecosystem. The problems faced by highway projects are intensified by the spatial and temporal dimensions at which they operate. In order to successfully handle uncertainties and limit risks, strong methodology and adaptive management strategies are required.

In addition, there is a tangled web of regulations, institutional systems, and stakeholder interests that makes it difficult to conduct EIAs for large highway projects. Diverse authorities in various jurisdictions have conflicting but complementary responsibilities when it comes to environmental legislation, permits, and consultation procedures that affect highway construction projects. The efficient execution of EIAs might be hindered by the logistical and bureaucratic constraints of encouraging cooperation and collaboration among numerous parties while ensuring compliance with these legislative obligations. It is still a constant struggle to achieve meaningful stakeholder participation, despite the fact that the EIA process's openness and transparency are critical for establishing public confidence and legitimacy.

The participatory ethos of EIAs is frequently undermined by power dynamics, informational gaps, and representational injustices, which disenfranchises already-marginalized populations and worsens socioeconomic imbalances. Taking proactive steps to make the EIA process

more open, accessible, and inclusive can help overcome these issues. This will enable communities to have a say in decisions and make sure their concerns are heard and respected. New paradigms and best practices are changing the way large highway projects conduct environmental impact assessments (EIAs), with the goal of making these processes more inclusive, efficient, and successful. To systematically include environmental concerns into larger strategic decisions about transportation infrastructure, one approach is to incorporate strategic environmental assessment (SEA) into highway design. Environmental sustainability engineering (SEA) encourages a preventative stance toward environmental problems by including sustainability concepts into project planning from the outset. This allows for the identification of ecologically sensitive locations and the exploration of alternative designs that reduce negative consequences.

In addition, decision-makers may comprehend the ecological and socio-economic ramifications of several roadway projects in a certain area more thoroughly when cumulative effects assessment approaches are used. In a similar vein, technological developments like big data analytics, AI, and ML show potential for improving EIAs' prediction capacities and accuracy, leading to more precise evaluations of environmental hazards and possibilities.

II. Review Of Literature

Khan, Mehreen & Nawaz Chaudhry, Muhammad. (2021) This study looked at the role of Environmental Impact Assessment (EIA) advocates in Punjab, Pakistan, and the challenges they faced. Environmental Impact Assessment (EIA) proponent duties were based on laws, regulations, and expert advice. Consultants, the EPA, and non-governmental organizations (NGOs) had their voices heard on the topic of proponents' roles via a literature review. At times, advocates do not provide consultants with all project details, which leads to a report of lower quality and postpones decision-making. A few of multinational corporations are an exception, but the vast majority of proponents try to sway review and decision-making without really ensuring compliance with approval criteria. Proponents mainly brought out the fact that the EPA treats private and public sector projects differently. The advisers' lack of expertise and the lengthy and confusing decision-making procedures were further roadblocks. Findings from this study have international implications, particularly for countries with similar economic systems that are attempting to strike a balance between economic growth and environmental preservation. Despite the study's regional emphasis, its findings have global significance for EIA systems.

George, Taako et al., (2020) It has been in operation for more than 25 years. Water pollution is on the rise, particularly in Lake Victoria, rivers, streams, aquifers, and soils. This study examined the institutional, legal, and regulatory structure surrounding Environmental Impact Assessments (EIA), as well as relevant literature and EIA documents, with a specific focus on EIA reports. Additionally, a survey was performed among key stakeholders involved in EIA, utilizing questionnaires to identify any capacity and practice-related concerns. The results showed that there was a mismatch between the way laws were put into practice and how they were actually carried out. These reasons included inadequate public participation, inadequate oversight, stakeholder capacities being limited, political meddling, the lack of Strategic

Environmental Assessment (SEA) procedures, and the omission of Environmental Impact Assessment (EIA) from a cross-border framework. However, the institutional, legal, and regulatory framework for Environmental Impact Assessment (EIA) is rather robust and comprehensive. In addition, there are active non-state actors, regional organizations, enough labor, a strong national planning framework, and operational local government systems. We suggest putting strategies into place to get around roadblocks in EIA procedures and make the most of opportunities present in the particular contexts where EIA is applied in order to fully optimize the effectiveness of EIA in contributing to the Sustainable Development Goals (SDGs).

Sirina, Natalia et al., (2013) Developed nations, such as France, use various methodologies and instruments, such as life cycle assessment (LCA), to evaluate the environmental effect. In nations with transitional economies, such as Russia, the evaluation of an activity on-site is generally dominant. Several problems exist in accurately accounting for the environmental effect, such as statutory limits and the need to adopt appropriate methodologies and instruments.

Macaulay, Babajide. (2013) Globally, the speed at which human civilizations are advancing their projects has made it necessary to strengthen environmental laws in order to protect the environment, its features, and its inhabitants from the negative impacts of development, while simultaneously enabling urbanization to proceed unhindered. An officially acknowledged method for controlling developers' or advocates' actions to lessen any adverse impacts on the environment is the Environmental Impact Assessment (EIA). This study looked at the vast variety of Environmental Impact Assessment (EIA) procedures used globally with regard to administration, scoping, and screening. The research also looked at the challenges that currently face environmental impact assessments (EIAs) throughout the globe, such as inadequate oversight, corruption, excessive bureaucracy, and antiquated environmental regulations. The difficulties encountered were unique to each nation or area, impacted by elements like project kind, socioeconomic structure, geographic location, and institutional framework of the law. Nonetheless, suggestions were made on how to handle these difficulties well while accounting for the environmental features of the impacted nations. To reduce red tape and expedite procedures, the suggestions include consolidating the EIA administrative agencies. To reduce prejudice and avoid bribery, it is recommended that EIAs be carried out by qualified authorities in each nation and that post-development monitoring be prioritized. Establishing check and balance methods to supervise the monitoring process financed by project proponents is necessary to resolve any conflicts of interest. It is also advised that the EIAs that are currently in effect in the impacted nations be reviewed and updated to comply with the latest regulations.

Makarenko, Iryna. (2012) Given that environmental damage caused by both natural and human factors does not adhere to national boundaries and is particularly difficult to define in the marine environment, the Environmental Impact Assessment (EIA) is crucial in evaluating its extent and consequences from the outset. This assessment involves considering political and economic factors between neighboring countries and serves to prevent conflicts.

III. Research Methodology

A mixed-method approach was used in this study, including both qualitative and quantitative research techniques. For the purpose of the research, 110 people with relevant experience in the highway sector were requested to complete a questionnaire. One hundred and ten responses were obtained. Thirteen closed-ended questions in the form of checkboxes and linear scales made up the survey. In order to gather accessible data, the survey's objective was to evaluate practitioners' familiarity with the EIA procedure, phases, and tools as well as the communication of EEAA. The poll also inquiries about the challenges that participants face when incorporating environmental impact assessments into their projects. This is supplementary to the earlier query. It also covers other pillars, such mitigation and management strategies, and the essential nature of their role in assisting with the application of the EIA to the project's phases. The internet was used to complete the survey.

IV. Data Analysis And Interpretation

Table 1: Familiarity of practitioners with the EIA process

S. No.	Particulars	percentage
1	Unfamiliar	2.0
2	Slightly Familiar	32.0
3	Moderately Familiar	41.0
4	Familiar	17.0
5	Very Familiar	8.0

The levels of expertise that practitioners possess about the Environmental Impact Assessment (EIA) procedure are shown in the table that follows. This presentation highlights the percentage distribution of practitioners across five distinct areas of familiarity. Merely 2% of the respondents to the poll acknowledged having no previous understanding of the Environmental Impact Assessment (EIA) process. After moving up the familiarity scale, the biggest proportion of respondents, which accounted for 41% of the total, defined themselves as having a moderate level of knowledge with the EIA process. The fact that this group has a substantial level of awareness and exposure to EIA processes is suggested by this conclusion. In close pursuit, 32 percent of practitioners indicated having a passing familiarity with the EIA process. This indicates that they have a fundamental degree of grasp, but they may be deficient in in-depth information. In addition, seventeen percent of those who participated in the survey claimed that they are familiar with the EIA process. This indicates that a sizeable proportion of respondents have enough knowledge and expertise in EIA procedures. In conclusion, eight percent of practitioners reported that they had a high level of familiarity with the EIA process. This finding highlights a smaller but significant group of highly experienced professionals who have a full grasp of EIA processes.

Table 2: Challenges of implementing the EIA

S. No.	Particulars	percentage
1	Time management	15.0
2	High cost/expenses	22.0
3	Data availability	19.0
4	Laws and regulations	9.0
5	Limited knowledge of tools	10.0
6	Limited skills of practitioners	25.0

The table provides an overview of the most significant difficulties that were experienced throughout the process of implementing Environmental Impact Assessment (EIA). High costs and expenses stand out as the most prominent issue among the major obstacles reported by practitioners. Twenty-two percent of respondents cited financial restrictions as a significant obstacle, making this phenomenon the most widespread barrier. It is essential to improve one's knowledge in environmental impact assessment methods since the percentage of practitioners who have limited abilities is close behind, at 25%. The availability of data offers still another significant obstacle, with 19% of respondents mentioning that they sometimes have trouble gaining access to information that is pertinent to evaluations. In addition, the management of time (15%), rules and regulations (9%), and poor understanding of technologies (10%) emerge as important impediments, which reflects the diverse character of the issues that are associated with the execution of enterprise impact analysis. Taking action to address these difficulties is very necessary in order to guarantee that environmental evaluations in development projects are both effective and complete.

V. Conclusion

Conducting Environmental Impact Assessments for significant highway building projects is one of the most crucial stages that must be completed in order to fulfill the aim of developing environmentally friendly transportation infrastructure. Decision-makers may make informed decisions that balance economic needs with environmental stewardship thanks to the Environmental Impact Assessment (EIA) process. This is achieved by carefully analyzing how road development projects affect the environment. However, overcoming a number of challenges is necessary for the environmental impact assessments (EIAs) to be completed successfully. These difficulties include dealing with ambiguity, striking a balance between conflicting interests, navigating the complexities of legal systems, and promoting inclusive stakeholder participation. By using new paradigms and best practices, we may enhance the effectiveness, efficiency, and inclusiveness of the environmental impact assessment (EIA) process for major highway projects as we go. Cumulative effects assessment and strategic environmental assessment are two instances of these methods. Environmental impact

assessments have the capacity to help create transportation infrastructure that is not only financially feasible but also ecologically sound and socially just. This is achieved via encouraging cooperation amongst diverse stakeholders and integrating environmental factors into decision-making procedures.

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