International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 11 Issue 7 ǁ July 2023 ǁ PP. 243-248

Effective Project Management of Environmental Impact Assessment in a Major Infrastructure Project in Bangladesh.

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Abstract
This article investigates the project management components of the Environmental Impact Assessment (EIA) process in the context of a large infrastructure project, specifically the Padma Bridge project in Bangladesh. The EIA process holds significant importance in identifying and mitigating potential environmental impacts associated with infrastructure projects, thereby contributing to sustainable development within the country. This study examines several key aspects of project management crucial for the effective implementation of the EIA process, including stakeholder involvement, project planning, risk management, and project governance. The engagement of stakeholders is vital in identifying potential environmental impacts, devising appropriate mitigation measures, and minimizing conflicts among stakeholders. Project planning ensures the seamless integration of the EIA process into the overall project planning and execution. Concurrently, effective risk management strategies are employed to identify potential environmental risks and develop measures to mitigate their impact. Project governance plays a pivotal role in ensuring the transparency and accountability of the EIA process. Furthermore, this paper investigates the challenges associated with managing the EIA process in the context of infrastructure projects in Bangladesh, such as inadequate data availability, insufficient stakeholder involvement, and conflicting stakeholder interests. To address these challenges, the study presents recommendations for effective project management of EIA processes in infrastructure projects in Bangladesh. These recommendations include establishing clear project goals and objectives, formulating a comprehensive stakeholder engagement plan, utilizing appropriate technology and tools, and ensuring adequate monitoring and evaluation of the EIA process. Adopting a project management perspective, this study focuses on essential elements such as time management, cost management, and quality management. The proposed recommendations aim to facilitate the timely completion of the EIA process within the allocated budget while concurrently addressing the environmental goals and objectives of the project. By implementing effective project management practices for EIA processes, infrastructure projects in Bangladesh can be executed in an environmentally sustainable and socially responsible manner.

Keywords: ***Environmental Impact Assessment (EIA), project management, stakeholder involvement, project planning, risk management, project governance, infrastructure projects.***

Date of Submission: 11-07-2023 Date of acceptance: 24-07-2023

I. INTRODUCTION

Infrastructure development projects are critical for developing countries like Bangladesh (Fan et al., 2018; Kabir & Momtaz, 2014). However, these projects can have significant environmental impacts that must be assessed and managed. The Environmental Impact Assessment (EIA) process is essential for identifying and mitigating potential environmental effects (Ahammed & Harvey, 2012). Effective project management of the EIA process is crucial in ensuring that the project's environmental impacts are adequately identified, assessed, and mitigated (Ismaeel & Lotfy, 2022). The EIA process is a systematic and interdisciplinary process that evaluates the potential environmental impacts of a proposed project or development (K. Morgan, 2022). The EIA process aims to identify potential environmental impacts, assess their significance, and develop mitigation measures to reduce or avoid adverse impacts. The EIA process includes various stages, including scoping, baseline studies, impact assessment, alternatives assessment, and mitigation planning (Rathi, 2017). The EIA process's success depends on effective project management, stakeholder engagement, and integration with the project planning process (Kabir & Momtaz, 2014).

Managing the EIA process in a large-scale infrastructure project can be challenging due to its complexity and interdisciplinary nature. The project manager plays a critical role in managing the EIA process successfully. The project manager is responsible for coordinating with stakeholders, ensuring that the EIA study is comprehensive and complete, and addressing any risks or issues that emerge during the EIA process (Lock, 2013). The project manager must ensure that the EIA process is integrated into the overall project planning process and that the mitigation measures are effectively implemented (Lock, 2013).

This study examines the EIA process's project management components in a significant infrastructure project in Bangladesh. Building a major bridge over the river "Padma" in Bangladesh is a project of concern. An EIA is necessary to evaluate any possible effects on the ecology of the river, the water quality, and the region nearby. The study will use this project as a case study to explore the project management components of the EIA process. The study will adopt a project management perspective, focusing on aspects such as time management, cost management, and quality management. The report will focus on managing the EIA process successfully, such as coordinating with stakeholders, ensuring that the EIA study is comprehensive and complete, and addressing any risks or issues that emerge during the EIA process. The study will also examine the difficulties of managing the EIA process, such as a lack of data, insufficient stakeholder involvement, and competing stakeholder interests. The study will also provide insights and recommendations for effective project management of EIA processes in the Padma Bridge projects in Bangladesh.

II. PROJECT DESCRIPTION

The Padma Bridge is a two-level road-rail bridge across the Padma River, the main distributary of the Ganges River in Bangladesh (Mclean et al., 2012). It connects the less-developed southwest of the country to the northern and eastern regions (Rashid et al., 2023). It is the longest bridge in Bangladesh, with a total length of 6.15 km (3.82 mi) (Tappin et al., 2015). It was inaugurated on June 25, 2022. The bridge is considered to be an engineering marvel, as the Padma River is among the most ferocious rivers in the world (Mclean et al., 2012). However, the project faced several delays due to technical challenges, environmental issues, land acquisition problems, and the COVID-19 pandemic. The construction work was finally completed on June 23, 2022. The final project cost was estimated at $3.6 billion (Rashid et al., 2023). The Padma Bridge project is divided into two phases: the Design Phase and the Construction Phase. The Design Phase began on January 29, 2009, which included the Quality Management System (QMS). Under the QMS, an environmental impact assessment was done (BBA, 2010).

Figure 1: Padma Bridge in Bangladesh (source: The Daily Star, 2022.)

III. KEY FINDINGS AND DISCUSSION

3.2 Project Management Components of the EIA Process

The Environmental Impact Assessment (EIA) process is essential to large infrastructure projects such as the Padma Bridge in Bangladesh. The EIA process identifies and assesses the potential environmental impacts of a project and proposes measures to mitigate or minimize these impacts (NWFP, 2004). Effective project management of the EIA process is critical for ensuring that the process is completed on time, within budget, and meets the environmental goals and objectives of the project. The following are the key project management components of the EIA process in the Padma Bridge project:

(i) Stakeholder Involvement

Effective stakeholder engagement is essential for identifying potential environmental impacts, developing mitigation measures, and minimizing stakeholder conflicts. The Padma Bridge project is a large-scale infrastructure project that involves significant environmental and social impacts. As such, stakeholder engagement was an essential component of the EIA process. Stakeholder engagement in the Padma Bridge project was achieved through public consultations, stakeholder meetings, and stakeholder surveys. Stakeholder input was used to identify potential environmental impacts, develop mitigation measures, and establish monitoring and evaluation protocols.

(ii) Project Planning

Project planning ensures that the EIA process is integrated into the overall project planning and implementation. The EIA process is typically conducted in parallel with the overall project planning process. The Padma Bridge project was a significant infrastructure project that required a robust project management approach. The EIA process was integrated into the overall project planning process by establishing an EIA team responsible for coordinating the EIA process with other project teams. The EIA team developed a project plan that identified the scope of the EIA, data collection and analysis requirements and reporting requirements.

(iii) Risk Management

Effective risk management identifies potential environmental risks and develops mitigation measures to minimize their impact. The successful completion of the Padma Bridge project hinged on implementing a comprehensive risk management strategy. Risk management was used to identify potential environmental risks, such as water pollution and habitat loss, and develop mitigation measures, such as sediment control and reforestation plans.

(iv) Project Governance

Transparency and accountability are crucial for effective project governance in the Environmental Impact Assessment (EIA) process. As a major infrastructure undertaking, the Padma Bridge project necessitated a robust project governance strategy, which was achieved by forming an EIA review committee. This committee reviewed the EIA report and ensured its compliance with all regulatory requirements.

3.3 Importance of Project Management in the Proper Implementation of Environmental Projects.

Ensuring environmental sustainability is one of the most pressing challenges of our time. The Earth's natural systems are under immense pressure due to the increasing human population, industrialization, and urbanization (Arora, 2018; Singh & Singh, 2017). Environmental issues such as climate change, deforestation, water pollution, and biodiversity loss pose significant threats to the well-being of people and the planet (Singh & Singh, 2017). Addressing these challenges requires a multifaceted approach that involves various stakeholders, including governments, the private sector, civil society, and individuals.

One crucial aspect of addressing environmental issues is properly implementing environmental projects. Environmental projects address environmental problems such as air and water pollution, waste management, and ecosystem conservation. These projects can be large or small, ranging from local community-based initiatives to global-scale programs. Implementing environmental projects requires careful planning, design, execution, and monitoring (Sutter et al., 2015). This is where project management comes into play.

Project management is a discipline that involves the application of knowledge, skills, tools, and techniques to manage projects effectively and efficiently (Wu, 2020). It provides a framework for planning, organizing, executing, and controlling project activities to achieve specific goals and objectives. Project management is an essential component of environmental projects because it helps ensure that projects are completed in an environmentally responsible manner, socially beneficial, and economically feasible way.

Environmental projects can be complex, involving multiple stakeholders with varying interests, competing resource demands, and uncertain environmental outcomes (Kiker et al., 2005). Therefore, effective project management is critical for ensuring that environmental projects are successful. Environmental project managers must deeply understand environmental science, policies, regulations, and project management practices. They must be able to work collaboratively with various stakeholders, communicate effectively, and manage risks.

Recently, there has been an increasing focus on sustainability and environmental protection in project management. Environmental project management involves integrating environmental considerations into project management practices, such as stakeholder engagement, risk assessment, life cycle assessment, and environmental impact assessment (Armenia et al., 2019). This helps to minimize adverse environmental impacts, optimize resource use, and achieve project goals.

The importance of project management in environmental projects must be considered. Properly implemented environmental projects can lead to significant environmental and social benefits, such as improved air and water quality, reduced greenhouse gas emissions, and conservation of ecosystems and biodiversity (Omer, 2008). Therefore, environmental scientists and project managers must work closely to ensure that environmental projects are executed in a manner that meets the needs of the present without compromising the ability of future generations to meet their needs.

3.4 The Role of Project Management in Environmental Projects:

Effective project management practices are essential for ensuring the success of environmental projects. Environmental projects are unique in that they require consideration of ecological factors, social factors, and economic factors. When managing environmental projects, project managers must consider several factors, such as stakeholder engagement, risk management, project planning, resource allocation, project monitoring, and evaluation (Lock, 2013).

(i) Stakeholder Engagement:
Stakeholder engagement is critical in successfully implementing environmental projects. Engaging stakeholders, including local communities, NGOs, and government agencies, can help build support for the project and reduce resistance to project implementation. Stakeholders can provide valuable input into the project's design and execution, helping to ensure that the project meets their needs and expectations.

(ii) Risk Management:
Environmental projects often involve complex ecological systems, and therefore, managing risks associated with these projects requires a deep understanding of the environmental context. Project managers need to assess the potential risks related to project activities, develop strategies to mitigate these risks, and implement measures to monitor and manage risks throughout the project's life cycle. The potential risks associated with environmental projects include habitat destruction, biodiversity loss, and pollution. Effective risk management practices ensure environmental projects achieve their intended outcomes while minimizing negative environmental impacts.

(iii) Project Planning:
Project planning is crucial for successfully implementing environmental projects. Project managers must develop a detailed project plan that outlines project objectives, timelines, milestones, and deliverables. A well-planned project can ensure that resources are allocated effectively and that project activities are completed within the allocated budget. Effective project planning ensures that environmental projects achieve their intended outcomes while minimizing negative environmental impacts.

(iv) Resource Allocation:
Resource allocation is critical for ensuring that environmental projects are completed within budget and on schedule while minimizing environmental harm. Project managers must allocate resources such as personnel, equipment, and finances to the project effectively. Effective resource allocation practices are crucial for promoting sustainable practices and reducing negative environmental impacts.

(v) Project Monitoring:
Project monitoring involves tracking progress against established targets and milestones. Monitoring allows project managers to identify issues early and take corrective action to ensure the project achieves its objectives. The importance of project monitoring in ensuring that environmental projects are on track to achieve their intended outcomes while minimizing negative environmental impacts.

(vi) Evaluation:
Evaluation involves measuring project performance against established targets and assessing the effectiveness of project activities. Evaluation allows project managers to identify areas for improvement and make necessary changes to ensure that the project achieves its objectives. Effective project evaluation practices are crucial for promoting sustainable practices and reducing negative environmental impacts.

3.5 Challenges of Managing the EIA Process

Despite the importance of the Environmental Impact Assessment (EIA) process in infrastructure projects like the Padma Bridge, several challenges are associated with its management. The following are some of the key challenges that were encountered in the Padma Bridge project:

(i) Lack of data:
The EIA process relies on accurate and reliable data to identify potential environmental impacts and develop effective mitigation measures. However, in many cases, sufficient data is lacking to assess the possible effects adequately. This was a challenge faced by the Padma Bridge project, which required extensive data collection efforts to inform the EIA process.

(ii) Insufficient stakeholder involvement:
Effective stakeholder engagement is critical for identifying potential environmental impacts, developing mitigation measures, and minimizing stakeholder conflicts. However, in some cases, stakeholders may not be adequately involved in the EIA process, which can result in important issues being overlooked. In the Padma Bridge project, efforts were made to involve stakeholders, but there were still challenges in achieving effective participation.

(iii) Competing stakeholder interests:
Infrastructure projects like the Padma Bridge often involve multiple stakeholders with competing interests. Balancing these interests and ensuring that the EIA process adequately addresses all concerns can be challenging. In the Padma Bridge project, there were disagreements between stakeholders regarding the project's potential impact on the local ecosystem and the displacement of communities living in the project area.

(iv) Regulatory challenges:
Regulatory requirements related to the EIA process can be complex and difficult to navigate. Compliance with these regulations can be time-consuming and costly, particularly in cases where changes need to be made to the project design or mitigation measures. In the Padma Bridge project, compliance with regulatory requirements was a significant challenge, requiring extensive coordination and communication with regulatory bodies.

(v) Limited resources:
The EIA process can be resource-intensive, requiring significant investments of time and money. In some cases, limited resources may constrain the scope of the EIA process, resulting in important issues being overlooked. The Padma Bridge project faced resource constraints, which impacted the scope of the EIA process and the development of effective mitigation measures.

3.6 Recommendations for Effective Project Management of EIA Processes in the Projects

To ensure effective project management of EIA processes in infrastructure projects in Bangladesh, several recommendations should be considered, including:

(i) Establish Clear Project Goals and Objectives: Clear project goals and objectives should be established to ensure that the EIA process is aligned with the overall project goals and objectives. The project goals and objectives should be clearly defined, measurable, and achievable.

(ii) Develop a Stakeholder Engagement Plan: A stakeholder engagement plan should be developed to ensure that all relevant stakeholders are engaged in the EIA process. The stakeholder engagement plan should identify all relevant stakeholders, their concerns, and engagement strategies.

(iii) Utilize Appropriate Technology and Tools: Appropriate technology and tools, such as GIS and remote sensing, should be utilized to collect and analyze environmental data. This will help to overcome the challenge of a lack of data in infrastructure projects in Bangladesh.

(iv) Ensure Adequate Monitoring and Evaluation of the EIA Process: Adequate monitoring and evaluation of the EIA process should be conducted to ensure that the EIA process is completed on time and within budget while also meeting the environmental goals and objectives of the project. The monitoring and evaluation process should be transparent and accountable.

3.7 Key Findings

- Environmental Impact Assessment process identifies & mitigates the environmental impacts of infrastructure projects in Bangladesh.
- Effective project management of EIA is essential for sustainable & responsible projects in Bangladesh.
- Stakeholder involvement minimizes conflicts & identifies environmental impacts & mitigation measures.
- Project planning integrates EIA into project planning & implementation.
- Effective risk management minimizes potential environmental risks.
- Project governance ensures that the EIA process is transparent & accountable.

- Challenges of managing the EIA process in Bangladesh include lack of data, stakeholder involvement, & competing interests.
- Recommendations to overcome challenges include clear project goals, a stakeholder engagement plan, technology use, and monitoring & evaluation.
- Conflict management plan needed for competing stakeholder interests.
- Appropriate technology & tools (GIS, remote sensing) can analyze environmental data in infrastructure projects.
- Monitoring & evaluation of the EIA process ensure completion on time, within budget & meeting environmental goals.
- Clear project goals align the EIA process with overall project goals.

IV. CONCLUSION

Effective project management is essential for the proper implementation of environmental projects. It helps to ensure that environmental projects are designed and executed in an environmentally responsible, socially beneficial, and economically feasible manner. By integrating environmental considerations into project management practices, we can minimize negative environmental impacts, optimize resource use, and achieve project goals. With the increasing importance of sustainability and environmental protection, project management in environmental projects has become a critical component for ensuring the success of these projects. Therefore, environmental scientists and project managers must collaborate closely to ensure that environmental projects are executed in a way that meets the needs of the present without compromising the ability of future generations to meet their needs.

REFERENCES

[1]. Ahammed, R., & Harvey, N. (2012). Evaluation of environmental impact assessment procedures and practice in Bangladesh. Http://Dx.Doi.Org/10.3152/147154604781766102, 22(1), 63–78. https://doi.org/10.3152/147154604781766102

[2]. Armenia, S., Dangelico, R. M., Nonino, F., & Pompei, A. (2019). Sustainable Project Management: A Conceptualization-Oriented Review and a Framework Proposal for Future Studies. Sustainability 2019, Vol. 11, Page 2664, 11(9), 2664. https://doi.org/10.3390/SU11092664

[3]. Arora, N. K. (2018). Environmental Sustainability—necessary for survival. Environmental Sustainability, 1(1), 1–2. https://doi.org/10.1007/s42398-018-0013-3

[4]. BBA. (2010). Environmental Assessment Report, Padma Multipurpose Bridge Project.

[5]. Fan, H., Ismail, H. M., & Reza, S. M. (2018). Technological Innovation, Infrastructure and Industrial Growth in Bangladesh: Empirical Evidence from ARDL and Granger Causality Approach. Asian Economic and Financial Review , 8(7), 964–985. https://doi.org/10.18488/JOURNAL.AEFR.2018.87.964.985

[6]. Ismaeel, W. S. E., & Lotfy, R. A. E. R. (2022). An integrated building information modelling-based environmental impact assessment framework. Clean Technologies and Environmental Policy, 1, 1–17. https://doi.org/10.1007/S10098-022-02443-6/TABLES/1

[7]. K. Morgan, R. (2022). Influence of EIA on project planning and design: exploring the gap between best and actual practice. Integrated Impact Assessment: Coming out of the Shadows?, 86–110. https://doi.org/10.4337/9781800379633.00011

[8]. Kabir, S. M. Z., & Momtaz, S. (2014). FIFTEEN YEARS OF ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM IN BANGLADESH: CURRENT PRACTICE, CHALLENGES AND FUTURE DIRECTIONS. Https://Doi.Org/10.1142/S146433321350018X, 15(4). https://doi.org/10.1142/S146433321350018X

[9]. Kiker, G. A., Bridges, T. S., Varghese, A., Seager, P. T. P., & Linkov, I. (2005). Application of multicriteria decision analysis in environmental decision making. Integrated Environmental Assessment and Management, 1(2), 95–108. https://doi.org/10.1897/IEAM_2004A-015.1

[10]. Lock, D. (2013). Project management. Project Management, 1–551. https://doi.org/10.4324/9781315245911

[11]. Mclean, D. G., Vasquez, J. A., Oberhagemann, K., & Sarker, M. H. (2012). Padma river morphodynamics near Padma bridge. Aquananotechnology: Global Prospects River Flow, 741–747.

[12]. NWFP, S. (2004). Environmental impact assessment: An effective management tool. Pakistan Journal of Biological Sciences, 7(12).

[13]. Omer, A. M. (2008). Energy, environment and sustainable development. Renewable and Sustainable Energy Reviews, 12(9), 2265–2300. https://doi.org/10.1016/J.RSER.2007.05.001

[14]. Rashid, M., Kabir, M. R., & Zaman, M. M. I. (2023). Padma Bridge in Global Media and Boost to SDGs in Bangladesh. Journalism and Media 2023, Vol. 4, Pages 445-466, 4(2), 445–466. https://doi.org/10.3390/JOURNALMEDIA4020029

[15]. Rathi, A. K. A. (2017). Evaluation of project-level environmental impact assessment and SWOT analysis of EIA process in India. Environmental Impact Assessment Review, 67, 31–39. https://doi.org/10.1016/J.EIAR.2017.08.004

[16]. Singh, R. L., & Singh, P. K. (2017). Global Environmental Problems. In R. L. Singh (Ed.), Principles and Applications of Environmental Biotechnology for a Sustainable Future (pp. 13–41). Springer Singapore. https://doi.org/10.1007/978-981-10-1866-4_2

[17]. Star, T. D. (n.d.). Padma Bridge Fact Box | The Daily Star. Retrieved April 11, 2023, from https://www.thedailystar.net/supplements/the-daily-star-plus-padma-bridge/news/padma-bridge-fact-box-3055811

[18]. Sutter, R. D., Wainscott, S. B., Boetsch, J. R., Palmer, C. J., & Rugg, D. J. (2015). Practical guidance for integrating data management into long-term ecological monitoring projects. Wildlife Society Bulletin, 39(3), 451–463. https://doi.org/10.1002/WSB.548

[19]. Tappin, R. G. R., Jones, V., & Khan, I. A. (2015). Hardinge bridge to Padma bridge--100 years of major river crossings in Bangladesh. Proc. of IABSE--JSCE Conf. on Advances in Bridge Engineering (Amin AFMS, Okui Y, Bhuiyan AR and Ueda T (Eds)), Dhaka, Bangladesh, 3–25.

[20]. Wu, T. (2020). Optimizing Project Management. In Optimizing Project Management. CRC Press,. https://doi.org/10.1201/9781003001119