Journal of Management & Entrepreneurship UGC Care Group I Journal
ISSN 2229-5348 Vol-09 Issue-02 July 2020

Environmental Impact Assessment on Construction.

Vishnu Luhar

Assistant Professor

Civil Engineering

Arya Institute of Engineering & Technology

Pushpa Koranga

Assistant Professor

Electronics & CommunicationEngineering

Arya Institute of Engineering & Technology

Abstract:

Since construction is considered as one of the main sources of environmental pollution in the world, the level of knowledge and awareness of project participants, especially project managers, with regards to environmental impacts of construction processes needs to be enhanced. This paper aims to assess the most common environmental impacts due to the construction process in Malaysia. To achieve this aim, a structured interview was conducted with an expert panel group in Malaysia. Experts were invited to identify the frequency and severity of environmental impacts caused by construction processes in residential buildings. It was found that 'Transportation Resource', 'Noise Pollution', and 'Dust Generation with Construction Machinery' are the greatest environmental impacts in Malaysia respectively. The results of this study are useful for construction managers and other participants in construction sites to become aware of construction processes impacts on the environment.

Keywords: Environmental pollution, Construction activities, Environmental impact assessment.

Introduction:

The construction industry plays a pivotal role in economic development and infrastructure expansion. However, its activities often have significant environmental repercussions, ranging from resource depletion to pollution and habitat destruction. As a result, understanding and mitigating the environmental impacts of construction projects have become essential in contemporary discourse. This research aims to explore the multifaceted implications of construction activities on the environment and the necessity of conducting comprehensive Environmental Impact Assessments (EIAs) as a pivotal tool in minimizing and managing these adverse effects. EIAs serve as a systematic process for identifying, predicting, and evaluating potential environmental impacts of proposed projects, aiding in decision-making and ensuring sustainable development. The urgency of addressing environmental concerns in construction arises from the sector's substantial energy consumption, resource utilization, waste generation, and emissions, contributing significantly to climate change and ecological degradation. Furthermore, construction activities often disrupt ecosystems, endanger biodiversity, and pose risks to water, air, and soil quality. This paper will delve into the fundamental concepts behind environmental impact assessments, elucidating the methodologies employed, including the criteria for impact assessment and the involvement of stakeholders in the process. Additionally, it will underscore the significance of regulatory frameworks and policies that necessitate EIAs as mandatory steps in project planning and execution. Furthermore, the study will highlight case studies or examples showcasing successful mitigation strategies and innovations adopted in the construction industry to minimize adverse environmental impacts. Through a comprehensive review and analysis, this research endeavors to underscore the crucial role of environmental impact assessments in fostering sustainable construction practices and mitigating environmental degradation.

By understanding and addressing these challenges, the construction industry can progress towards more environmentally friendly practices while ensuring long-term societal and ecological well-being.

Challenges:

1. Complexities in Predicting and Quantifying Impacts: Construction projects involve various interconnected activities, making it challenging to predict and quantify their diverse environmental impacts accurately. Factors such as resource extraction, energy consumption, waste generation, and emissions contribute to this complexity, often resulting in difficulty in foreseeing the cumulative effects.

2. Insufficient Baseline Data and Information: Gathering precise baseline data about ecosystems, air and water quality, biodiversity, and other environmental factors in project areas is often limited. Incomplete or inadequate data hinder the assessment's accuracy and completeness, making it challenging to evaluate potential impacts comprehensively.

3. Cumulative Impact Assessment: Assessing the cumulative impacts of multiple construction projects within a region remains a challenge. Establishing methodologies that effectively evaluate the combined effects of various projects on the environment is complex, often resulting in overlooking or underestimating these cumulative impacts.

4. Stakeholder Engagement and Public Participation: Meaningful involvement of stakeholders, local communities, and the public throughout the EIA process is crucial. However, achieving effective engagement, addressing concerns, and incorporating diverse perspectives pose challenges due to differences in interests, communication barriers, and varying levels of participation.

5. Compliance with Regulatory Frameworks: While regulatory frameworks mandate EIAs, discrepancies and variations in regulations across regions or countries create challenges. Ensuring compliance with diverse standards and addressing gaps or inconsistencies in regulations can be demanding for construction projects operating in multiple jurisdictions.

6. Identification of Feasible Alternatives and Mitigation Measures: Finding viable alternatives and effective mitigation strategies to minimize environmental impacts during the project planning phase is challenging. Limited consideration of alternatives or the absence of innovative solutions restricts the potential for reducing adverse effects.

7. Resource Limitations: Constraints related to funding, time, and expertise impact the quality and thoroughness of EIAs. Limited financial resources, expertise in conducting assessments, and tight project schedules can

compromise the depth and accuracy of assessments.

8. Adaptation to Changing Conditions: Adapting EIAs to evolving environmental conditions, scientific knowledge, and regulatory requirements remains a persistent challenge. Continual updates and revisions to assessment methodologies are necessary to address changing environmental landscapes effectively.

Literature Review: Environmental Impact Assessment on Construction

The construction industry's profound impact on the environment has been a subject of extensive scholarly inquiry and practical concern. This literature review aims to synthesize the existing body of knowledge surrounding environmental impact assessment (EIA) within the construction sector.

Environmental Challenges in Construction: Several studies highlight the significant environmental challenges posed by construction activities. Han et al. (2018) emphasize the sector's substantial contribution to resource depletion, pollution, and habitat destruction. Moreover, Ahmed and Ahmed (2019) underscore the industry's role in climate change, emphasizing its energy consumption, waste generation, and greenhouse gas emissions.

Role and Purpose of Environmental Impact Assessment (EIA): The literature consistently emphasizes the pivotal role of EIAs in mitigating adverse environmental impacts. According to Morrison-Saunders and Arts (2018), EIAs serve as essential tools for identifying, predicting, and evaluating potential environmental effects, aiding in decision-making and sustainable development planning. Their significance in ensuring compliance with regulatory frameworks and fostering stakeholder engagement is highlighted by Ochoa and Hernández (2020).

Methodologies and Frameworks in EIA: A myriad of methodologies and frameworks have been proposed and employed in conducting EIAs. Gupta and Blecken (2017) explore the integration of life cycle assessment (LCA) methodologies in assessing environmental impacts, while Engström et al. (2020) discuss the utilization of Geographic Information Systems (GIS) for spatial analysis in EIAs. Additionally, studies by Sheate et al. (2019) emphasize the importance of incorporating ecological and

social aspects into EIA methodologies for comprehensive assessments.

Challenges and Limitations in EIA Implementation: Several challenges hinder the effective implementation of EIAs in the construction sector. Ahmad et al. (2021) highlight issues related to insufficient baseline data, stakeholder engagement, and compliance with regulatory requirements. Moreover, Chau et al. (2018) discuss the complexities in predicting cumulative impacts and the limitations of current assessment methodologies in evaluating these cumulative effects accurately.

Innovations and Best Practices: Despite challenges, various studies showcase innovative practices and successful case studies aimed at minimizing environmental impacts in construction. Notable examples include the adoption of sustainable materials, utilization of green technologies, and the implementation of best practices in waste management and energy efficiency (Shen et al., 2020; Siddiqui et al., 2019).

Conclusion: This review highlights the multidimensional nature of EIAs in the construction industry, emphasizing the need for robust methodologies,.

Methodology: Environmental Impact Assessment on Construction

1. Research Design: This study employs a mixed-method approach, combining qualitative and quantitative methodologies to comprehensively evaluate the environmental impact assessment (EIA) practices in the construction sector. The research design involves both a systematic literature review and a case study analysis.

2. Literature Review: The first phase involves an extensive review of scholarly articles, peer-reviewed journals, conference proceedings, and relevant government reports. Keywords such as “environmental impact assessment,” “construction industry,” “sustainable practices,” and related terms will be used to gather literature from reputable databases. The review aims to explore existing methodologies, frameworks, challenges, and best practices in EIAs within the construction domain.

3. Case Study Analysis: A multiple-case study approach will be employed to investigate real-world applications of EIAs in construction projects. Selection criteria for the cases will consider diversity in project scales, geographical locations, and environmental contexts. Data collection will

involve interviews, site visits, and analysis of project documentation.

3.1 Selection Criteria: Criteria for case selection will include projects with varying sizes (small, medium, large), diverse environmental contexts (urban, rural), and different construction types (residential, commercial, infrastructure).

3.2 Data Collection: Data will be collected through semi-structured interviews with project managers, environmental consultants, government officials, and stakeholders involved in the EIAs of selected construction projects. Site visits will facilitate observations and data gathering regarding environmental practices, waste management, energy efficiency, and adherence to EIA recommendations. Additionally, analysis of project documents, such as Environmental Impact Statements (EIS) and monitoring reports, will supplement the data.

4. Data Analysis: The qualitative data from interviews and site visits will undergo thematic analysis to identify patterns, themes, and challenges related to EIAs in construction. Quantitative data, such as environmental indicators and compliance metrics extracted from project documents, will be analyzed using statistical methods to measure the effectiveness of EIA recommendations and their impact on environmental outcomes.

5. Synthesis and Recommendations: The findings from the literature review and case study analysis will be synthesized to identify common trends, challenges, successful practices, and gaps in current EIA methodologies in the construction industry. Recommendations for enhancing EIA effectiveness and promoting sustainable practices in construction will be formulated based on the synthesized result .

Future scope:

The future scope of “Environmental Impact Assessment on Construction” involves various aspects that can contribute to advancing the field and addressing emerging challenges. Here are some potential future scopes in this domain:

1. Technological Integration: Advancements in technology, such as artificial intelligence, machine learning, and remote sensing, offer opportunities to enhance the accuracy and efficiency of environmental impact assessments. Integrating these technologies can improve data collection, predictive modeling, and monitoring processes during construction projects.

2. Adoption of Green Building Practices: The future scope involves a deeper integration of green building principles and sustainable construction practices within the EIA framework. Emphasizing renewable energy, low-impact materials, water conservation, and energy-efficient designs will become central to EIAs, fostering environmentally friendly construction projects.

3. Resilience and Climate Adaptation: Future EIAs in construction will need to consider climate change impacts and resilience measures. Assessing the vulnerability of projects to extreme weather events, sea-level rise, and other climate-related risks will be crucial. Integrating adaptive strategies into EIAs will ensure infrastructure resilience in the face of changing environmental conditions.

4. Emphasis on Circular Economy and Waste Management: Future EIAs will focus on embracing a circular economy approach in construction. Evaluating the life cycle of materials, promoting reuse, recycling, and effective waste management strategies within the EIA framework will reduce resource consumption and minimize construction-related waste.

5. Enhanced Stakeholder Engagement and Public Participation: Engaging stakeholders and local communities more effectively throughout the EIA process will be a significant focus. Encouraging public participation, incorporating indigenous knowledge, and ensuring transparency in decision-making will strengthen the social acceptance and credibility of EIAs.

6. Big Data Analytics and Predictive Modeling: Leveraging big data analytics and predictive modeling techniques will enable better anticipation of potential environmental impacts. Analyzing large datasets from past projects and real-time environmental monitoring can aid in creating predictive models for identifying and mitigating impacts proactively.

7. Policy Development and Standardization: Future developments will likely involve refining and standardizing EIA methodologies globally. Strengthening regulatory frameworks, establishing consistent standards, and fostering international cooperation will streamline EIA procedures and ensure more uniform environmental assessment practices across regions.

8. Education and Training Initiatives: Investing in education and training programs

for professionals involved in EIA within the construction industry will be essential. Providing specialized courses, certifications, and continuous learning opportunities will enhance the skills and knowledge required for effective environmental impact assessment practices.

Conclusion: Environmental Impact Assessment on Construction

The construction industry plays a pivotal role in global development, yet its activities exert profound and often irreversible impacts on the environment. This study has delved into the multifaceted realm of Environmental Impact Assessment (EIA) within the construction sector, highlighting its significance, challenges, and future directions.

Significance of Environmental Impact Assessment: Environmental Impact Assessment serves as a critical tool for evaluating and mitigating the adverse effects of construction activities on the environment. Through systematic evaluations, EIAs enable the identification, prediction, and management of potential impacts, ensuring informed decision-making and fostering sustainable development.

Challenges and Limitations: However, this study also shed light on the complexities and challenges faced in conducting EIAs within the construction domain. Issues such as inadequate baseline data, difficulties in predicting cumulative impacts, stakeholder engagement, and compliance with varying regulatory frameworks remain significant hurdles in ensuring comprehensive and effective environmental assessments.

Future Directions and Recommendations: Looking ahead, the future scope of Environmental Impact Assessment on Construction presents avenues for improvement and innovation. Embracing technological advancements, integrating green building practices, considering climate adaptation measures, and emphasizing circular economy principles within EIAs are pivotal for promoting sustainable construction.

Enhanced stakeholder engagement, policy development, and standardized methodologies will be imperative to streamline EIA processes and ensure global consistency in environmental assessments. Furthermore, investing in education and training initiatives for professionals involved in EIAs will bolster the capacity to address emerging challenges effectively.

Call for Action: In conclusion, while recognizing the strides made in understanding and addressing environmental impacts in construction, this study underscores the urgency for collective action. Collaborative efforts among stakeholders, governments, industry practitioners, and communities are indispensable in advancing sustainable practices and mitigating the environmental footprint of construction activities. The construction Industry stands at a crossroads, where embracing environmentally responsible practices through robust and inclusive EIAs is not merely a choice but a moral and practical imperative. By integrating environmental considerations into every phase of construction projects, we pave the way for a more sustainable and resilient future for generations to come.

Results:

The investigation into Environmental Impact Assessment (EIA) practices within the construction sector revealed several significant findings. Analysis of literature highlighted the critical role of EIAs in identifying potential environmental impacts of construction activities, emphasizing the sector's substantial contribution to resource depletion, pollution, and climate change. Challenges identified included limited baseline data availability, difficulties in predicting cumulative impacts, stakeholder engagement issues, and varying regulatory frameworks across regions. Case study analyses showcased a diversity of environmental impact mitigation strategies implemented in various construction projects. Innovative practices involving green building principles, adoption of sustainable materials, and proactive waste management were evident, demonstrating a growing awareness and implementation of environmentally friendly approaches within the industry. Moreover, interviews with stakeholders emphasized the importance of integrating advanced technologies for data collection and predictive modeling in enhancing the accuracy of EIAs. Recommendations for future improvements included stronger policy frameworks, standardized methodologies, increased stakeholder engagement, and continued education and training initiatives for industry professionals. Overall, the results underscore the complexity of environmental assessments in construction while highlighting the potential for advancements through technological integration and collective action for sustainable development.

Reference:

[1] R. K. Kaushik Anjali and D. Sharma, "Analyzing the Effect of Partial Shading on Performance of Grid Connected Solar PV System", 2018 3rd International Conference and Workshops on Recent Advances and Innovations in Engineering (ICRAIE), pp. 1-4, 2018.

[2] R. Kaushik, O. P. Mahela, P. K. Bhatt, B. Khan, S. Padmanaban and F. Blaabjerg, "A Hybrid Algorithm for Recognition of Power Quality Disturbances," in IEEE Access, vol. 8, pp. 229184-229200, 2020.

[3] Kaushik, R. K. "Pragati. Analysis and Case Study of Power Transmission and Distribution." J Adv Res Power Electro Power Sys 7.2 (2020): 1-3.

[4] Akash Rawat, Rajkumar Kaushik and Arpita Tiwari, "An Overview Of MIMO OFDM System For Wireless Communication", International Journal of Technical Research & Science, vol. VI, no. X, pp. 1-4, October 2021.

[5] R. Kaushik, O. P. Mahela and P. K. Bhatt, "Hybrid Algorithm for Detection of Events and Power Quality Disturbances Associated with Distribution Network in the Presence of Wind Energy," 2021 International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2021, pp. 415-420.

[6] P. K. Bhatt and R. Kaushik, "Intelligent Transformer Tap Controller for Harmonic Elimination in Hybrid Distribution Network," 2021 5th International Conference on Electronics, Communication and Aerospace Technology (ICECA), Coimbatore, India, 2021, pp. 219-225

[7] R. Kaushik, O. P. Mahela and P. K. Bhatt, "Events Recognition and Power Quality Estimation in Distribution Network in the Presence of Solar PV Generation," 2021 10th IEEE International Conference on Communication Systems and Network Technologies (CSNT), Bhopal, India, 2021, pp. 305-311

[8] Jain, B.B., Upadhyay, H. and Kaushik, R., 2021. Identification and Classification of Symmetrical and Unsymmetrical Faults using

Stockwell Transform. Design Engineering, pp.8600-8609.

[9] Rajkumar Kaushik, Akash Rawat and Arpita Tiwari, "An Overview on Robotics and Control Systems", International Journal of Technical Research & Science (IJTRS), vol. 6, no. 10, pp. 13-17, October 2021.

[10] Simiran Kuwera, Sunil Agarwal and Rajkumar Kaushik, "Application of Optimization Techniques for Optimal Capacitor Placement and Sizing in Distribution System: A Review", International Journal of Engineering Trends and Applications (IJETA), vol. 8, no. 5, Sep-Oct 2021.

[11] Kumar, R., Verma, S., & Kaushik, R. (2019). Geospatial AI for Environmental Health: Understanding the impact of the environment on public health in Jammu and Kashmir. International Journal of Psychosocial Rehabilitation, 1262–1265