

# Unpacking Project Management Challenges in Green Building Projects: Insights from the Indian Construction Sector

Gargi Ray<sup>1</sup>, Vijay R. Panchal<sup>2</sup>, Devanshu Pandit<sup>3</sup>

<sup>1</sup>Assistant Professor, M. S. Patel Department of Civil Engineering, Chandubhai S. Patel Institute of Technology (CSPIT), Faculty of Technology & Engineering (FTE), Charotar University of Science and Technology (CHARUSAT), Anand 388421, Gujarat, India

<sup>2</sup>Professor, M. S. Patel Department of Civil Engineering, Chandubhai S. Patel Institute of Technology (CSPIT), Faculty of Technology & Engineering (FTE), Charotar University of Science and Technology (CHARUSAT), Anand 388421, Gujarat, India

<sup>3</sup>Adjunct Professor, Faculty of Technology, CEPT University, Ahmedabad 380009, Gujarat, India

**Email ID:** [gargisojitra.cv@charusat.ac.in](mailto:gargisojitra.cv@charusat.ac.in)<sup>1</sup>, [vijaypanchal.cv@charusat.ac.in](mailto:vijaypanchal.cv@charusat.ac.in)<sup>2</sup>, [devanshu@cept.ac.in](mailto:devanshu@cept.ac.in)<sup>3</sup>

## Abstract

*The growing acceptance and construction of green building projects has led to additional challenges in construction project management. Green buildings improve environmental performance and sustainability but for their successful implementation specialized project management approaches are required. This study aims to examine the key project management challenges faced in green building projects within the Indian construction industry. The challenges were identified from an extensive review of existing literature and based on these a systematic questionnaire survey was conducted among construction professionals working on green building projects, including architects, engineers, contractors, and sustainability consultants. The data collected through the questionnaire survey of construction professionals were analysed to identify and rank key project management challenges using the Relative Importance Index (RII) method. The findings highlight several critical issues affecting green building project delivery, including the complexity of coordination among multiple stakeholders, increased documentation requirements for certification, regulatory approval processes, and the higher initial costs associated with sustainable construction practices. The study provides insights into the management difficulties associated with green building implementation in India and highlights areas requiring improved project management practices. The findings can help green building professionals in developing more effective management strategies for green building projects while also contributing to ongoing research on sustainable construction management.*

**Keywords:** Green Buildings, Project Management, Project Delivery, Sustainability

## 1. Introduction

The global construction sector is presently experiencing a significant transformation[27], shifting from conventional delivery methodologies towards sustainable and environmentally-friendly building practices. This transformation becomes necessary because of the pressing need to reduce the environmental impact of the construction industry, which represents a considerable fraction of worldwide carbon emissions, energy utilization, and waste production (Darko & Chan, 2017). Within the Indian context, this transformation is especially important as the nation is undergoing urbanization

and infrastructure development at a rapid pace. The Indian construction industry faces the dual challenge of satisfying housing demand while complying with international climate obligations, such as the attainment of Net Zero emissions by 2070 [1]. While the implementation of green building frameworks—such as LEED, IGBC, and GRIHA—has seen considerable progress in India, this transition is accompanied by certain challenges. Green buildings are more complex than traditional projects; they necessitate the incorporation of cutting-edge technologies, unconventional materials, and rigorous

performance criteria from the design stage to commissioning (B. G. Hwang & Tan, 2012). As a result, conventional project management (PM) practices often fall short. The "Green Gap"—the disparity between ambitious sustainability objectives and real project results—is often attributed to managerial shortcomings rather than technical obstacles. In the Indian construction sector, project managers face a number of constraints, including varying material prices, a disorderly supply chain, and differing degrees of technical proficiency among stakeholders. Current research shows that while the environmental advantages of green buildings are agreed upon by all, the practical "on-the-ground" management difficulties pose a significant challenge to widespread adoption (Arif et al., 2009). Hence it becomes necessary to find which obstacles are most critical, so that the construction firms can make necessary changes in the way they approach a green building project. This research, titled "Unpacking Project Management Challenges in Green Building Projects: Insights from the Indian Construction Sector," seeks to fill this gap. By employing a structured questionnaire survey and the Relative Importance Index (RII) method, this study identifies and prioritizes the key obstacles faced by the construction industry professionals. The results aim to provide a strategic framework for architects, engineers, and project managers to enhance their management approaches, ultimately promoting a more robust and sustainable construction ecosystem in India [2].

## 2. Literature Review

### 2.1. Sustainability vs. Traditional Management

The construction sector consumes over one-third of global energy and produces nearly 40% of CO<sub>2</sub> emissions. At the same time the building floor area world over is expected to double by 2050 (IEA, 2020). This environmental challenge has led to a fundamental shift from traditional project management methods to sustainability-integrated approaches. In India, this transition is particularly important as the nation has committed to becoming Net Zero by 2070 and the buildings account for 33%

of national energy consumption (Govt of India, 2022). Green building project management goes beyond conventional constraints of time, cost, and scope to include environmental performance, lifecycle sustainability, and stakeholder value creation (Prasetyo et al., 2024). Traditional project management structures, which are based on linear processes and isolated execution, fall short in addressing the multifaceted complexities of green building projects. While standard construction methods focus on efficiency and minimizing costs [3], sustainable project management necessitates the integration of environmental responsibility throughout the entire project lifecycle—from design and material sourcing to construction implementation and operational commissioning (Shah et al., 2023). Recent studies highlight key distinctions between traditional and green project management strategies. Conventional frameworks emphasize predictability and control through uniform procedures, while green projects demand a management approach that can adapt to changing sustainability standards, emerging technologies, and intricate stakeholder networks. The certification process itself—whether it involves LEED, GRIHA, or IGBC—imposes stringent documentation requirements, performance verification protocols, and adherence to diverse sustainability criteria encompassing site selection, water conservation, energy efficiency, material sourcing, and indoor environmental quality (Chaisaard & Taemthong, 2018). Green building projects also need improved collaboration among a variety of stakeholders—architects, engineers, green building consultants, specialized contractors, and certification organizations—each contributing unique knowledge and priorities. This necessity for multi-disciplinary integration is very different from the linear, hierarchical methods typical of conventional construction. As a result [4], this necessitates a project setting where conventional success indicators are modified to incorporate sustainability achievements while still guaranteeing efficient delivery. (B.-G. Hwang & Ng, 2013). The Indian context has distinct challenges. Despite growth in green certifications and government

incentives [28], project managers encounter major obstacles. These obstacles include limited availability of sustainable materials, high initial costs, lack of skilled labor, and inconsistent regulations across states (Shahiera Nooradzhar et al., 2024). Research shows that effective green project management needs a complete rethinking of governance, risk management, and value delivery. (Silvius & Schipper, 2014).

## **2.2. The Green Gap: Intention vs. Implementation**

Even with increasing recognition and policy backing for sustainable building practices, a significant “green gap” exists between sustainability goals and the reality of implementation results. This gap appears in various forms: financial, technical, managerial, and regulatory, establishing systemic obstacles that hinder the acceptance of green construction even among dedicated stakeholders (Darko & Chan, 2017). **Financial Barriers:** Cost continues to be the most commonly mentioned barrier to the implementation of green building practices. Budget uncertainties exacerbate this issue, as project managers find it challenging to accurately forecast expenses for unfamiliar sustainable technologies and materials, particularly when local market data is scarce (Wuni et al., 2023). Although lifecycle cost analyses show long-term economic advantages through decreased operational costs, the focus on initial capital expenditures create financial disincentives in embracing green practices (Chegut et al., 2014). **Technical Challenges [26]:** The addition of energy-efficient technologies and sustainable materials brings substantial technical [6] complexity. The limited availability of green materials in local markets leads to extended procurement lead times and necessitates careful supply chain coordination (B. G. Hwang & Tan, 2012). Construction teams frequently lack knowledge or skill in the installation and commissioning of advanced building systems, such as Building Management Systems (BMS), renewable energy integration, and water recycling technologies. This gap in knowledge increases the execution risks and the likelihood of performance shortfalls that could make the certification results

uncertain (Shi et al., 2013). **Managerial Barriers:** Green projects require noticeably different management skills. Project managers need to possess knowledge of sustainability standards, lifecycle assessments, and integrated design processes—skills that are not developed through conventional construction experience (B.-G. Hwang & Ng, 2013). Stakeholder coordination becomes far more complex, requiring alignment among various parties with differing sustainability literacy and commitment levels (Mok et al., 2015). Client hesitancy or a lack of understanding regarding the benefits of green building frequently leads to value engineering choices that undermine sustainability features when projects encounter financial constraints (Onubi, 2019; Sang & Yao, 2019). **Regulatory Challenges:** India’s regulatory environment for green buildings is still disorderly and inconsistent across various states and municipalities. Although national policies advocate for sustainable construction practices, they are not made mandatory and the mechanisms for implementation differ greatly, leading to uncertainty for project teams (Sinha et al., 2013). Although certification processes are standardized by rating agencies, they frequently encounter delays due to extensive documentation requirements and a shortage of available assessors. The lack of mandatory green building codes in numerous jurisdictions reduces the market demand [29], making adoption reliant on voluntary commitments from clients [5]. Recent studies emphasize that the green gap is not merely a collection of separate barriers, but a systemic challenge rooted in institutional apathy, market structures, and deficiency in skills (Darko & Chan, 2017). Closing this gap necessitates coordinated efforts that tackle financial mechanisms, enhance technical capacity, develop managerial skills, and align regulations (Prasetyo et al., 2024).

## **2.3. Identification of Variables: A Comprehensive Framework**

Several variable categories that collectively determine green building project outcomes were identified from the study of the literature. Literature shows consistent high-level barrier categories: financial and economic, material and supply chain

[7], design and technical, management and education, and stakeholder and market (Goel et al., organizational, regulatory and legal, knowledge and 2020; B.-G. Hwang & Ng, 2013) shown in Table 1.

**Table 1 A Comprehensive Framework**

Category	Challenge	Impact	References
Financial	High Upfront Costs	Budget escalation, reduced adoption	(Darko & Chan, 2017; B. G. Hwang & Tan, 2012)
	Budget Constraints	Performance shortfalls	(Kozhakhmetova & Anarkhan, 2024)
	Long Payback Periods	Reduced investment	(Abidin & Azizi, 2021; Iyer & Jha, 2005)
	Cost Overruns	Financial risk	(Adindu et al., 2022)
Technical	Modelling Limitations	Performance Gaps	(Geng et al., 2019)
	Faulty Design Assumptions	System underperformance	(Adindu et al., 2022)
	Complex Integrated Design	Integration challenges	(Adindu et al., 2022)
	Immature Technologies	Performance risk	(Abdelkhalik & Azmy, 2022; Darko & Chan, 2017)
	Construction Difficulties	Quality risks	(B.-G. Hwang & Ng, 2013; Shi et al., 2016)
Managerial	Poor Collaboration	Design intent loss	(B.-G. Hwang & Ng, 2013; Venkataraman & Cheng, 2018)
	Lack of Leadership	Weak project support	(Abdelkhalik & Azmy, 2022)
	Insufficient Training	Operational errors	(Chaisaard & Taemthong, 2018; Onubi, 2019)
Regulatory	Weak Enforcement	Reduced compliance	(Ogunmakinde et al., 2024)
	Lengthy Approvals	Schedule delays	(B.-G. Hwang & Ng, 2013)
	Misaligned Incentives	Market friction	(Potbhare et al., 2009)
Knowledge	Limited Training	Capability gaps	(B.-G. Hwang & Ng, 2013)
	Low Awareness	Weak demand	(B.-G. Hwang & Ng, 2013)
Stakeholder	Limited Demand	Low investment	(Sang & Yao, 2019)
	Cultural Resistance	Market resistance	(B.-G. Hwang & Ng, 2013)
Supply Chain	Uncertain Supply	Procurement delays	(Abdelkhalik & Azmy, 2022; B.-G. Hwang & Ng, 2013)
	Quality Risk	Performance risk	(Abdelkhalik & Azmy, 2022)
	Logistics Complexity	Supply disruptions	(Abdelkhalik & Azmy, 2022)

### 3. Research Methodology

This research takes a quantitative approach to methodically identify and rank the challenges faced in project management within the Indian green building sector [9]. The methodology follows a well-organized procedure involving the design of a questionnaire, gathering data from industry experts engaged in green building construction, and then ranking the results using the RII method [8].

#### 3.1. Research Design and Data Collection

The primary data was collected by conducting a systematic questionnaire survey which was distributed to construction professionals across India. A total of 62 valid responses were received [11], representing a focused group of practitioners. Considering the technical aspects of green building project management, a targeted selection method was utilized to guarantee that the data reflected the perspectives of individuals with firsthand experience in sustainable construction [10].

#### 3.2. Survey Instrument and Design

The questionnaire was developed through a comprehensive review of existing literature and a pilot study with industry experts. It was organized into five distinct sections to ensure a comprehensive representation of different project management dynamics shown in Table 2:

**Table 2 Survey Instrument and Design**

Section	Focus Area	Objective
Section A	General Information	Captures demographics, professional roles (PM, Architect, Consultant), and cumulative experience in green projects.
Section B	Current PM Practices	Benchmarks existing levels of Planning, Risk Management, and Communication strategies currently in use.
Section	PM	The core analytical

C	Challenges	section identifying specific Financial, Technical, Managerial, and Regulatory hurdles.
Section D	Impact & Success	Uses a 5-point Likert scale to quantify the perceived severity of challenges on project performance.
Section E	Feedback & Strategy	Collects qualitative recommendations and strategic insights for future framework development.

To ensure a complete understanding of the management landscape, the survey specifically focused on variety of stakeholders including owners, project managers, contractors, architects, engineers, and green building consultants. These participants were selected based on their experience with green building construction. The identified challenges reflect the practical realities of the contemporary Indian construction market as the responses were taken from professionals having a wide range of experience [12].

#### 3.3. Measurement Scale: The Relative Importance Index (RII)

The collected data were analyzed using the Relative Importance Index (RII) method to convert individual scores into a collective ranking of challenges. The RII is calculated as follows:

$$RII = \frac{\sum W}{(A \times N)}$$

Where W represents the weight given to each factor by the respondents, A is the highest weight (5 in this study), and N is the total number of respondents. This method was due to its ability to normalize the data effectively, facilitating a transition from mere "opinions" to a statistically validated "ranked list" of significant issues. The produced indices (spanning from 0 to 1) allow professionals to differentiate between commonly identified obstacles and those

that clearly have the most substantial influence on the delivery of green buildings in India [15].

#### 4. Analysis Of Key Findings

The data collected from 62 construction professionals provides a detailed look at the project management scene for green buildings in India. The results are categorized through Relative Importance Index (RII) rankings and direct percentage-based feedback [16].

##### 4.1. Project Management Practices and Sustainability Outcomes

The analysis indicates that targeted management strategies are essential for meeting environmental goals. Continuous monitoring emerged as the most significant factor (RII = 0.839) for ensuring compliance with sustainability standards. This is closely followed by early stakeholder involvement (RII = 0.806) and effective planning (RII = 0.790), both of which are seen as essential for improving energy efficiency and overall sustainability performance. Interestingly, while communication and budget management are acknowledged, they hold a lower ranking in their direct impact on green results when compared to technical oversight and early integration [13].

##### 4.2. Insights from Real Project Experiences

Analysis of practical project highlights the importance of institutional knowledge. The top-rated factor in this domain is the conviction that insights gained from previous green initiatives enhance future planning (RII = 0.871). Additionally, practitioners place significant importance on early-stage planning (RII = 0.852) and experiential learning (RII = 0.835). These results indicate that the Indian sector relies considerably on "learning by doing" to bridge the gap between theoretical green designs and practical implementation on field [14].

##### 4.3. Essential Elements for an Effective Green PM Framework

When evaluating the necessities for a tailored management framework, respondents prioritized cost and schedule control (RII = 0.788) above other factors. This reflects the industry's concern with the "green premium" and potential delays [17]. Other critical components include the integration of sustainability goals as a core element (RII = 0.781)

and clear addressing of certification requirements (RII = 0.745). Stakeholder coordination also remains a high priority for any proposed framework (RII = 0.74).

##### 4.4. Feedback and Strategic Priorities

Overall feedback from the survey indicates considerable disappointment with existing industry standards. 55% of participants rated current project management methods as "inadequate to very inadequate" in meeting the specific demands of green buildings in India [18]. The execution phase (36%) was considered as the one requiring the most improvement. Stakeholder collaboration (38%) and the availability of a qualified workforce (27%) also emerged as urgent issues. A significant 62% of professionals highlighted that incorporating sustainability during the initial planning stages as "important to very important." Also an increasing inclination is noted towards a hybrid management strategy (31%) which merges traditional methods with agile or lean practices [19].

#### 5. Discussion

The findings reveal a significant consensus among construction professionals in India that traditional project management struggles to adjust to the intricacies tied to green construction. The high RII for continuous monitoring and proactive stakeholder involvement indicates that green projects cannot be effectively governed by the linear, segmented approaches typical of conventional Indian construction [20].

##### 5.1. The "Green Gap" and Experience-Based Learning

The data suggests that the "green gap"—the difference between design intentions and real-world results—is mainly being addressed through experiential learning. The notable ranking of "lessons learned" (RII = 0.871) implies that as the Indian industry progresses, the gathering of practical knowledge is becoming the most effective approach to overcoming technical challenges. However, the fact that 55% believe current methods fall short suggests that this experiential knowledge has not yet been incorporated into a standardized framework within the sector [22].

## 5.2. Coordination and Documentation Hurdles

The summary of this research emphasized that coordination and documentation are significant obstacles. The results support this assertion, with stakeholder coordination recognized as the top priority for enhancement (38%). The weight of certification documentation is also evident in the framework requirements, where addressing certification standards ranked third (RII = 0.745). These findings indicate that project managers in India are increasingly taking on the role of "integration managers," tasked with harmonizing technical certification demands with intricate team dynamics.

**5.3 Towards a Customized Indian Framework** There is a clear call for transformation, with 42% of respondents advocating for a tailored project management framework specifically suited to the Indian green building landscape. This framework must harmonize the global certification requirements (LEED/GRIHA) with the local necessities of cost control and schedule management, which were identified as the foremost priorities for the framework. The inclination towards a hybrid model (31%) suggests that the future of green project management in India is likely to adopt a flexible approach that merges the rigor of traditional project management with the versatility of lean or agile methodologies [21].

## 6. Critical Evaluation

The primary strength of this study lies in its robust empirical basis, incorporating the firsthand insights of 62 construction professionals instead of depending solely on theoretical frameworks. Employing the Relative Importance Index (RII), the paper effectively ranks industry challenges, clearly indicating that experts prioritize continuous monitoring (RII = 0.839) significantly more than the immediate use of digital tools (RII = 0.745). Moreover, by concentrating specifically on the Indian market and local certification systems such as IGBC and GRIHA, the research addresses a critical void in a discipline often influenced by Western-centric studies. However, the research does have its limitations. Although 62 respondents offer a

commendable data set for a specialized conference presentation, this sample size may restrict the ability to extrapolate findings across a country as diverse both geographically and economically as India. Furthermore, the results stem from subjective professional views captured through a Likert scale; these insights would gain even greater strength if accompanied by longitudinal data, such as actual energy savings or project cost documentation. There is also a risk of geographic bias, as the findings may not fully reflect the specific challenges encountered in Tier-2 or Tier-3 cities where the adoption of green building practices is still in its early stages [23]. Ultimately, this paper represents a meaningful contribution to the global discourse on Green Project Management (GPM) research by illuminating the distinct friction points present within a swiftly evolving economy. It shifts the dialogue beyond merely technical solutions, revealing that management failures—particularly in stakeholder coordination—often serve as the most significant obstacles to success. By uncovering that 55% of practitioners deem current project management approaches insufficient, the research offers a compelling rationale for the creation of new, specialized frameworks tailored to the specific requirements of the Indian construction industry [24].

## 7. Recommendations And Future Research

Based on the insights from the study, several strategic recommendations are proposed to improve the delivery of green building projects in the Indian context. Project managers should shift from traditional linear scheduling toward integrated, lifecycle-based planning that incorporates sustainability monitoring from the initiation phase to ensure continuous compliance. Similarly, policymakers are encouraged to simplify regulatory and certification procedures, effectively reducing the documentation burden that currently hinders project timelines and certification success. Finally, developers should prioritize investment in specialized training and "experience-based learning" programs; this is critical because lessons learned from past projects were identified as the most valuable asset for future planning, receiving the

study's highest ranking with an RII of 0.871 [25]. Future research should investigate the impact of Building Information Modeling (BIM) and Artificial Intelligence (AI) in addressing these issues. Furthermore, studies that compare the RII rankings with actual building performance data would establish a clear connection between management quality and environmental results.

## References

- [1]. Abdelkhalik, H. F., & Azmy, H. H. (2022). The role of project management in the success of green building projects : Egypt as a case study. *Journal of Engineering and Applied Science*, 69(61), 1–17. <https://doi.org/10.1186/s44147-022-00112-5>
- [2]. Abidin, N. Z., & Azizi, N. Z. M. (2021). Soft cost elements: Exploring management components of project costs in green building projects. *Environmental Impact Assessment Review*, 87, 106545. <https://doi.org/10.1016/j.eiar.2020.106545>
- [3]. Adindu, C., Ekung, S., & Ukpong, E. (2022). Green cost premium as the dynamics of project management practice: A critical review. *Journal of Project Management*, 7(3), 133–146. <https://doi.org/10.5267/j.jpmp.2022.3.002>
- [4]. Arif, M., Egbu, C., Haleem, A., Kulonda, D., & Khalfan, M. (2009). State of green construction in India: Drivers and challenges. *Journal of Engineering, Design and Technology*, 7(2), 223–234. <https://doi.org/10.1108/17260530910975005>
- [5]. Chaisaard, N., & Taemthong, W. (2018). LEED building project management in Thailand. *Lowland Technology International Journal*, 20(2), 95–108. [https://cot.unhas.ac.id/journals/index.php/ialt\\_1ti/article/view/194](https://cot.unhas.ac.id/journals/index.php/ialt_1ti/article/view/194)
- [6]. Chegut, A., Eichholtz, P., & Kok, N. (2014). Supply, Demand and the Value of Green Buildings. *Urban Studies*, 51(1), 22–43. <https://doi.org/10.1177/0042098013484526>
- [7]. Darko, A., & Chan, A. P. C. (2017). Review of Barriers to Green Building Adoption. *Sustainable Development*, 25(3), 167–179. <https://doi.org/10.1002/SD.1651>
- [8]. Geng, Y., Ji, W., Wang, Z., Lin, B., & Zhu, Y. (2019). A review of operating performance in green buildings: Energy use, indoor environmental quality and occupant satisfaction. *Energy and Buildings*, 183, 500–514. <https://doi.org/10.1016/j.enbuild.2018.11.017>
- [9]. Goel, A., Ganesh, L. S., & Kaur, A. (2020). Project management for social good: A conceptual framework and research agenda for socially sustainable construction project management. *International Journal of Managing Projects in Business*, 13(4), 695–726. <https://doi.org/10.1108/IJMPB-06-2019-0155>
- [10]. Govt of India. (2022). India's Updated First Nationally Determined Contribution Under Paris Agreement.
- [11]. Hwang, B. G., & Tan, J. S. (2012). Green building project management: Obstacles and solutions for sustainable development. *Sustainable Development*, 20(5), 335–349. <https://doi.org/10.1002/sd.492>
- [12]. Hwang, B.-G., & Ng, W. J. (2013). Project management knowledge and skills for green construction: Overcoming challenges. *International Journal of Project Management*, 31(2), 272–284. <https://doi.org/https://doi.org/10.1016/j.ijproman.2012.05.004>
- [13]. IEA. (2020). Buildings - A source of enormous untapped efficiency potential. International Energy Agency. <https://www.iea.org/topics/buildings>
- [14]. Iyer, K. C., & Jha, K. N. (2005). Factors affecting cost performance: Evidence from Indian construction projects. *International Journal of Project Management*, 23(4), 283–295. <https://doi.org/10.1016/j.ijproman.2004.10.003>
- [15]. Kozhakhmetova, A., & Anarkhan, A. (2024). Green Energy Project Management : Industry-Specific Risk Assessment Models. *Eurasian Journal of Economic and Business*

- Studies, 68(2), 153–163.  
<https://doi.org/10.47703/ejeb.v68i2.406>
- [16]. Mok, K. Y., Shen, G. Q., & Yang, J. (2015). Stakeholder management studies in mega construction projects: A review and future directions. *International Journal of Project Management*, 33(2), 446–457. <https://doi.org/10.1016/j.ijproman.2014.08.007>
- [17]. Ogunmakinde, O. E., Egbelakin, T., Sher, W., Omotayo, T., & Ogunnusi, M. (2024). Establishing the limitations of sustainable construction in developing countries: a systematic literature review using PRISMA. *Smart and Sustainable Built Environment*, 13(3), 609–624. <https://doi.org/10.1108/SASBE-10-2022-0223>
- [18]. Onubi, H. O. (2019). A review of success factors for the adoption of green construction site practices in developing countries. *International Journal of Sustainable Building Technology and Urban Development*, 10(4), 216–226. <https://doi.org/10.22712/susb.20190023>
- [19]. Potbhare, V., Syal, M., & Korkmaz, S. (2009). Adoption of green building guidelines in developing countries based on u.s. and india experiences. *Journal of Green Building*, 4(2), 158–174. <https://doi.org/10.3992/jgb.4.2.158>
- [20]. Prasetyo, G., Sutanto, M. E., Putra, A. M., Ichsan, M., Dwidienawati, D., & Bawono, M. (2024). Insights and challenges of sustainable project management implementations in construction sectors: Systematic literature analysis. In *Journal of Infrastructure, Policy and Development* (Vol. 8, Number 10). EnPress Publisher, LLC. <https://doi.org/10.24294/jipd.v8i10.8104>
- [21]. Sang, P., & Yao, H. (2019). Exploring Critical Success Factors for Green Housing Projects : An Empirical Survey of Urban Areas in China. *Advances in Civil Engineering*, 2019. <https://doi.org/https://doi.org/10.1155/2019/8746836>
- [22]. Shah, F. H., Bhatti, O. S., & Ahmed, S. (2023). Project Management Practices in Construction Projects and Their Roles in Achieving Sustainability—A Comprehensive Review. *Engineering Proceedings*, 44(1), 1–5. <https://doi.org/10.3390/engproc2023044002>
- [23]. Shahiera Nooradzhar, F., Abdullah, N., & Asmoni, M. (2024). Strategic Pathways to Sustainable Development: A Comprehensive Review of the Benefits and Barriers of Green Buildings. *International Journal of Real Estate Studies*, 18(2), 91–102.
- [24]. Shi, Q., Yan, Y., Zuo, J., & Yu, T. (2016). Objective conflicts in green buildings projects: A critical analysis. *Building and Environment*, 96, 107–117. <https://doi.org/10.1016/j.buildenv.2015.11.016>
- [25]. Shi, Q., Zuo, J., Huang, R., Huang, J., & Pullen, S. (2013). Identifying the critical factors for green construction - An empirical study in China. *Habitat International*, 40, 1–8. <https://doi.org/10.1016/j.habitatint.2013.01.003>
- [26]. Silvius, A. J. G., & Schipper, R. P. J. (2014). Sustainability in project management: A literature review and impact analysis. *Social Business*, 4(1), 63–96. <https://doi.org/10.1362/204440814x13948909253866>
- [27]. Sinha, A., Gupta, R., & Kutnar, A. (2013). Sustainable Development and Green Buildings. In *Drvna Industrija* (Vol. 64, Number 1, pp. 45–53). <https://doi.org/10.5552/drind.2013.1205>
- [28]. Venkataraman, V., & Cheng, J. C. P. (2018). Critical Success and Failure Factors for Managing Green Building Projects. *Journal of Architectural Engineering*, 24(4), 1–10. [https://doi.org/10.1061/\(asce\)ae.1943-5568.0000327](https://doi.org/10.1061/(asce)ae.1943-5568.0000327)
- [29]. Wuni, I. Y., Bao, Z., Yevu, S. K., & Tetteh, M. O. (2023). Theorizing the path dependencies and hierarchical structure of the multidimensional risks in green building projects. *Journal of Building Engineering*, 68, 106069. <https://doi.org/10.1016/j.job.2023.106069>