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DETERMINANTS INFLUENCING THE ADOPTION OF SUSTAINABLE CONSTRUCTION PRACTICES IN THE INDIAN REAL ESTATE SECTOR

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Keywords	Abstract
Sustainable Construction Practices, Real Estate Sector.	Sustainable construction of buildings in a manner that reduces the environmental effects, optimizes resource utilization, and improves efficiency of the building during its entire life cycle. Sustainable construction promotes economic, social and environmental health in the long term by incorporating new technologies and responsible planning. This paper is influenced by the increased desire to find out why the implementation of sustainable construction practices in the Indian real estate industry is still low despite their obvious advantages. The purpose of conducting this research is to evaluate the determinants influencing the adoption of sustainable construction practices in the Indian Real Estate Sector. The technique used in the current study is Structural Equation Modelling. The results of this study indicates that economic feasibility, environmental awareness, and regulatory support have a significant impact on adoption of sustainable construction practices.

1. INTRODUCTION

Implementation of construction and real estate industry contributes greatly to economic growth in India, yet at the same time, it contributes to the consumption of a lot of energy, use of materials



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and carbon emission throughout the building life cycle. With India addressing its national sustainability objectives in correspondence with the “Paris Agreement and the National Action Plan on Climate Change”, the shift to sustainable construction practices has taken the status of policy and market priorities (Bureau of Energy Efficiency, 2024; NIUA, 2022). The goal of sustainable construction is to reduce the effects on the environment by “ensuring the efficient use of resources, the use of low-carbon materials, the energy efficiency” of the design, and the use of better waste management. To put the scope of practices in perspective across the world and the Indian market, the below table gives a concise overview of common sustainable practices in construction as far as the Indian real estate business is concerned.

Table 1 Types of Sustainable Construction Practices

Category	Description
Energy-efficient building design	Use of passive design strategies, insulation, daylighting, and efficient HVAC systems to reduce operational energy (Darko & Chan, 2017).
Low-carbon and green materials	Adoption of fly ash bricks, recycled aggregates, bamboo, low-embodied-energy cement, and other eco-friendly materials (Saha et al., 2021).
Water-efficient strategies	Rainwater harvesting, low-flow fixtures, greywater recycling, and on-site wastewater treatment (NIUA, 2022).
Construction and demolition (C&D) waste management	Segregation, reuse, and recycling of C&D waste to minimize landfill burden (Eze et al., 2023).
Renewable energy integration	Use of rooftop solar PV, solar water heaters, and hybrid renewable systems in buildings.
Green building certifications	Adoption of IGBC, GRIHA, and LEED frameworks that guide holistic sustainable development practices (NIUA, 2022).

Although there is a distinct policy inducement in the form of the “Eco-Niwas Samhita 2024 policy on residential buildings and the Energy Conservation Building Code on commercial buildings”, uptake in cities, developers, and types of projects is still not uniform (Bureau of Energy Efficiency, 2024). It is always emphasized in the literature that despite sustainable practices being associated with long-term cost-saving measures, increased indoor comfort, regulatory benefits, and an increase in buyer preference, developers are confronted with financial, informational, and institutional barriers in their implementation (Darko and Chan, 2017; Saha et al., 2021). Fears of increased initial expenses, reduced supply of trained green professionals, disjointed supply chains of certified materials and poor implementation of building codes remain barriers to diffusion in the real estate industry in India.

Considering these issues, Indian bodies like the “National Institute of Urban Affairs (NIUA)” state that their solution should focus on enhancing the municipal abilities, integrating green standards



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into the building approval systems, and enhancing access to performance metrics and green finance (NIUA, 2022). The scholarly research also indicates that adoption can be affected by the combination of regulatory frameworks, cost-benefit perceptions, organizational commitment, market awareness, and technological readiness (Darko and Chan, 2017; Eze et al., 2023). Hence, the determinants of sustainable construction adoption are vital to learn in order to inform policy and development of evidence-based policy, strategic choices by developers, and catalyze transition India to a resource-efficient and low-carbon built environment.

2. REVIEW OF LITERATURE

Koul, P. & Ghatak, R. (2024)

In their study made it clear that because of the stiff environmental and social pressures, the real estate business is experiencing a shift towards being environmentally conscious and this is what is bringing a significant green shift. The analysis of the indicates that the “government policies and legislation, developer orientation and commitment, and green financing” were the top leading drivers regarding the green supply chain in the Indian real estate industry.

Perumandla, S. & Bhattacharyya, S. (2024)

In their research study, they sought to discuss a complex interaction among “technology, personal norms and emotional factors” in deciding the sustainable housing preference of millennials in the developing economies. One of the important findings of this study was the development of strong positive correlations between the awareness of consequences, the responsibility and personal norms with the behavioral intentions.

Khamis, W. (2024)

Examined the practices of sustainability that are prevalent, analyse the effect of sustainability on the performance of the firm, to understand the barriers to sustainability, and valuation of sustainability by customers. The results obtained after the study show that the demand in the market on sustainable buildings is the primary factor and vice versa the study also reveals some limitations.

Krishnamurthy, A. & Mahesh, G. (2024)

Was both to develop and to test conceptual framework of stimulating construction sector by optimising the market of housing in India. The findings obtained through the study indicate that there is high association between delivery of customer centric residential related estate and real-estate investment led construction sector.

Macherla, U. (2023)

Pointed out as the primary objective the inquiry of the meaning of sustainable construction by conducting two surveys using primary and secondary survey. The results obtained of the study reveal that the activities of green building have a favorable impact in the minimization of carbon footprints to the environment by the construction industry.

Nenavath, S. (2025)



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Explored the “drivers of a low-carbon practices in Green Supply Chain Management (GSCM) in the construction industry”. The results obtained with the help of the research show that the interaction between the organization culture and supply chain has a positive significant impact on the “adoption of low-carbon practices in Green Supply Chain Management”.

Jat, A. & Mane, P. (2018)

Cantered their study on the acceptance and willingness of the consumers to pay more on the products made of green building within the area of Delhi-NCR. The result of the research points out that the willingness of the consumers to pay a higher price to the green buildings is affected by the “green awareness, environmental attitude, social influence, and architectural factors significantly”.

3. OBJECTIVES OF THE STUDY

1. To evaluate Determinants Influencing the Adoption of Sustainable Construction Practices in the Indian Real Estate Sector
2. To provide practical suggestions that can help real estate developers enhance the adoption of sustainable construction practices.

4. HYPOTHESIS

H₁: Economic Feasibility has a statistically significant effect on the Adoption of Sustainable Construction Practices.

H₂: Environmental Awareness has a statistically significant effect on the Adoption of Sustainable Construction Practices.

H₃: Regulatory Support has a statistically significant effect on the Adoption of Sustainable Construction Practices.

5. RESEARCH METHODOLOGY

Table No: 2 Research Methodology

Aspect	Details
Sample Size	200 Real Estate Developers (minimum required: 173)
Effect Size	0.3
Statistical Power	0.9
Probability Level	0.05
Latent Variables	4
Observable Indicators	15
Sampling Method	Non-random purposive sampling
Data Sources	Primary and secondary data
Analytical Method	Structural Equation Modelling (SEM)
Analytical Tool	SMART-PLS software

The ethical considerations that were made during data collected adhered to the principles as described by Pirani (2024).



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6. STATISTICAL ANALYSIS AND RESULTS

Table No: 3 Reliability and validity

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Adoption of Sustainable Construction Practices (ASCP)	0.799	0.803	0.576
Economic Feasibility (EF)	0.846	0.846	0.582
Environmental Awareness(EA)	0.852	0.850	0.588
Regulatory Support (RS)	0.856	0.857	0.603

Source: Compiled from Primary Data

The findings of reliability and validity show that all the constructs employed in the research have high levels of internal consistency, as well as, acceptable convergent validity. The alpha values of Cronbach are between 0.799 and 0.856, which is higher than the recommended value of 0.70, which indicates reliable measures. All constructs also have composite reliability values of more than 0.80, which determines stable construct performance. Moreover, the AVE values measured are 0.576 to 0.603 which is higher than the required value of 0.50 to indicate that every construct explains over 50 percent of its indicators and which indicates a good convergent validity.

Table No: 4 Discriminant validity

Construct	ASCP	EF	EV	RS
Adoption of Sustainable Construction Practices	0.759			
Economic Feasibility	0.654	0.763		
Environmental Awareness	0.711	0.731	0.767	
Regulatory Support	0.734	0.709	0.739	0.776

Source: Compiled from Primary Data

According to the discriminant validity analysis, every construct is differentiated by the rest of them because the square root of AVE (the figures in the diagonal) is greater than the inter-construct correlations in the rows and columns. As an illustration, the ASCP construct scores 0.759 as compared to the correlations with EF (0.654), EA (0.711), and RS (0.734). The same is also the case with EF, EA, and RS, and it can be concluded that the measures of each construct represent a distinct dimension without any significant overlap. This substantiates the fact that there is good discriminant validity of the model in the sense that the constructs adopted in the research are theoretically and empirically different.



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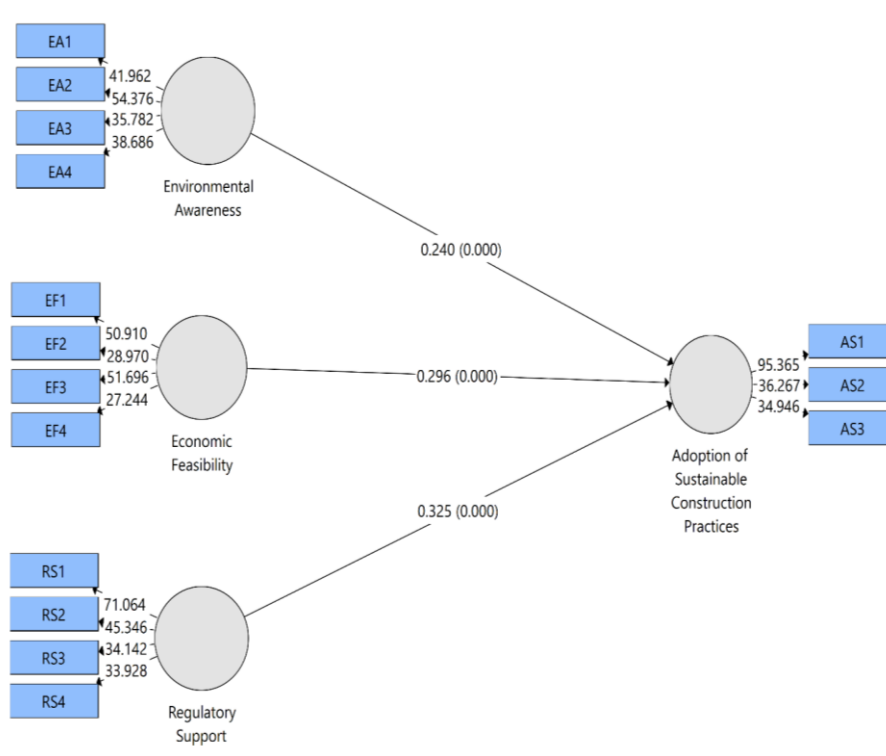


Figure No: 1 SEM model

Table No: 4 Hypothesis testing

Path	Beta Coefficient	T-statistics	P-Value
Economic Feasibility ? Adoption of Sustainable Construction Practices	0.296	5.170	0.000
Environmental Awareness? Adoption of Sustainable Construction Practices	0.240	4.729	0.000
Regulatory Support ? Adoption of Sustainable Construction Practices	0.325	5.663	0.000

Source: Compiled from Primary Data

The results of the hypothesis testing show that the three determinants Economic Feasibility, Environmental Awareness and Regulatory Support had significant positive effect on the Adoption of Sustainable Construction Practices. The beta coefficients of each path are high (between 0.240 and 0.325) and the t-statistics of each path exceed the critical value of 1.96 significantly, implying a p-value of 0.000, which is statistically significant. Regulatory Support has the highest effect as one of the predictors, with Economic Feasibility and Environmental Awareness ranking next.

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7. CONCLUSION

The study results have shown clearly that economic, environmental, and regulatory factors have major influence on the implementation of sustainable construction practices in the Indian real estate industry. One way developers are likely to adopt sustainable options is when they believe them to be cost-effective, environmentally useful and with a clear policy guidance. The beneficial effect of environmental awareness points to the fact that the higher the knowledge about the ecological effects, the more the ecological decisions made are environmentally friendly, whereas the powerful role played by the regulatory support implies that well-organized guidelines and institutional reinforcement can greatly contribute to the adoption rates. The findings, in general, demonstrate that the market feasibility, environmental responsibility, and regulatory frameworks cooperate and reinforce the idea that an integrated approach to facilitating sustainability in the sector is necessary.

8. SUGGESTIONS

- The developers can consider using the less expensive green products and technologies that can minimize the expenses in the long-term and promote sustainable buildings.
- They can organize awareness programs and training on how the teams can know about the environmental and business advantages of sustainable practices.
- Collaborating with government bodies can contribute to the developers keeping up with new policies, incentives and compliance requirements that can facilitate green construction.
- Real estate companies may incorporate sustainability objectives in the project design so that eco-friendly design and material are addressed at the early stages.
- Alliances with green-certification bodies and sustainability advisors can help guide the developers to focus on accepted practices and achieve recognised green building standards.

9. AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

10. CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

11. PLAGIARISM POLICY

All authors declare that any kind of violation of plagiarism, copyright and ethical matters will take care by all authors. Journal and editors are not liable for aforesaid matters.

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