CHAPTER 72

Green Construction: Legal Issues and Challenges

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ABSTRACT

Green construction refers to the philosophy and processes that minimize the built environment's negative impact on nature while promoting sustainability throughout a building's lifecycle. This study examines the legal challenges and regulatory frameworks associated with green construction in Pune, Maharashtra, India, focusing on compliance complexities, certification processes (LEED, IGBC, GRIHA), and contractual disputes. A qualitative research design was adopted, employing doctrinal and non-doctrinal methods, including interviews with five key industry experts and questionnaire-based surveys with 20 professionals, such as architects, engineers, and policymakers. The study identifies major legal challenges, including ambiguities in sustainability laws, high compliance costs, lack of streamlined certification procedures, and enforcement inconsistencies. Findings reveal that 72.7% of respondents cited high certification costs as a barrier, while 63.6% faced difficulties due to lack of expertise in green building regulations. Additionally, 77.3% stressed the need for simplified compliance processes, and 86.4% emphasized the necessity for clearer regulatory frameworks. Comparative insights from global best practices highlight the importance of government incentives, stricter legal enforcement, and public-private collaboration to improve sustainability adoption. The study recommends harmonized regulations, enhanced legal clarity, and targeted policy interventions to make green construction more accessible and legally feasible in Pune. By addressing these challenges, the research provides actionable recommendations to streamline green building compliance and accelerate sustainable urban development.

Keywords: Green construction; Certification processes; Legal framework; Regulatory challenges; Green building standards.

1.0 Introduction

Green construction integrates sustainability into the built environment by minimizing environmental impact, promoting energy efficiency, and ensuring resource conservation. The concept of green buildings has gained prominence in India since the establishment of the Indian Green Building Council (IGBC) in 2001, leading to increased adoption of sustainable construction practices (IGBC, n.d. 2025).

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"These buildings follow green rating systems such as LEED, IGBC, and GRIHA, which evaluate environmental performance based on energy efficiency, water conservation, material selection, and indoor air quality. The growth of green construction has been substantial, with numerous projects across residential, commercial, and industrial sectors" (World Economic Forum, 2024). Despite this progress, legal challenges remain a significant barrier to widespread adoption. Key issues include compliance complexities, certification disputes, regulatory ambiguities, and contractual conflicts related to sustainability requirements. Legal concerns also arise from disputes over third-party certification, discrepancies in energy efficiency claims, unfair competition allegations, and challenges in securing government incentives for green building initiatives (Build Your Future, n.d. 2025).

Furthermore, traditional contracts often lack provisions for green clauses, leading to legal uncertainties regarding sustainability obligations, maintenance responsibilities, and warranty claims for green technologies (U.S. Green Building Council, n.d. 2025). This study examines the legal aspects of green construction in Pune, India, focusing on regulatory frameworks, certification compliance, and contractual challenges. A comparative analysis with the United States, Germany, and Singapore provides insights into global best practices and their applicability to the Indian legal landscape. The scope of this study is limited to the legal aspects of green building certification, compliance challenges, and regulatory mechanisms in Pune. While a comparative review is included, the recommendations are specifically tailored to India's legal, environmental, and economic conditions. The paper is structured as follows: Section 2 presents a literature review, Section 3 outlines the research methodology, Section 4 discusses key findings, Section 5 provides policy recommendations, and Section 6 concludes with future research directions.

2.0 Legal Framework

2.1 Legal framework around green construction in India

Environment Protection Act (1986): This Act provides the legal foundation for environmental regulations, ensuring compliance with pollution control, energy efficiency, and sustainable resource management in construction. It mandates monitoring of air, water, and land pollution, ensuring that buildings integrate eco-friendly principles (Forest and Climate Change, 1986).

Energy Conservation Act (2001): The Act led to the establishment of the Bureau of Energy Efficiency (BEE) and introduced the Energy Conservation Building Code (ECBC). It promotes energy efficiency, optimized energy use, and renewable energy adoption, forming the legal basis for green building energy standards (EC Act, 2001). *National Building Code (NBC 2016), Part 11:* The NBC provides guidelines for sustainability, energy conservation, and eco-friendly building design. Part 11 focuses on natural ventilation, daylighting, and energy-efficient HVAC systems, influencing state and municipal building regulations (BISNBC, 2018).

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Energy Conservation Building Code (ECBC): Revised 2020: The ECBC establishes minimum energy efficiency requirements for commercial and residential buildings. It mandates efficiency in HVAC systems, lighting, water heating, and building envelope design, promoting low-energy designs (BEE-Buildings, 2020).

Environmental Impact Assessment (EIA) Notification (2006): This notification ensures environmental clearance for large-scale projects by assessing their impact on air, water, biodiversity, and land use. Developers must adopt sustainable construction practices to mitigate environmental risks (Ministry of Housing and Urban Affairs, Government of India, n.d. 2025).

Water (Prevention and Control of Pollution) Act (1974): This Act mandates wastewater treatment, rainwater harvesting, and sustainable drainage systems in construction. Compliance is essential for green building certification to reduce water wastage (Forest and Climate Change, 1986).

Air (Prevention and Control of Pollution) Act (1981): The Act enforces dust control measures, use of low-emission materials, and improved air circulation in construction projects. It supports indoor and outdoor air quality standards for sustainable buildings (Forest and Climate Change, 1986).

Solid Waste Management Rules (2016): These rules promote waste segregation, recycling, and reuse in construction projects. Green buildings must comply by adopting sustainable waste disposal methods to minimize landfill waste (BISNBC, 2018).

Construction and Demolition (C&D) Waste Management Rules (2016): These rules focus on construction debris recycling and sustainable waste management. Compliance requires prefabricated materials, waste reduction strategies, and eco-friendly disposal (BISNBC, 2018).

Occupational Safety, Health, and Working Conditions Code (2020) (OSH Code): The OSH Code ensures safe working conditions, health monitoring, and labor welfare at construction sites. It applies to contract, gig, and platform workers, ensuring better workplace standards (OSH Code, 2020).

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act (1996): This Act protects construction workers' rights, fair wages, and welfare Provisions such as sanitation, clean water, and medical benefits. Green buildings must adhere to these standards for compliance (OSH Code, 2020).

2.2 Legal concerns and obstacles

- Difficulties in obtaining third-party certifications, leading to disputes over unmet requirements and loss of associated benefits.
- Variations between actual and projected energy efficiency, resulting in legal claims over unfulfilled sustainability targets.
- Claims of unfair competition in the green construction sector due to misleading statements or improper endorsements.

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- Disputes over government incentives and financial aid, stemming from compliance issues with third-party certification.
- Inadequacies in traditional contracts, making it challenging to address the legal complexities of green building standards.
- Conflicts over sustainability and green clauses, arising from differing interpretations and enforcement in construction contracts.
- Liability concerns regarding maintenance and warranties, questioning the effectiveness of implemented green technologies.

These legal issues underscore gaps in policy enforcement, compliance challenges, and the urgent need for standardized legal frameworks to facilitate the seamless adoption of green construction practices in Pune and across India.

3.0 Literature Review

The study examines the evolution and global progress of green building technology, analyzing key growth factors such as policies, financial benefits, certifications, technology, and user behavior. It highlights adoption challenges in countries like the U.S., U.K., Japan, and China while emphasizing economic drivers, policy strength, and evaluation methods. By identifying research gaps, it provides insights for academic and industry professionals. (Zhang *et al.*. 2019) The study examines legal aspects of green building, including risks and liabilities for owners, design professionals, contractors, and tenants.

It highlights liability bases such as contract breaches, fraud, and negligence while recommending risk mitigation through clear communication, proper documentation, and compliance with standards. (Bowers, 2009) This study examines various rewards and incentives promoting green building design and construction. It identifies nine government-provided incentives, emphasizing their voluntary nature. While this limits large-scale adoption, many professionals utilize them. The paper suggests adjusting incentives at different project stages to enhance effectiveness. (Saka, 2021)

This study analyzes legal and contractual risks in sustainable construction, surveying 95 professionals in Turkey from July 2015 to January 2016. Using a questionnaire and cause-and-effect analysis, it identifies 18 risk factors in four categories, highlighting professional liability concerns and legal challenges in developing countries to raise industry awareness. (Mohammadi, 2016) This study uses text mining and natural language processing to analyze construction legal cases, identifying dispute causes and contractual issues. It presents a data-driven framework, revealing patterns in seven key dispute areas, including delays, liquidated damages, and payment notices. The research highlights the importance of contract understanding to prevent disputes and demonstrates the potential of AI-driven legal analysis.(Lee, 2021) This study examines challenges hindering green building adoption in India, identifying 20 key obstacles grouped into policy issues, financial difficulties, lack of awareness,

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and management problems. The biggest barrier is insufficient knowledge, with limited training and unclear eco-friendly material labeling. Weak policies, poor enforcement, and financial constraints further slow adoption. The research highlights the need for stronger policies, education initiatives, and financial incentives while addressing internal resistance and leadership gaps. A clear strategic framework is essential to enhance awareness, policy execution, and economic support for green construction.(Abraham, 2018)

This study examines factors influencing sustainable construction adoption in the U.S., highlighting energy conservation, indoor air quality, resource efficiency, and waste reduction as key drivers. Barriers include high costs, long payback periods, industry resistance, and lack of expertise, slowing green building adoption.(Ahn, 2013)

The study explores challenges in developing green homes in Malaysia, analyzing public acceptance and developer obstacles through case studies and interviews. Findings highlight uncertainties about acceptance and high costs as major hurdles. The research emphasizes the need for awareness and education to promote green housing adoption. (Alias, 2010) The study examines the growth of green building practices in India, emphasizing sustainability to reduce environmental harm and conserve resources. It highlights IGBC's role in promoting green construction but notes slow adoption due to high costs and low awareness. The research recommends public education and demand-driven strategies to accelerate growth (Singh, 2020)

The study explores green building from business and legal perspectives, highlighting environmental responsibility, cost savings, and market competitiveness as key drivers. It also examines legal risks like certification failures, regulatory challenges, and liability issues. To mitigate these risks, the research suggests strategies for legal compliance and smoother implementation of sustainability goals (Kelly, 2010)

The study examines the link between urbanization, industrialization, and environmental degradation in India, highlighting the government's efforts to promote sustainability through GRIHA, IGBC, and BEE. However, multiple regulations create confusion among stakeholders, leading to inconsistent implementation. The research emphasizes the need for strong local oversight and policy simplification to ensure energy-efficient and sustainable buildings. (Tiwari, 2023) The study examines barriers to green building adoption in India's commercial sector, categorizing them into economic, governmental, organizational, and technological factors. Key challenges include high costs, weak policy enforcement, lack of awareness, and material uncertainties. The research highlights the need for region-specific strategies to overcome these obstacles and promote sustainable construction. (Saha, 2021)

The study examines contractual and legal risks in green construction, highlighting disputes over ambiguous specifications, performance guarantees, and regulatory compliance. Financial risks, including high upfront costs and budget conflicts, further complicate adoption. Traditional dispute resolution may be inadequate for sustainability-related issues. The research recommends clear contracts, stakeholder education, and open communication to mitigate risks and ensure smoother project execution. (Riazi & Mohamad, 2022)

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This study examines legal and contractual challenges in green building projects, emphasizing gaps in sustainability clauses, performance standards, and environmental liabilities. Case studies show disputes arise from unclear certification requirements and financial liabilities. The research recommends contract standardization, legal training, and stronger regulations to improve clarity and reduce conflicts. (Chen *et al.*, 2021) This study explores government policies in green construction, focusing on regulatory incentives, financial subsidies, and compliance facilitation. While initiatives like tax rebates and expedited approvals promote sustainability, bureaucratic delays, inconsistent enforcement, and legal uncertainties hinder effectiveness. The research recommends streamlining approvals, strengthening legal support, and standardizing compliance frameworks to address these challenges. (Kumar & Williams. 2020)

4.0 Methodology

This study adopts a qualitative research design to explore the legal challenges in green construction. Purposive sampling was used to select participants with relevant expertise, including architects, engineers, consultants, developers, and environmental experts. Data collection involved five in-depth interviews with key industry professionals and a questionnaire-based survey administered to 20 professionals to gather both qualitative and quantitative insights on regulatory issues, certification processes, and legal concerns.

The questionnaire was structured with both closed-ended and open-ended questions, covering topics such as awareness of green building laws, certification challenges, compliance issues, and government policies. It was distributed through online surveys and direct interactions to ensure a diverse range of responses. A mixed-method approach was used for data collection, combining interviews for in-depth insights and surveys for statistical analysis. For data analysis, thematic analysis was applied to interview responses, identifying common legal and regulatory challenges, while survey responses were statistically analyzed to determine trends, percentages, and industry viewpoints. Data visualization techniques, such as bar charts and pie charts, were employed to present findings effectively, ensuring a comprehensive understanding of legal barriers in green construction projects in Pune.

5.0 Results and Discussion

Legal complexities in green construction stem from sustainability mandates, certification processes, environmental compliance, and unclear contractual responsibilities. While 45% of respondents reported no legal issues, 30% faced disputes, with 15% related to certifications and 10% to contractual conflicts. The biggest challenge, cited by 72.7%, is high costs, including certification fees and compliance expenses. Lack of expertise in green building regulations affects 63.6% of respondents, while 50% face regulatory hurdles due to complex approval processes and inconsistent guidelines. These challenges create legal and financial barriers for businesses seeking green certification.

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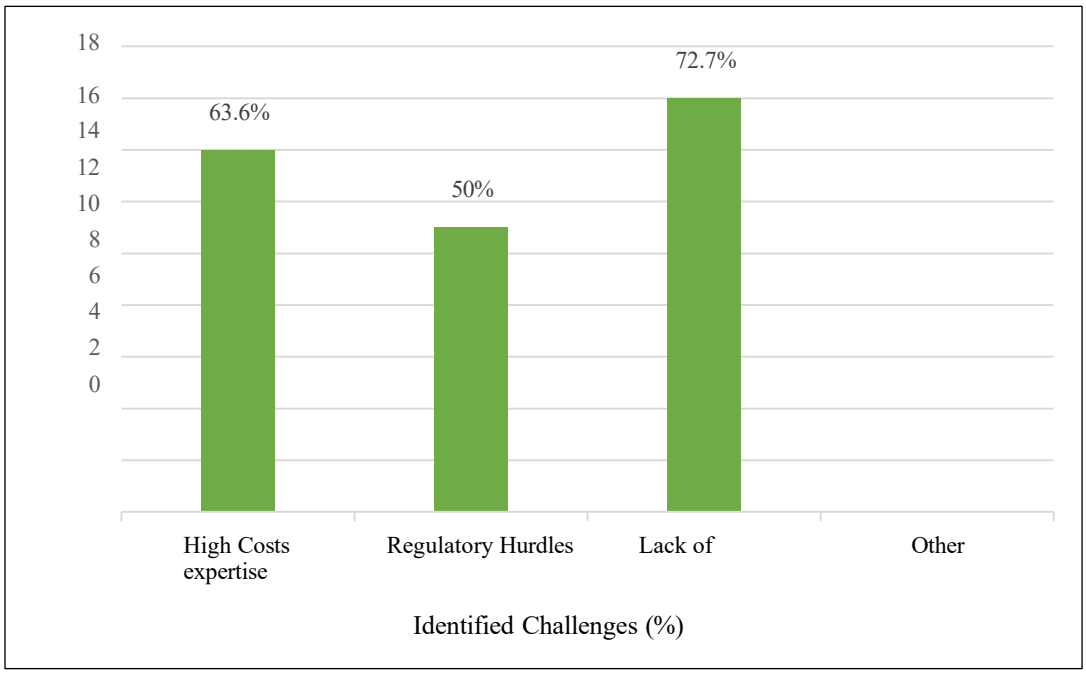
Figure 1: Identified Challenges in Green Building Certification



Delays and ambiguities in certification approvals for LEED, GRIHA, and IGBC were a major legal concern, with 15% of respondents facing compliance issues due to unclear or evolving standards. Some projects experienced rejections or delays despite following guidelines, while inconsistent interpretations of energy efficiency benchmarks led to disputes. Failure to meet sustainability targets post-certification also resulted in legal claims against developers. The biggest challenge, cited by 81.8%, is the lengthy review process, followed by complex compliance requirements (77.3%) and high certification costs (36.4%). A small 4.5% noted lack of support from authorities. These findings highlight the need for streamlined approvals, clearer guidelines, and financial incentives to facilitate green construction in Pune.

Contractual disputes are a major legal challenge in green construction, with 10% of respondents noting that contracts often lack clarity on compliance responsibilities, causing conflicts between developers, contractors, and certification agencies. Poorly drafted agreements due to legal professionals' limited expertise further complicate sustainability obligations. Performance guarantees also create disputes when energy savings or environmental targets are not met. Additionally, tenant-landlord conflicts over sustainability upgrade costs add to legal complexities. 81.8% of respondents believe green certifications increase contractual obligations, while 59.1% say they introduce new liabilities, and 54.5% find them complex to negotiate. These findings highlight the significant legal impact of green certifications on contracts.

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Figure 2: Identified Challenges Faced by Developers

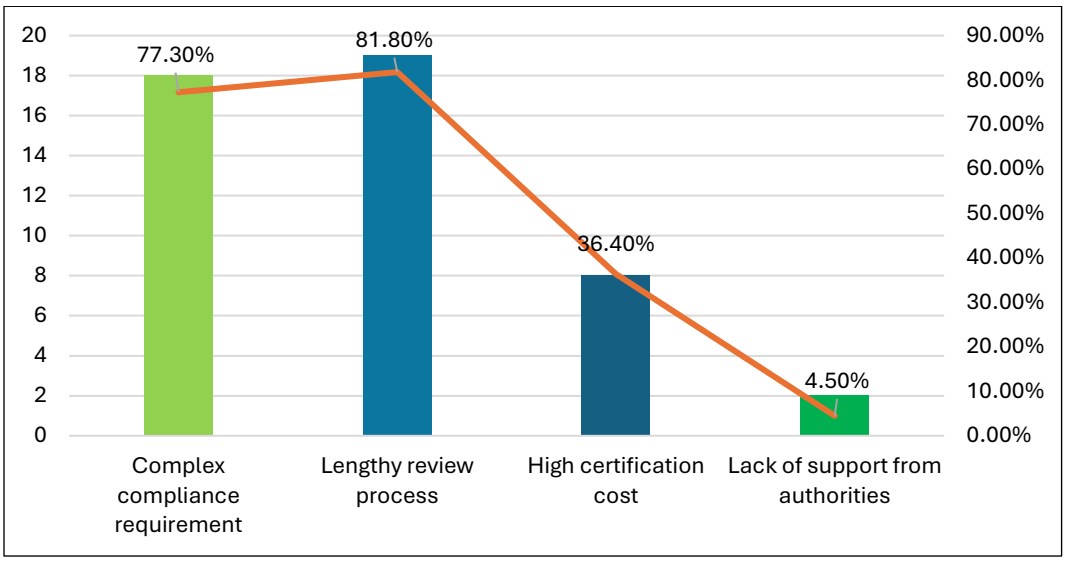
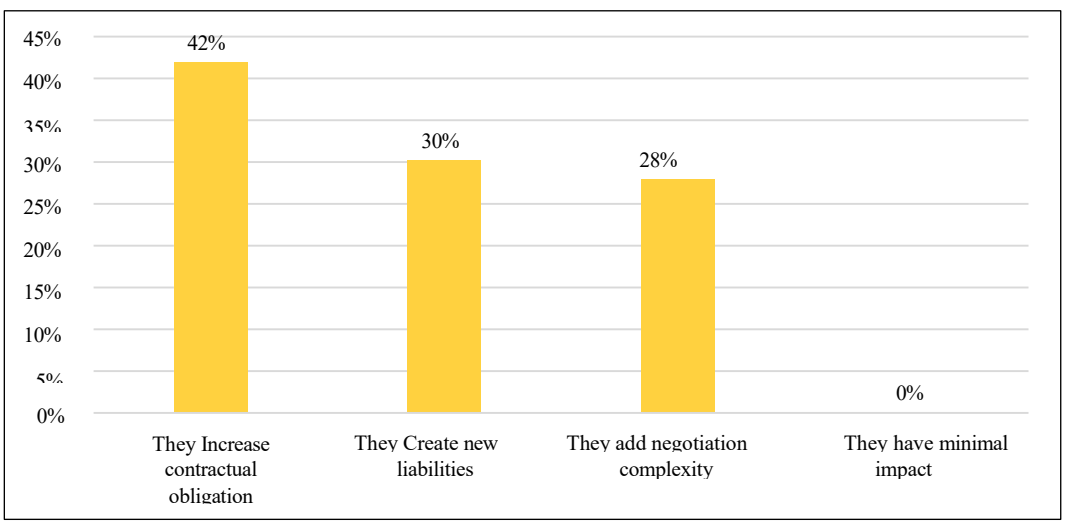


Figure 3: Impact of Green Building Certifications on Contractual Agreements



Government-issued tenders for green construction pose legal challenges for 10% of respondents, as outdated clauses and unclear compliance requirements create confusion regarding sustainability benchmarks, financial obligations, and legal responsibilities. Some contractors report that regulatory bodies lack technical expertise, leading to inconsistent

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approvals and arbitrary legal rulings. 50% of respondents find Pune's legal framework insufficient, while 45.5% believe it requires modifications, indicating weak enforcement. 86.4% support financial incentives as the most effective government intervention, followed by stricter regulations (54.5%) and expedited approvals (40.9%).

Figure 4: Preferred Government Interventions for Green Construction

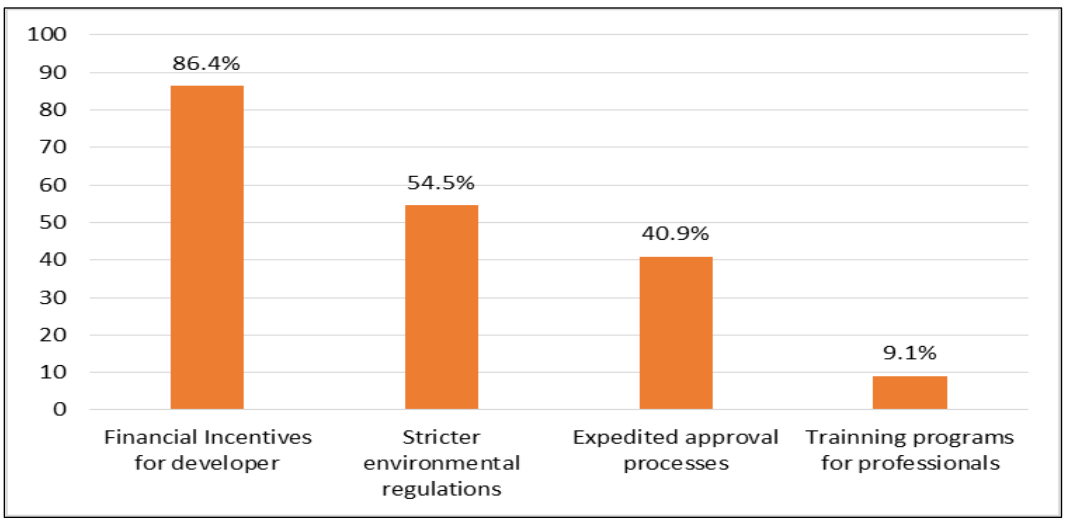
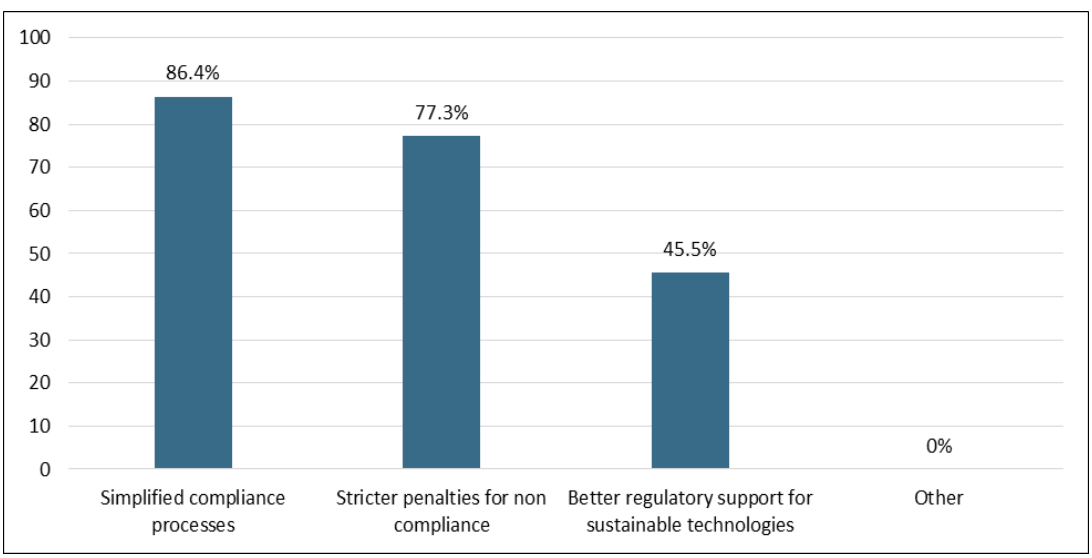


Figure 5: Preferred Legal Reforms for Green Construction in Pune



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Training programs (9.1%) were the least prioritized, emphasizing that financial and regulatory support are key to promoting green construction in Pune. Developers in Pune primarily integrate sustainable technologies by hiring legal experts (86.4%) to navigate compliance challenges and thoroughly reviewing contracts (63.6%) to ensure legal and sustainability obligations are met. However, only 9.1% favor collaborating with the government, indicating weak public-private engagement. The findings highlight the need for stronger cooperation with regulatory authorities to streamline legal compliance in sustainable construction.

6.0 Conclusion

This study highlights the legal and regulatory challenges in Pune's green construction sector, including certification hurdles, contractual disputes, regulatory inconsistencies, and financial barriers. Legal conflicts arise when developers fail to implement pre-certification recommendations, leading to disputes during final audits. Marketing properties based on pre-certification without achieving final certification also results in legal battles. Contractual issues, such as vague agreements and lack of legal expertise, further complicate sustainability commitments. Government-issued tenders often contain outdated clauses, creating compliance difficulties. Data analysis shows 86.4% of respondents support simplified compliance processes, 77.3% favor stricter penalties for non-compliance, and 45.5% advocate for stronger regulatory support for green technologies. The findings emphasize the need for clear legal frameworks, improved contract enforcement, and structured tendering processes. Government intervention through financial incentives, policy standardization, and stricter enforcement is essential for promoting green construction. A collaborative effort between developers and regulatory bodies is crucial to ensuring transparency and accountability in sustainable construction. By adopting best practices, enhancing compliance mechanisms, and strengthening regulatory enforcement, Pune can lead in sustainable urban development.

6.1 Recommendation

1. Simplify compliance processes: Regulatory bodies should streamline the approval mechanisms for green building certifications by reducing bureaucratic delays, ensuring consistency in assessment criteria, and providing clear guidelines to developers and contractors.
2. Enhance contract enforcement and legal clarity: Contracts should explicitly define sustainability obligations to prevent disputes. Legal professionals involved in drafting agreements should have specialized knowledge of green construction laws to ensure enforceability and clarity.
3. Improve accountability in certification processes: Developers must be held responsible for meeting sustainability commitments made during the pre-certification stage. Legal

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provisions should protect buyers and investors in cases where final certification is not achieved.

4. Introduce financial incentives: The government should provide tax benefits, subsidies, and low-interest loans to offset the high initial costs of sustainable materials and certification fees, encouraging wider adoption of green construction.
5. Expedite approval processes: Fast-track clearances should be introduced for projects that meet predefined green criteria, incentivizing developers to integrate sustainability from the early stages.
6. Revise tendering practices for public projects: Government agencies should develop structured frameworks for drafting tenders specific to green construction, ensuring updated, project-specific requirements rather than relying on outdated templates.
7. Promote legal awareness and capacity building: Training programs, workshops, and awareness campaigns should be conducted by government agencies, certification bodies, and professional organizations to educate stakeholders about evolving green building regulations and best practices.
8. Strengthen collaboration between regulators and industry professionals: Improved coordination between policymakers, developers, and certification bodies can bridge gaps in policy implementation and regulatory compliance.
9. Mandate independent compliance audits: Regular sustainability audits should be conducted at different stages of construction to verify adherence to green building standards and prevent legal conflicts.
10. Implement stricter penalties for non-compliance: Developers failing to meet sustainability benchmarks after obtaining pre-certification should face legal consequences, ensuring greater accountability in the green construction sector.

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