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Sustainable Construction Materials Under the Kenya Building Regulations 2024: *A Critical Review*

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Abstract

The construction sector is vital to Kenya's economy but contributes to environmental degradation through resource-intensive conventional materials. With rapid urbanization intensifying demand, sustainable materials such as bamboo, compressed earth blocks and recycled composites offer pathways to reduce emissions and resource use. The Kenya Building Regulations 2024 (KBR 2024) mark a shift towards performance-based standards and sustainability. This study critically evaluates KBR 2024's capacity to foster sustainable material adoption through policy analysis and comparative case studies involving South Africa, India and Rwanda. Results reveal that KBR 2024 enables innovation through alternative material approval pathways and acknowledges local materials. However, gaps persist in sustainability criteria, standards for indigenous materials, county-level testing and enforcement capacity, and incentives for sustainable materials. The study concludes that KBR 2024 is progressive but requires further refinement. It recommends developing standards for local materials, integrating measurable environmental performance criteria, decentralizing testing capacity and establishing incentives for sustainable material adoption.

Keywords: Sustainable construction materials, Kenya Building Regulations 2024, life-cycle assessment, regulatory governance, alternative materials, indigenous materials, green building policy, sustainable building codes

INTRODUCTION

The construction industry is a critical driver of economic development in Kenya, contributing approximately 7.2% to the national GDP as of 2023 and employing hundreds of thousands directly and indirectly (Kenya National Bureau of Statistics [KNBS], 2023). However, this growth has come at an environmental cost. The sector accounts for substantial material resource use, energy consumption, and greenhouse gas (GHG) emissions—much of it linked to the manufacture and use of conventional construction materials such as cement, steel, and fired clay bricks.

As Kenya continues to urbanize rapidly—with projections indicating that over 50% of the population will reside in urban areas by 2050 (United Nations-Habitat [UN-Habitat], 2019)—the pressure on construction inputs is expected to intensify. This underscores the urgent need for sustainable construction practices that reduce environmental harm while supporting economic and social development. Sustainable construction materials, defined broadly as those with low environmental impact across their life cycle, are central to this effort. These include materials that are renewable (e.g., bamboo, timber), locally sourced (e.g., stabilized soil blocks), recycled (e.g., crushed concrete), or low-carbon (e.g., pozzolana cement blends).

Globally, regulatory frameworks have been instrumental in guiding the construction industry towards sustainable material use. Countries such as South Africa, India, and members of the European Union have adopted codes or rating systems that integrate environmental performance indicators, promote innovation in material use, and discourage unsustainable building practices. For example, the South African National Building Regulations include energy efficiency and material performance guidelines aligned with their National Climate Change Response Strategy (Department of Environmental Affairs, 2011).

In Kenya, however, the regulatory landscape has historically lagged behind these developments. The previous code—largely based on the British Standard

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system and dating back to the 1968 Building Code—offered limited guidance on sustainability or material innovation. This regulatory gap has stifled the adoption of environmentally responsible materials, particularly among small- and medium-scale developers who rely heavily on prescribed standards for compliance.

The Kenya Building Regulations 2024 (KBR 2024) mark a significant policy shift. Developed under the oversight of the State Department for Housing and Urban Development, the revised regulations aim to modernize the built environment sector in alignment with national development agendas such as Kenya Vision 2030 and the National Climate Change Action Plan (NCCAP) 2018–2022. KBR 2024 introduces language that explicitly addresses environmental sustainability in construction, including provisions related to energy efficiency, material performance, and waste reduction.

However, the extent to which KBR 2024 meaningfully supports the use of sustainable construction materials remains to be critically examined. Among the issues to be interrogated are whether the new regulations offer clear technical guidance for assessing material sustainability, whether indigenous and alternative materials are appropriately accommodated, and whether compliance and enforcement mechanisms support innovation and local material ecosystems.

This paper aims to fill that analytical gap by critically reviewing the material-related provisions of KBR 2024 through the lens of sustainability. Drawing on policy documents and comparative case studies, it evaluates the regulations' effectiveness in fostering the use of sustainable materials and highlights areas for improvement. Special attention is given to the regulatory treatment of locally available green materials such as compressed stabilized earth blocks (CSEBs), interlocking bricks, and bamboo, which are seen by some to hold promise for low-cost, low-carbon construction in Kenya's informal and rural settings.

The specific objectives of the paper are to:

i. Examine the provisions of the Kenya Building Regulations 2024 relating to sustainable construction materials.
ii. Assess the extent to which the regulations accommodate indigenous, alternative and environmentally sustainable construction materials.
iii. Evaluate the regulatory and institutional challenges affecting the adoption and implementation of sustainable construction materials in Kenya.
iv. Compare Kenya's regulatory approach with selected international practices and identify lessons for strengthening sustainable material regulation.

Ultimately, this paper argues that while KBR 2024 represents an important step forward, the transition to truly sustainable material use will require more robust regulatory support, including performance-based standards, incentives for material innovation, and the integration of life-cycle assessment (LCA) methodologies. The Kenyan experience can also offer valuable lessons for other rapidly urbanizing countries in Africa and elsewhere striving to build greener and more resilient built environments.

THEORY

The Global Push for Sustainable Construction Materials

The construction industry is at the center of global climate action efforts due to its heavy reliance on materials that are energy-intensive and carbon-emitting. Cement alone is estimated to contribute nearly 8% of global CO_2 emissions (IEA, 2022). This has led to an intensified search for alternative materials that reduce environmental impact without compromising performance.

Sustainable construction materials are broadly defined as those that minimize negative environmental impacts across their life cycle—from extraction and processing to use and disposal. They are often categorized into renewable or rapidly replenishing materials such as bamboo and timber from sustainable forests; recycled and recyclable materials such as fly ash and crushed concrete; locally available materials with low embodied energy such as earth blocks and natural stone; and industrial by-products such as pozzolans, slag and rice husk ash.

In recent years, Life Cycle Assessment (LCA) has become an important approach for evaluating the environmental performance of building materials, considering metrics such as embodied carbon, energy use, water consumption and end-of-life recyclability (Cabeza et al., 2014). Countries with advanced regulatory environments increasingly incorporate such environmental performance considerations into building codes or green certification systems such as LEED, BREEAM and EDGE.

Sustainability and Regulation: A Conceptual Nexus

Regulations act as crucial enablers—or barriers—in the transition toward sustainable building practices. From a policy theory perspective, regulations serve to internalize externalities by requiring or incentivizing actors to consider the broader social and environmental impacts of their decisions (Stavins, 2001).

Building regulations, in particular, are central to shaping material use because they define what materials are approved or restricted, influence design decisions

through performance or prescriptive standards, and standardize testing, certification and compliance mechanisms.

There are two primary regulatory approaches. Prescriptive codes specify particular materials or construction methods and can consequently constrain innovation. Performance-based codes specify the performance required but provide flexibility in how that performance is achieved, potentially supporting sustainable construction practices.

The transition from prescriptive to performance-based regulation has been a feature of regulatory reforms in countries such as Australia, Singapore and South Africa, where building codes increasingly incorporate sustainability indicators and material-efficiency considerations (Meacham, 2010). In developing countries, however, building codes may remain outdated, restrictive or poorly aligned with local contexts, potentially hindering the use of indigenous or innovative green materials. The broad outlook of such codes may also place greater emphasis on individual rather than societal agency (Kamweru, 2023).

The Kenyan Policy and Regulatory Context

Kenya's construction sector operates within a regulatory environment historically influenced by British colonial codes, with limited emphasis on environmental sustainability or material innovation. Until recently, the 1968 Building Code remained the reference standard, with amendments failing to integrate evolving priorities such as climate change, resource efficiency or informal sector inclusion.

Recent policy shifts, however, signal change. Key frameworks include the National Climate Change Action Plan (2018–2022), the Green Economy Strategy and Implementation Plan (2016–2030), and the Affordable Housing Programme. These frameworks have increasingly highlighted the need for a sustainable and inclusive built environment.

In this context, the Kenya Building Regulations 2024 (KBR 2024) seek to modernize the regulatory framework, with aspirations to reflect sustainability concerns, broaden material acceptability and promote efficiency. The question remains whether KBR 2024 has substantively internalized sustainability principles and whether it enables the use of alternative materials in a technically, economically and administratively viable manner.

Theoretical and Analytical Framework

This study employs a regulatory governance lens to analyse the Kenya Building Regulations 2024. Regulatory governance provides a basis for examining not only the formal provisions contained within regulations but also the institutional arrangements and implementation mechanisms through which regulatory objectives are pursued.

The framework considers five dimensions:

i. Normative content, including the language and provisions used to promote sustainability;
ii. Institutional mechanisms, including standards bodies and testing institutions;
iii. Material scope, particularly the sustainable, indigenous and alternative materials supported or excluded;
iv. Implementation structures, including county government enforcement and institutional capacity; and
v. Comparative benchmarking with selected international jurisdictions.

Applying these dimensions enables the study to examine how well KBR 2024 aligns with contemporary sustainability principles in construction and whether it provides a feasible pathway for scaling up sustainable construction materials in Kenya. These dimensions also provide the analytical basis for reviewing the regulations and organising the subsequent findings.

Conceptual and Analytical Framework

The study adopts a regulatory governance perspective to examine how the Kenya Building Regulations 2024 support the adoption of sustainable construction materials. The framework recognizes that the effectiveness of building regulations depends not only on their stated provisions but also on the institutional and implementation mechanisms through which those provisions are translated into practice.

The analysis is structured around five interrelated dimensions: normative content, institutional mechanisms, material scope, implementation structures and comparative benchmarking. Normative content considers the extent to which sustainability principles and requirements are incorporated into the regulations. Institutional mechanisms examine the roles of regulatory, standards and testing institutions in supporting sustainable material use. Material scope assesses the recognition and treatment of conventional, alternative, indigenous and innovative construction materials. Implementation structures consider enforcement capacity, testing infrastructure, professional competence and county-level implementation. Comparative benchmarking examines Kenya's approach against selected international regulatory systems.

Together, these dimensions provide the basis for assessing whether KBR 2024 moves beyond recognition of sustainability towards an enabling and enforceable regulatory environment for sustainable construction

materials. **Figure 1** presents the conceptual and analytical framework used to assess the capacity of KBR 2024 to support the adoption of sustainable construction materials.

RESEARCH METHODS

Research Design

The study adopted a qualitative documentary review and comparative policy analysis design to critically examine the Kenya Building Regulations 2024 (KBR 2024) in relation to sustainable construction materials. This approach was appropriate because the study sought to examine the content, scope and implementation implications of the regulations rather than measure construction-material performance experimentally. The analysis focused particularly on provisions concerning material selection, sustainability, performance requirements, testing, certification and regulatory implementation.

Document Selection and Sources

The Kenya Building Regulations 2024 constituted the principal document for analysis. Supporting documents included relevant national policies, regulatory and standards documents, institutional reports and published literature on sustainable construction materials and building regulation. These sources provided the broader policy and regulatory context within which KBR 2024 was assessed.

Documents were selected on the basis of their relevance to sustainable construction materials, building regulation, environmental performance, alternative and indigenous materials, material testing and certification, and implementation of building standards. Academic literature was used to support the interpretation of regulatory provisions and establish the wider sustainability and regulatory context.

Comparative Analysis

A comparative analysis was undertaken using selected regulatory approaches from South Africa, India and Rwanda. These cases were selected because they provide relevant experiences in integrating sustainability considerations, alternative materials, environmental performance requirements and material certification into building regulation or green building systems. Rwanda was particularly relevant because of its regional and development context, while South Africa and India provided examples of more established regulatory and certification approaches.

The comparison did not seek to rank the countries but to identify regulatory approaches and practices that could provide lessons relevant to the Kenyan context.

Data Analysis

The documents were analysed qualitatively using the conceptual and analytical framework developed for the study. Five dimensions guided the analysis:

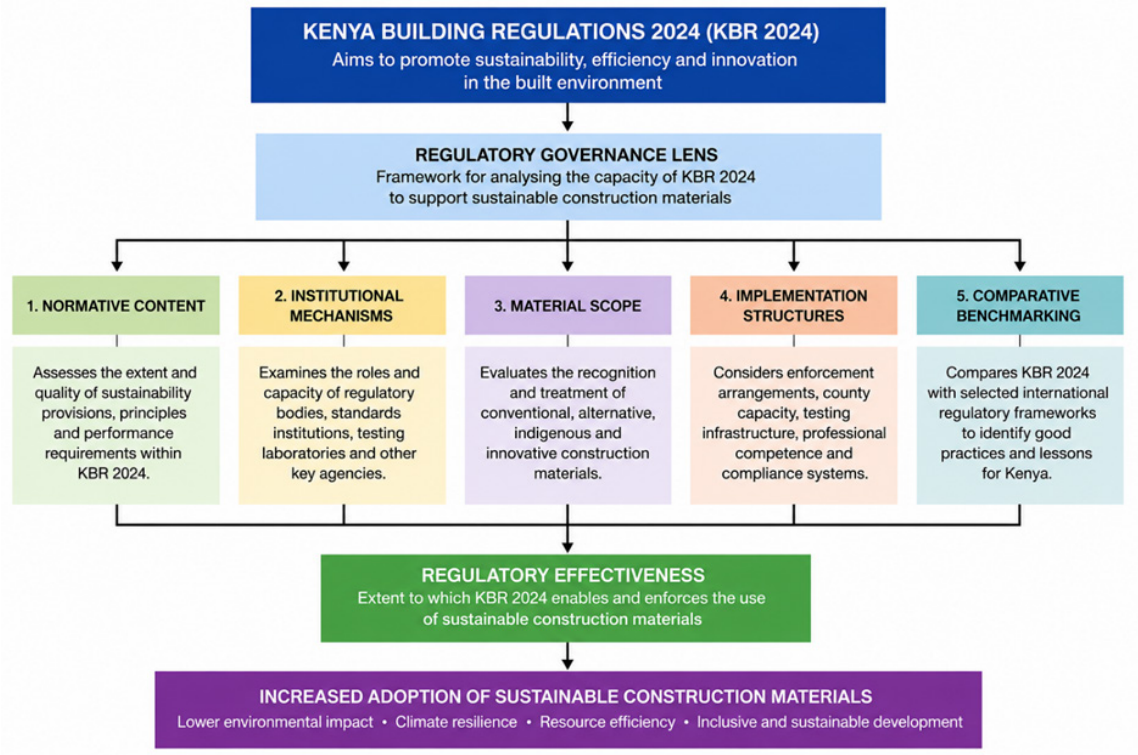


FIGURE 1
Conceptual and analytical framework for assessing sustainable construction materials under KBR 2024
Source: Author (2026), adapted from Stavins (2001) and Meacham (2010).

normative content, institutional mechanisms, material scope, implementation structures and comparative benchmarking. These dimensions were already established in the manuscript as the basis for assessing KBR 2024.

Normative content examined how sustainability was expressed within the regulations; institutional mechanisms considered the roles of standards, regulatory and testing institutions; material scope examined the treatment of sustainable, indigenous and alternative materials; implementation structures considered enforcement and institutional capacity; and comparative benchmarking assessed Kenya's regulatory approach against the selected international cases.

Findings from these dimensions were synthesized to identify the strengths, gaps and opportunities within KBR 2024 and to assess its capacity to support increased adoption of sustainable construction materials. The analysis subsequently informed the policy and practice recommendations presented in the study.

Scope and Limitations

The study was limited to documentary and comparative analysis and did not undertake laboratory testing of construction materials or primary empirical investigation of regulatory implementation. Consequently, conclusions regarding implementation capacity and institutional challenges are based on the documentary evidence examined and should be interpreted within this scope. Future empirical research could examine how KBR 2024 is implemented across counties and how developers, professionals and regulatory institutions experience its sustainable material provisions.

RESULTS

The documentary analysis of the Kenya Building Regulations 2024 (KBR 2024) revealed both advances and continuing gaps in the regulatory treatment of sustainable construction materials. The findings are presented according to the main areas examined in the study: regulatory provisions for sustainable materials, accommodation of indigenous and alternative materials, institutional and implementation arrangements, and comparative regulatory performance.

Sustainable Material Provisions in KBR 2024

The analysis established that KBR 2024 represents a shift from the largely prescriptive orientation of the previous building regulatory framework towards a more performance-based approach. The regulations allow greater flexibility in design and material selection, provided that required functional and safety outcomes can be demonstrated through recognised testing and certification.

The material-related provisions require certification and testing through approved laboratories and adherence to applicable Kenya Standards developed by the Kenya Bureau of Standards (KEBS). They also provide for the use of innovative materials subject to performance verification. The regulations therefore create regulatory space for materials that may not have been adequately accommodated under the previous prescriptive framework.

The review further found that sustainability is incorporated through provisions concerning environmental impact, energy and thermal performance, construction waste reduction and the use of environmentally responsible materials. However, these provisions remain broad in several areas. The regulations do not establish explicit Life Cycle Assessment (LCA) requirements, embodied carbon thresholds or comprehensive quantitative benchmarks for determining material sustainability.

Accommodation of Indigenous and Alternative Materials

The analysis found that KBR 2024 provides opportunities for the use of alternative and locally available materials through performance validation pathways. Materials considered within this context include compressed stabilized earth blocks (CSEBs), interlocking soil blocks, bamboo, pozzolanic materials and agricultural by-products such as rice husks and bagasse ash.

Although the regulations create space for these materials, the review identified limitations in their testing, grading and certification. The absence of sufficiently developed standards for some alternative materials may constrain their mainstream adoption, particularly where developers and community-based builders have limited access to accredited testing facilities. The regulatory language also provides limited distinction between traditional materials, indigenous construction knowledge and industrially produced green materials.

Institutional and Implementation Findings

The analysis identified institutional capacity as an important factor affecting the ability of KBR 2024 to support sustainable material adoption. Implementation involves several institutions, including county governments, the National Construction Authority (NCA), KEBS and built-environment professional bodies.

The review identified limitations relating to materials testing infrastructure, professional capacity, approval procedures and institutional coordination. Testing and certification capacity is particularly important under a performance-based regulatory system because

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innovative and non-standard materials require verification before approval. The findings therefore indicate that the effectiveness of the alternative-material pathway depends on institutional capacity to test, certify and approve such materials.

Fragmentation of responsibilities among national regulatory institutions and county governments may also create uncertainty in the approval of new materials. These institutional issues potentially limit the practical benefits expected from the transition towards performance-based regulation.

Comparative Findings

Comparative analysis showed differences between Kenya and the selected international approaches. South Africa provides a more developed system of energy-efficiency requirements and national standards; India combines technical standards with the Green Rating for Integrated Habitat Assessment (GRIHA); while Rwanda provides a regional example of minimum green-building compliance requirements. The comparison suggests that Kenya has created regulatory space for sustainable materials but has fewer measurable environmental performance requirements and supporting mechanisms.

South Africa's framework, in particular, provides a useful comparison because its standards combine building performance requirements with established testing and certification arrangements. India demonstrates the potential role of material standards and green-building assessment systems, while Rwanda illustrates how sustainability requirements can be incorporated within an African regulatory setting. The author's comparative material supports these distinctions. **Table 1** summarises the comparative findings between Kenya's KBR 2024 and South Africa's regulatory framework across key dimensions of sustainable material integration.

DISCUSSION

Regulatory Shift towards Sustainable and Performance-Based Construction

The findings indicate that KBR 2024 represents an important transition from Kenya's historically prescriptive building regulatory system towards a more performance-based approach. By allowing flexibility in material selection where functional and safety requirements can be demonstrated, the regulations create greater scope for innovation and the introduction of sustainable construction materials. This supports Meacham's (2010) observation that performance-based regulation can facilitate innovation by focusing on required outcomes rather than prescribing particular materials or construction methods.

From a regulatory governance perspective, however, recognition of sustainability within a regulation does not necessarily guarantee sustainable outcomes. Stavins (2001) argues that regulation can address environmental externalities by influencing the behaviour and choices of actors. For KBR 2024, this requires sustainability provisions that are sufficiently clear and measurable to influence material-selection decisions. The findings

TABLE 1

Comparative analysis of building regulations and sustainable material integration in Kenya and South Africa

Feature	Kenya (KBR 2024)	South Africa (SANS 10400 & SABS)
Inclusion of sustainability in code	Included in broad terms	Included through defined performance requirements
Treatment of alternative materials	Permitted through perfor-mance-based pathways	Supported through testing and applicable standards
Standardisation of indigenous materials	Limited; some standards remain underdeveloped	Supported through testing and technical guidance
Use of environmental metrics	Limited; lacks embodied carbon and LCA requirements	Includes thermal and energy-efficiency requirements
Building material rating system	Absent	Indirectly supported through voluntary Green Star SA certification
Testing and certification infrastructure	Limited and relatively centralised	Established through SABS and related institutions
Focus on affordability and local context	Moderate; some recognition of local materials	Moderate; balanced against performance requirements
Institutional coordination	Distributed among NCA, KEBS and county governments	More centralised regulatory structure

Source: Author's analysis based on Kenya Building Regulations 2024 and South African regulatory and standards frameworks.

show that although sustainability is recognised, several provisions remain broad and lack measurable thresholds. The absence of explicit embodied carbon limits, Life Cycle Assessment (LCA) requirements and Environmental Product Declarations (EPDs) therefore weakens the transition from regulatory intent to measurable environmental performance.

This finding also relates to Cabeza et al. (2014), who demonstrate the value of life-cycle approaches in assessing the environmental performance of buildings and construction materials. Incorporating such approaches would enable KBR 2024 to move beyond general descriptions of environmentally responsible materials towards more objective assessment of their environmental performance.

Indigenous and Alternative Materials: Recognition versus Mainstream Adoption

The findings further demonstrate that KBR 2024 creates regulatory space for indigenous, alternative and locally available materials through performance-validation pathways. This represents progress because prescriptive regulatory systems can restrict materials that do not conform to conventional specifications. The finding observes that restrictive or poorly adapted building regulations can inhibit the adoption of indigenous and innovative construction approaches, particularly in developing-country contexts.

However, regulatory permission alone does not ensure mainstream adoption. Materials such as compressed stabilized earth blocks, bamboo, interlocking soil blocks and pozzolanic products require appropriate testing, grading and certification systems before they can compete effectively with conventional materials. The findings therefore reveal a gap between regulatory recognition and the supporting technical infrastructure required for implementation.

This is particularly relevant to Kenya's rural and informal construction contexts, where locally sourced materials may provide affordable and environmentally responsive alternatives but where builders may have limited access to formal testing and certification systems. As discussed by Kamweru (2023), regulatory systems need to consider the wider societal context within which compliance occurs. Sustainable material regulation should therefore accommodate not only technologically advanced green products but also locally established material practices that can satisfy appropriate performance and safety requirements.

Institutional Capacity and Regulatory Implementation

The findings show that the effectiveness of KBR 2024 depends considerably on the institutional arrangements supporting its implementation. Performance-based regulation places greater responsibility on testing, certification and approval institutions because compliance must be demonstrated rather than achieved simply by following prescribed material specifications. This means that regulatory flexibility must be accompanied by adequate institutional capacity.

The identified limitations in testing infrastructure, professional capacity, approval procedures and institutional coordination consequently present an important implementation challenge. This reinforces the regulatory governance perspective adopted in the conceptual framework, which treats institutional mechanisms and implementation structures as integral to regulatory effectiveness rather than separate administrative concerns.

The findings further suggest that implementation at county level requires particular attention. Where testing and certification services are difficult to access, the costs associated with validating alternative materials may discourage their adoption. This could inadvertently favour established conventional materials, even where the regulations formally permit sustainable alternatives. The performance-based orientation of KBR 2024 must therefore be supported by accessible testing, clear approval procedures and adequate professional knowledge if its sustainability objectives are to be realised.

Kenya in Comparative Perspective

The comparative findings demonstrate that Kenya's regulatory approach shares some characteristics with international efforts to integrate sustainability into building regulation but remains less developed in measurable environmental requirements and supporting systems. South Africa provides a useful example of combining building performance requirements with established standards and certification structures (South African Bureau of Standards [SABS], 2011), while India's GRIHA system demonstrates how material selection, resource efficiency and environmental assessment can be incorporated into a broader green-building framework (GRIHA Council, n.d.). Rwanda provides a particularly relevant regional comparison because it demonstrates the incorporation of minimum green-building requirements within an African development context (Republic of Rwanda, 2019).

These comparisons should not imply that international systems can be transferred directly into Kenya. Differences in institutional capacity, construction markets, material availability and regulatory structures require contextual adaptation. Nevertheless, the comparison reinforces the argument that performance-based regulation works most effectively when accompanied by clear standards, measurable criteria,

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testing capacity and institutional coordination.

The comparative results therefore suggest that KBR 2024 provides an important regulatory foundation but requires stronger supporting mechanisms if sustainable materials are to move from permitted alternatives to mainstream construction options. This interpretation is consistent with the theoretical proposition that regulatory effectiveness depends both on the content of regulation and on the institutional environment through which regulatory requirements are implemented.

SWOT Synthesis of KBR 2024

The preceding discussion can be synthesised through a SWOT analysis of KBR 2024's treatment of sustainable construction materials. The analysis brings together the regulatory strengths and weaknesses identified in the findings while highlighting opportunities for strengthening implementation and potential threats to effective sustainable material adoption (**Table 2**).

CONCLUSION

The Kenya Building Regulations 2024 (KBR 2024) mark an important regulatory milestone for the country's construction sector, offering a long-overdue update to the previous building code and introducing greater recognition of sustainability imperatives. As Kenya confronts the intersecting challenges of rapid urbanization, climate vulnerability and housing demand, the role of regulation in guiding sustainable construction material use has become increasingly important.

This paper critically examined the material-related provisions of KBR 2024 through the lens of sustainable construction and regulatory governance. The analysis reveals that while the regulations make important progress towards environmental responsibility—particularly through the adoption of a performance-based framework and accommodation of alternative materials—their sustainability provisions remain broad in several areas and lack the technical depth, measurable criteria and institutional support required for effective implementation.

The study identified gaps in material standardization, the absence of explicit life-cycle assessment and embodied carbon requirements, limited integration of indigenous and informal-sector materials, and constraints in county-level testing, certification and implementation capacity. At the same time, KBR 2024 creates opportunities for the development of Kenya Standards for sustainable materials, expansion of testing infrastructure and greater collaboration among government, academia, industry and local material producers.

TABLE 2

SWOT analysis of KBR 2024 in relation to sustainable construction materials

Strengths	Weaknesses
Explicit recognition of environmental sustainability in material use	Lack of specific performance metrics, including embodied carbon and LCA
Introduction of performance-based provisions	Broad sustainability language limits enforceability
Alternative-material pathways support innovation	Limited standards for green and indigenous materials
Alignment with national sustainability policy objectives	Testing and certification capacity remains constrained
Creates space for CSEBs, bamboo and pozzolanic materials	Limited integration of traditional knowledge and informal-sector practices
Opportunities	Threats
Development of Kenya Standards for local and green materials	Bureaucratic approval processes may discourage innovation
Collaboration among academia, industry and counties	Weak implementation capacity at devolved levels
Integration of LCA and EPD requirements in future revisions	Excessive reliance on international standards may constrain local innovation
Professional capacity-building in sustainable construction	Sustainable materials may remain inaccessible to smaller developers
Positioning Kenya as a regional leader in green building regulation	Without incentives, developers may continue using conventional materials

Source: Author's synthesis based on the documentary and comparative analysis (2026)

Comparative analysis with South Africa, India and Rwanda demonstrates that performance-based regulation can provide greater opportunities for sustainable material adoption when supported by clear technical standards, measurable environmental requirements and adequate institutional capacity. Kenya can draw lessons from these experiences while adapting regulatory approaches to its own construction practices, material resources and institutional context.

Overall, KBR 2024 provides an important foundation for advancing low-carbon, resource-efficient and locally appropriate construction in Kenya. Its effectiveness will, however, depend on moving from broad sustainability aspirations towards measurable requirements, accessible compliance mechanisms and stronger implementation capacity.

From an academic perspective, the paper contributes to the growing literature on regulatory frameworks and sustainability transitions in the built environment, particularly within rapidly urbanizing economies in the Global South. Future research could develop localized life-cycle inventories, empirically evaluate the performance and affordability of sustainable materials under Kenyan climatic and economic conditions, and examine the implementation of KBR 2024 across different counties and construction contexts.

RECOMMENDATIONS

Based on the findings and discussion, the study makes the following recommendations:

Develop national standards for sustainable and indigenous materials. KEBS should fast-track the development and expansion of Kenya Standards for priority materials such as compressed stabilized earth blocks (CSEBs), bamboo, pozzolanic products and interlocking blocks. Standards development should involve academia, industry, professional bodies and county governments and should draw appropriately from regional and international sustainability standards.

Embed measurable environmental performance criteria in KBR 2024. Future revisions should progressively incorporate Life Cycle Assessment (LCA), Environmental Product Declarations (EPDs), embodied carbon measures, recycled-content requirements and construction-waste reduction targets. Implementation could begin with public projects and affordable housing programmes before wider application.

Strengthen county-level capacity for testing, approval and oversight. Investment should be made in regional and county-level materials testing laboratories and, where appropriate, mobile testing facilities. Training and certification programmes should also be provided for building inspectors, planners, engineers and other professionals involved in implementing performance-based regulations.

Improve coordination in alternative-material approval. A coordinated mechanism should be established among KEBS, the National Construction Authority, county governments and relevant professional institutions to facilitate testing, certification and approval of alternative and innovative construction materials.

Create incentives for sustainable material use. Appropriate fiscal and procedural incentives, including fee concessions, accelerated approvals and recognition mechanisms, should be considered for developments that demonstrate the use of certified sustainable materials. Public procurement should also encourage locally sourced and low-impact construction materials.

Promote collaboration between formal and informal construction sectors. Community-based builders, informal masons and small and medium-sized enterprises should be integrated into material certification, training and innovation programmes. Pilot projects can provide opportunities for traditional and locally developed materials to be tested and progressively mainstreamed.

Support education, research and innovation. Sustainability and material innovation should be strengthened within architectural, engineering and vocational training curricula. Universities and research institutions should be supported to undertake local LCA studies, develop new material applications and improve durability and performance testing.

Promote further empirical research. Future studies should examine the implementation of KBR 2024 across counties, assess the actual environmental and economic performance of sustainable materials, and investigate the experiences of regulators, professionals, developers and material producers.

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