

Unveiling the roles and effective engagement of stakeholders involved in sustainable building design and practices

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Received 29 October 2025
Revised 11 February 2026
Accepted 24 March 2026

Abstract

Purpose – This study examines the roles and interrelationships of key stakeholders in Sustainable Building Designs and Practices (SBDPs) and how their collaboration influences the integration of Energy Efficiency (EE), Water Efficiency (WE), and Indoor Environmental Quality (IEQ). It proposes a framework that combines Stakeholder Theory with Habermas' critical social theory to align objectives, bridge performance gaps, and advance sustainable building outcomes.

Design/methodology/approach – An integrative literature review (2013–2025) was employed using Scopus and Google Scholar ($n = 86$). Thematic analysis identified five primary stakeholder groups, including investors, producers, policymakers, users, and academics, and examined their interactions, collaborative mechanisms, and barriers. Insights informed the development of a stakeholder engagement framework grounded in both descriptive and normative theory.

Findings – Stakeholders hold distinct yet interdependent roles. Effective collaboration is crucial to closing the gap between design intent and realised performance, but is hindered by fragmented communication, conflicting priorities, and regulatory limitations. The proposed framework facilitates inclusive dialogue, shared objectives, and transparent decision-making.

Research limitations/implications – Reliance on secondary data and the predominance of studies from developed countries limit context-specific insights. Future research should incorporate empirical investigations across diverse regions to address institutional barriers and power imbalances.

Practical implications – The framework offers actionable strategies, such as stakeholder forums, participatory design processes, and lifecycle monitoring, to align EE, WE, and IEQ goals, improve efficiency, and enhance compliance of buildings with sustainability rating systems.

Social implications – SBDPs contribute to public health, resource conservation, and climate resilience, while inclusive engagement ensures equitable access to sustainable living and working environments.

Originality/value – The study introduces a novel framework that integrates descriptive and normative approaches, offering ethically grounded, practical strategies for enhancing global SBDP collaboration and stakeholders' collaboration.

Keywords Sustainable building design and practices, Stakeholders, Energy efficiency, Water efficiency, Indoor environmental quality, Stakeholder collaboration, Built environment

Paper type Literature review

1. Introduction

In recent years, Sustainable Building Designs and Practices (SBDPs) have attracted increasing attention, particularly in developed countries, as part of a broader response to environmental degradation, resource scarcity, and growing concerns over human well-being in the built environment. SBDPs aim to deliver building solutions that are both environmentally



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Smart and Sustainable Built Environment
Emerald Publishing Limited
e-ISSN: 2046-6102
p-ISSN: 2046-6099
DOI 10.1108/SASBE-10-2025-0678

sustainable and financially viable, with the ultimate objective of improving residents' living conditions and long-term quality of life (Asman *et al.*, 2019). Central to these practices are several core principles, most notably Energy Efficiency–EE (Hafez *et al.*, 2023), Water Efficiency–WE (Al-Qawasmi *et al.*, 2019), and Indoor Environmental Quality – IEQ (Lee *et al.*, 2019). These dimensions are widely recognised as critical performance pillars of sustainable buildings, as they directly influence resource consumption, environmental impacts, and occupant health, comfort, and productivity (Poorisat *et al.*, 2024). The growing emphasis on EE, WE, and IEQ is closely aligned with the United Nations' Sustainable Development Goals (SDGs), particularly Goals 3, 6, 7, 11, and 13 (United Nations, 2022).

This alignment reflects a global shift toward building practices that not only reduce environmental footprints but also contribute to broader social, economic, and environmental sustainability objectives. As such, SBDPs are increasingly viewed as a key mechanism through which the built environment can support the achievement of the SDGs at both national and global levels. Despite significant advances in sustainable building technologies and design strategies, mounting evidence suggests that the success of SBDPs depends not only on technical innovation but increasingly on how effectively the human and institutional systems that deliver, govern, and operate buildings are managed, particularly through stakeholder engagement across the project lifecycle (Li *et al.*, 2025). Moreover, sustainable buildings function as complex socio-technical systems, in which sustainability outcomes emerge from the interaction between technologies, organisations, institutions, and user behaviours (Poorisat *et al.*, 2024). Within this context, stakeholder engagement has become a central concern in understanding why designed sustainability performance often diverges from actual operational outcomes. Stakeholder engagement is widely recognised as a critical determinant of SBDP success because it shapes sustainability-related decisions from early planning and conceptual design through construction, commissioning, and post-occupancy operation (Poorisat *et al.*, 2024). Engaging stakeholders early and continuously can enhance the transparency and legitimacy of decision-making, align diverse expectations, and foster a shared vision for sustainable outcomes (Li *et al.*, 2022a, b). Moreover, more inclusive collaboration helps ensure that sustainability objectives are not only ambitious but also technically feasible, economically viable, and operationally achievable. Such engagement contributes to improved building performance, higher levels of occupant satisfaction, and stronger compliance with regulatory and policy requirements, thereby reinforcing the long-term effectiveness and scalability of SBDPs (Weerakoon and Perera, 2025).

The importance of stakeholder engagement is further amplified by the inherently pluralistic nature of the built environment. SBDPs typically involve a wide range of stakeholders, including investors, developers, architects, engineers, contractors, regulators, facility managers, occupants, and knowledge institutions, who operate under different incentive structures, time horizons, professional cultures, and interpretations of value, as well as the expectation (Munaro and Tavares, 2023). As a result, sustainability decisions frequently entail contested priorities, asymmetric power relations, and complex trade-offs between short-term financial considerations and long-term environmental and social benefits (Alam *et al.*, 2021). In response to this complexity, a substantial body of literature has examined stakeholder engagement in sustainable building projects, generating valuable insights into stakeholder roles, interests, influence, and barriers to collaboration (Agyarko *et al.*, 2020; Poorisat *et al.*, 2024). However, despite broad consensus on the importance of engagement, the research problem remains insufficiently resolved because much of the existing literature documents stakeholder-related challenges, such as fragmented communication, coordination failures, and resistance to sustainability initiatives, without fully clarifying what remains underdeveloped at a structural level within prevailing stakeholder engagement frameworks and practices (Wade *et al.*, 2018).

Accordingly, three interrelated areas emerge where further conceptual development is particularly warranted. First of all, the existing literature remains descriptive and

actor-focused, emphasising stakeholder identification, categorisation, and salience. While this work provides an important foundation for understanding who is involved in SBDPs, it offers limited insight into how stakeholder roles, decision rights, and interdependencies interact over time to shape EE, WE, and IEQ outcomes across the project lifecycle (Wade *et al.*, 2018). This limitation is significant because sustainability performance in buildings depends not only on individual actors but on how their decisions and actions are coordinated within a broader socio-technical system (Larsson and Larsson, 2020).

Secondly, existing research has made important contributions by highlighting the value of collaboration and interaction among stakeholders in SBDPs (Li *et al.*, 2022a, b; Wen and Qiang, 2022). Nevertheless, much of this work examines engagement within specific project phases or organisational contexts, providing limited guidance on how collaboration can be structured, sustained, and evaluated across the full lifecycle of a building. For example, while Li *et al.* (2022a, b) and Ferme *et al.* (2018) emphasise the importance of collaboration, they offer relatively little procedural detail on how engagement processes can accommodate competing interests, manage power asymmetries, and support collective decision-making over time. Third, and most critically, prevailing stakeholder engagement frameworks in SBDPs have largely been developed from managerial and instrumental perspectives, such as stakeholder identification, prioritisation, and influence mapping (Zhu *et al.*, 2024). These approaches have contributed valuable tools for managing project complexity and improving performance. At the same time, a growing body of scholarship highlights the need to complement instrumental effectiveness with greater attention to normative legitimacy and procedural quality. For example, Kujala *et al.* (2022) observe that dominant stakeholder engagement research often conceptualises engagement as a strategic means to enhance organisational performance, manage risks, or secure support, while issues of ethical justification, fairness, and legitimacy remain comparatively underdeveloped. From a governance perspective, Stupak *et al.* (2021) argue that many sustainability governance frameworks place strong emphasis on output effectiveness, while devoting comparatively less attention to input and throughput legitimacy, such as who participates in decision-making, how decisions are made, and how competing claims are justified. Complementing this critique, Maher and Buhmann (2019) highlight that many sustainability frameworks institutionalise engagement as consultation rather than meaningful participation, thereby limiting stakeholders' ability to influence outcomes and leaving underlying power asymmetries largely unaddressed. These concerns are particularly salient in SBDPs, where sustainability decisions often carry ethical and distributive implications, including unequal cost burdens, health impacts, and long-term environmental externalities.

Taken together, existing studies provide a robust empirical and conceptual foundation for understanding stakeholder engagement in SBDPs, while also indicating the need for greater integration between instrumental effectiveness and normative legitimacy (Li *et al.*, 2022a, b; Wen and Qiang, 2022). Rather than reflecting isolated shortcomings, these limitations point to an opportunity to advance stakeholder engagement scholarship by articulating clearer process logics through which sustainability decisions are negotiated, justified, and translated into accountable outcomes across the project lifecycle. In response, this study advances the literature by integrating Stakeholder Theory with Habermas's critical social theory, particularly the concepts of communicative rationality and discourse ethics, to develop a stakeholder engagement model that is both ethically grounded and operationally actionable (Freeman *et al.*, 2021; Mahajan *et al.*, 2023). Stakeholder Theory provides a systematic basis for identifying key actors and understanding their interests and influence (Freeman *et al.*, 2021; Mahajan *et al.*, 2023). At the same time, Habermas's framework offers a procedural foundation for designing engagement processes based on inclusive deliberation, evidence-based justification of trade-offs, and legitimacy arising from non-coercive dialogue (Habermas, 1984, 2023).

Accordingly, this study adopts an integrative literature review to synthesise and interpret stakeholder roles and interrelationships in SBDPs, with two objectives: (1) to characterise the key stakeholder groups involved in SBDPs, including their roles and interdependencies across

the project lifecycle; and (2) to propose mechanisms for enhancing stakeholder collaboration through a theory-informed engagement framework. By doing so, the study aims to support governments, investors, built environment professionals, and academics in strengthening cross-sector coordination, improving the quality and legitimacy of sustainability decision-making, and accelerating the effective implementation and scaling of SBDPs across diverse contexts.

2. Materials and methods

This study adopted an integrative literature review to systematically synthesise and interpret existing research on stakeholders involved in SBDPs (Toronto and Remington, 2020). An integrative review approach was selected because it enables the inclusion of diverse empirical, conceptual, and theoretical studies, making it particularly suitable for interdisciplinary fields such as sustainable construction and the built environment (Hamida *et al.*, 2022). Unlike systematic reviews that prioritise narrow question-driven aggregation, integrative reviews support theory development, conceptual clarification, and holistic understanding across fragmented bodies of knowledge (Toronto and Remington, 2020). The overall review process followed a structured and transparent sequence of stages, as summarised in Figure 1, which provides an overview of the search, screening, and synthesis procedures adopted in this study.

2.1 Review design and search strategy

The review commenced with the clear definition of research objectives and guiding questions to delimit the scope of the inquiry and ensure analytical focus on stakeholder identification, roles, interrelationships, and collaboration mechanisms within SBDPs (See Figure 1).

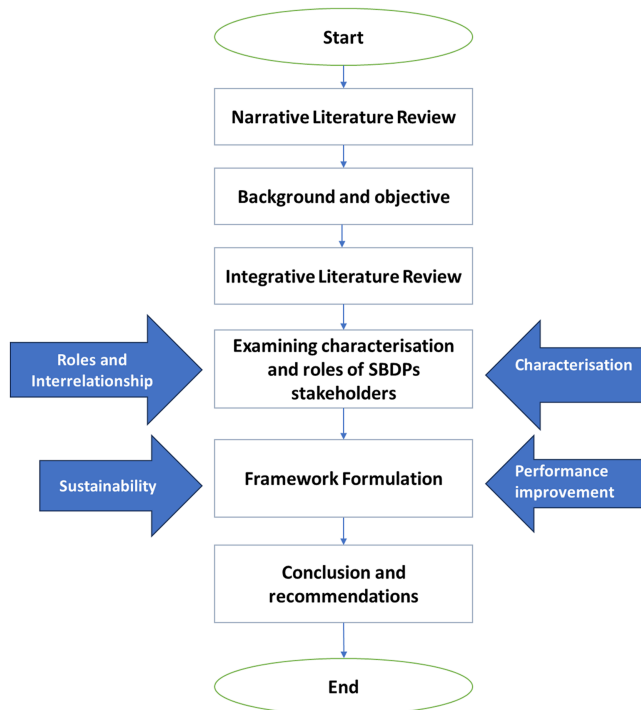


Figure 1. Schematic flow chart of the study process

A systematic literature search was then conducted using Scopus and Google Scholar, selected for their complementary strengths (See Figure 2). Scopus was prioritised as the primary database due to its curated coverage of peer-reviewed journals, particularly within construction management, engineering, architecture, and sustainability disciplines (Roberts *et al.*, 2020). Compared with other databases, Scopus offers greater transparency in indexing, consistent bibliographic metadata, and relatively faster indexing processes, increasing the likelihood of capturing recent and high-quality publications relevant to the rapidly evolving sustainability domain (Poorisat *et al.*, 2024). Google Scholar was used as a supplementary source to enhance interdisciplinary breadth and to identify influential peer-reviewed studies that may not be uniformly indexed within a single bibliographic database (Roberts *et al.*, 2020). The search employed structured keyword combinations applied to titles, abstracts, and keywords, as follows: TITLE-ABS-KEY (“sustainable building” OR “green building”) AND TITLE-ABS-KEY (“stakeholder” OR “collaboration” OR “engagement”) AND TITLE-ABS-KEY (“built environment”). To ensure relevance to contemporary sustainability discourse, the review focused on studies published between 2013 and 2025, capturing over a decade of evolving research, policy development, and emerging practices in sustainable development (Liu *et al.*, 2019; Poorisat *et al.*, 2024). Only peer-reviewed journal articles written in English were included to maintain academic rigour and reliability (Poorisat *et al.*, 2024).

2.2 Study selection and screening process

The initial search across both databases yielded 741 records, as illustrated in Figure 2. A two-stage screening process was applied to ensure relevance and alignment with the study objectives. In the first stage, titles and abstracts were screened to identify studies addressing

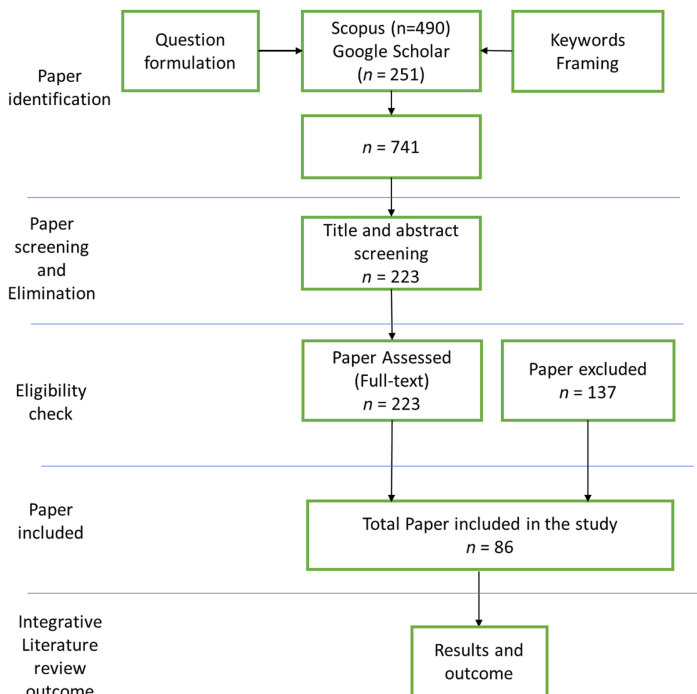


Figure 2. Study selection overview for the integrative literature review

SBDPs with explicit consideration of stakeholder roles, engagement, governance, or collaboration. In the second stage, full-text screening was conducted to confirm conceptual alignment with the research focus and to assess the depth and quality of stakeholder-related analysis. Studies were retained if they examined one or more stakeholder groups, including investors, producers, policymakers, users, and academics and provided empirical, conceptual, or theoretical insights relevant to sustainability decision-making in the built environment. Studies focusing exclusively on technical or engineering performance, such as energy modelling, material optimisation, or simulation-based analysis without stakeholder or organisational consideration, were excluded. Grey literature, conference papers, opinion pieces, non-English publications, studies outside the built environment domain, and articles lacking substantive analytical discussion of stakeholder dynamics were also excluded (Poorisat *et al.*, 2024). Following the screening process, a final sample of 86 peer-reviewed journal articles was retained for the integrative literature review. Although this study does not constitute a formal systematic review, selected principles of transparency and traceability commonly associated with PRISMA reporting were adopted to enhance methodological clarity and reproducibility (Hamida *et al.*, 2022; Page *et al.*, 2021). Consistent with integrative literature review methodology, strict adherence to PRISMA flow diagrams or reporting checklists was not required, as integrative reviews prioritise conceptual breadth, interpretive synthesis, and theory development rather than exhaustive quantitative aggregation (Toronto and Remington, 2020).

2.3 Data analysis and synthesis

Following study selection, thematic analysis was employed to analyse and synthesise the included literature. Thematic analysis was chosen due to its flexibility and suitability for integrative reviews, enabling the identification of recurring patterns, conceptual relationships, and interpretive insights across heterogeneous sources (Braun and Clarke, 2021; Toronto and Remington, 2020). The analysis followed a reflexive and iterative process. Relevant textual content was first coded inductively, focusing on stakeholder categories, roles, interactions, power relations, and barriers to collaboration within SBDPs. These initial codes were then iteratively compared and progressively grouped into higher-order themes that reflected shared meanings and theoretical convergence across the literature (Braun *et al.*, 2022). Within this study, themes are conceptualised as analytically rich constructs that capture consistent patterns of meaning rather than simple frequency of occurrence (Toronto and Remington, 2020). Emphasis was placed on coherence, explanatory depth, and alignment with the stated research objectives. Through this systematic and transparent analytical process, five primary stakeholder groups were identified, together with their respective roles and interrelationships within SBDPs. This methodological approach enhances the credibility, reproducibility, and interpretive depth of the findings and provides a robust foundation for subsequent framework development and discussion (Toronto and Remington, 2020).

3. Results and discussion

3.1 Characterisation of SBDP stakeholders

Stakeholders in SBDPs comprise a broad spectrum of individuals, organisations, and groups that possess an assigned interest in, exert influence over, or are affected by decisions throughout the lifecycle of sustainable building projects (Díaz-López *et al.*, 2021). Owing to substantial heterogeneity in professional roles, cultural backgrounds, and educational training these stakeholders frequently hold divergent, and sometimes conflicting, as priorities and expectations that must be negotiated across planning, design, construction, and operational phases (Oppong *et al.*, 2017). Accordingly, stakeholder engagement emerges not merely as a procedural or managerial requirement, but also a decisive factor shaping both the operational performance and long-term sustainability outcomes of buildings (Li *et al.*, 2022a, b).

From social, environmental, economic, and technological perspectives, stakeholders actively contribute to or constrain the advancement of sustainability objectives (Poorisat *et al.*, 2024). Prior studies consistently emphasise the importance of open, continuous, and multi-directional communication among project participants as a critical enabler for aligning diverse interests and translating sustainability ambitions into practice (Hao *et al.*, 2019; Zhang *et al.*, 2019). However, despite the prominence of stakeholder engagement rhetoric within sustainability discourse, empirical evidence reveals persistent challenges in balancing stakeholder influence and ensuring meaningful participation across different stakeholder groups (Debrah *et al.*, 2022). In practice, engagement processes often struggle to reconcile competing values, unequal power relations, and divergent temporal horizons between short-term project delivery imperatives and long-term sustainability goals (Poorisat *et al.*, 2024).

Critically, while stakeholder engagement is widely acknowledged in the SBDP literature, many existing studies conceptualise stakeholder groups as discrete or functionally bounded entities, rather than as actors embedded within asymmetric power structures and contested decision-making spaces (Oppong *et al.*, 2017). This tendency obscures the reality that sustainability outcomes are shaped not only by the presence or inclusion of stakeholders, but by who holds decision authority, whose forms of knowledge are legitimised, and whose interests are marginalised at critical project stages (Li *et al.*, 2022a, b). The integrative literature review conducted in this study indicates that stakeholder engagement in SBDPs therefore constitutes less a technical coordination challenge and more a governance problem, rooted in conflicting value systems, unequal access to decision-making processes, and structurally embedded imbalances of influence (Li *et al.*, 2022b; Wade *et al.*, 2018). Although sustainability narratives frequently emphasise collaboration, participation, and inclusivity, engagement practices in SBDPs remain predominantly instrumental, consultative, or symbolic, rather than genuinely deliberative or transformative (Hao *et al.*, 2019; Zhang *et al.*, 2019). In response to these limitations, this study adopts a critical stakeholder categorisation framework that moves beyond descriptive classification to interrogate stakeholders' structural positioning within sustainability decision-making. Based on a comprehensive review of the relevant literature, stakeholders in SBDPs are systematically classified into five primary groups: (1) Investors, (2) Producers, (3) Policymakers, (4) Users, and (5) Academics (Table 1). The respective roles and responsibilities of these groups are illustrated in Figure 3, while the following sections provide a critical examination of each category, focusing not only on their functional roles but also on their relative power, influence, and capacity to shape sustainability outcomes within SBDPs.

3.1.1 Investors. The Investors in SBDPs comprise a broad range of actors, including financial institutions, landowners, developers, project owners, and clients, from both public and private sectors. These include commercial developers, government agencies, corporations, educational institutions, healthcare providers, residential developers, hospitality operators, and community organisations, each motivated by distinct financial, environmental, or social objectives. Investors play a pivotal role by providing the capital necessary to develop, renovate, and operate environmentally responsible buildings, directly influencing the adoption and performance of SBDPs (Li *et al.*, 2022a, b). Project owners, whether public or private, have sector-specific responsibilities that shape their sustainability priorities (Aigwi *et al.*, 2021). Public owners, such as national and local governments, primarily deliver public services, while private owners are profit-oriented, seeking to maximise returns through efficient and sustainable developments. Given that public buildings, including schools, hospitals, and government facilities, are among the highest energy consumers in cities, embedding sustainability within these projects is critical (Zekić-Sušac *et al.*, 2021).

Educational institutions increasingly demonstrate environmental stewardship through SBDPs, exemplified by the rise of smart and sustainable campuses. Such initiatives advance institutional sustainability goals and enhance learning environments and student well-being. Improved IEQ also supports cognitive performance, knowledge absorption, and academic productivity (Akanmu *et al.*, 2021). Reflecting global climate commitments, many

Table 1. Relevant stakeholders in SBDPs

Category	Stakeholders	References
1. Investors	Financial organisations, owners, clients, landowners, developers	Akanmu <i>et al.</i> (2021), Alam <i>et al.</i> (2019), Christensen <i>et al.</i> (2022), Dagiliūtė <i>et al.</i> (2018), Darko <i>et al.</i> (2018), Li <i>et al.</i> (2022a, b), Olanipekun <i>et al.</i> (2017), Olubunmi <i>et al.</i> (2016), Shanti and Joshi (2022), Ullah <i>et al.</i> (2019), Xuan (2016, 2018), Zang <i>et al.</i> (2022), Zekić-Sušac <i>et al.</i> (2021), Zhang <i>et al.</i> (2019)
2. Producers	Engineers, project managers, architects, designers, consultants, site managers, contractors, suppliers, competitors, urban planners, professional associations, technology providers, green accreditation professionals, energy assessors, energy service companies, real estate surveyors, energy managers, and carbon managers	Cole (2019), Debrah <i>et al.</i> (2022), Delzende <i>et al.</i> (2017), Doan <i>et al.</i> (2017), Fadeyi (2017), Greer <i>et al.</i> (2019), Ikudayisi <i>et al.</i> (2022), Kishore Kumar <i>et al.</i> (2020), Li <i>et al.</i> (2022a, b), Magrini <i>et al.</i> (2020), Munaro and Tavares (2023), Olanipekun <i>et al.</i> (2017), Pode (2020), Shan <i>et al.</i> (2020), Sousa <i>et al.</i> (2019), Tian <i>et al.</i> (2019), Visscher <i>et al.</i> (2016), Wade <i>et al.</i> (2018), Wuni <i>et al.</i> (2019), Xuan (2016), Zhang <i>et al.</i> (2019, 2022)
3. Policymakers	The government, government regulatory authorities, and legal authorities	Christensen <i>et al.</i> (2022), Gram-Hanssen and Georg (2018), Li <i>et al.</i> (2017), Vujanović <i>et al.</i> (2019), Wong and Abe (2014), Xing and Cao (2019), Li <i>et al.</i> (2022a, b), Olubunmi <i>et al.</i> (2016)
4. Users	Tenants, communities, homebuyers, the general public, facility managers, property managers, building operators, and utility customers	Christensen <i>et al.</i> (2022), Delzende <i>et al.</i> (2017), Gram-Hanssen and Georg (2018), Li <i>et al.</i> (2020), Li <i>et al.</i> (2022a, b), Visscher <i>et al.</i> (2016), Wei <i>et al.</i> (2020), Xu <i>et al.</i> (2023)
5. Academics	Researchers and educators	Delzende <i>et al.</i> (2017), Fan and Hui (2020), Geng <i>et al.</i> (2019), Li <i>et al.</i> (2022a, b), Mujan <i>et al.</i> (2019), Mulligan <i>et al.</i> (2014), Shan <i>et al.</i> (2018), Vujanović <i>et al.</i> (2019), Wong and Abe (2014), Wu <i>et al.</i> (2017)

universities have declared climate emergencies and pledged to achieve net-zero emissions by 2030 (Akanmu *et al.*, 2021). Private-sector corporations are similarly integrating SBDPs to achieve cost savings, strengthen brand reputation, and enhance employee satisfaction (Poorisat *et al.*, 2024). Empirical studies show that high-quality IEQ in office environments improves employee well-being and productivity (Rasheed and Rotimi, 2022). The hospitality industry also recognises the value of SBDPs, as eco-certified hotels and resorts attract environmentally conscious travellers while reducing long-term operating costs (Shanti and Joshi, 2022). In healthcare, hospitals and medical centres adopt SBDPs to improve patient recovery, optimise resource efficiency, and comply with stringent regulatory standards. Sustainability measures help reduce operational costs while maintaining safety and comfort. However, limited financial incentives continue to constrain wider adoption. Active engagement from project owners can leverage available mechanisms such as green loans, tax incentives, and density bonuses to support sustainable development (Owoha *et al.*, 2022). Recognition through certifications and awards further motivates broader industry commitment to SBDPs (Poorisat *et al.*, 2024).

3.1.2 Producers. The producers in SBDPs include individuals and organisations directly responsible for the design, development, and delivery of sustainable buildings. This group comprises architects, engineers, project managers, designers, consultants, contractors, site

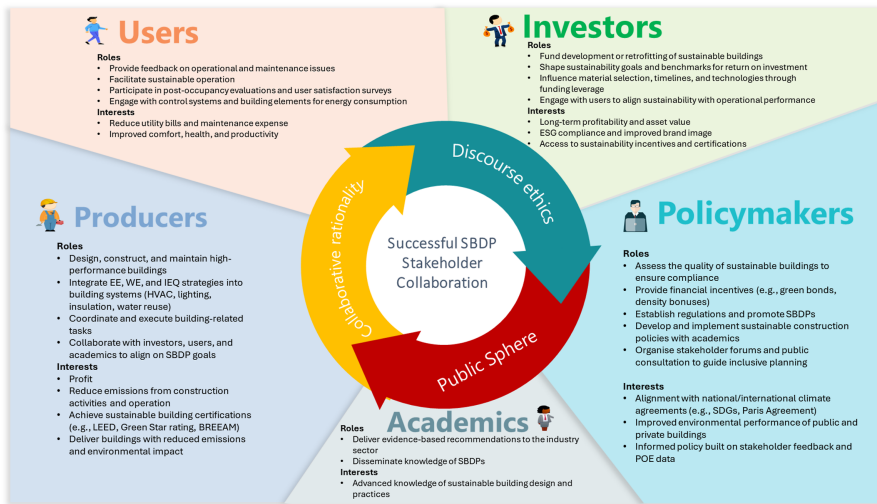


Figure 3. Conceptual framework to enhance SBDP stakeholder collaboration. Author's own work

managers, suppliers, urban planners, technology providers, surveyors, energy assessors, carbon and energy managers, accreditation professionals, energy service companies, and members of professional associations (Munaro and Tavares, 2023). Their combined expertise determines the sustainability performance of buildings through the integration of technical knowledge, design innovation, and operational efficiency (Debrah *et al.*, 2022). Architects and engineers are central to this process. Architects initiate conceptual designs and coordinate multidisciplinary teams, including mechanical, electrical, plumbing, and fire protection engineers, to translate sustainability objectives into buildable solutions (Heindryckx *et al.*, 2021). Engineers develop systems that underpin building performance, such as HVAC, lighting, and water infrastructure, ensuring energy and resource efficiency across the life cycle (Wade *et al.*, 2018). Collaboration among these professionals during design, construction, and operation phases directly affects occupant experience and long-term building performance.

Producers also navigate technological, institutional, and economic complexities to achieve sustainable outcomes (Munaro and Tavares, 2023). The involvement of green-accredited professionals enhances project delivery, particularly during design and pre-construction, where they often act as client representatives to uphold sustainability goals as their expertise supports the integration of renewable technologies, such as solar PV, wind, and geothermal systems-through feasibility assessment, sizing, and on-site implementation (Heindryckx *et al.*, 2021). In addressing WE, construction professionals design plumbing systems that minimise water use, specify low-flow fixtures, and incorporate rainwater harvesting and greywater recycling solutions (Poorisat *et al.*, 2024). Material selection is equally critical, with attention to embodied energy, durability, and recyclability (Assadiki *et al.*, 2022). To enhance IEQ, producers design ventilation systems that improve air quality, regulate temperature and acoustics, and control pollutants (Mujan *et al.*, 2019). These measures collectively contribute to achieving certifications such as LEED, BREEAM, and Green Star, which demand performance excellence across EE, WE, and IEQ dimensions (Doan *et al.*, 2021). Suppliers within the producer group further enable sustainability by providing efficient materials and technologies, ranging from high-performance insulation and HVAC systems to LED lighting, solar energy systems, and wind turbines (Škvorc and Kozmar, 2021). Close collaboration between suppliers and construction teams ensures the effective implementation of these solutions on-site (Magrini *et al.*, 2020).

3.1.3 Policymakers. The “policymakers” stakeholder group comprises governments, regulatory agencies, and legal authorities responsible for developing and enforcing policies that promote SBDPs (Komolafe *et al.*, 2020). Governments play a leading role in shaping the sustainable construction agenda and remain among the most influential actors in project-level decision-making (Xing and Cao, 2019). Policymakers set regulatory frameworks that affect investment decisions by defining minimum performance requirements and compliance standards for building development (Christensen *et al.*, 2022). Through targeted programmes, policymakers design energy-saving schemes tailored to building types and contexts. Governments also play a critical role in implementing financial incentives that encourage stakeholders to adopt green construction practices (Poorisat *et al.*, 2024). Moreover, building codes and municipal regulations increasingly emphasise energy performance, requiring or encouraging EE measures across building types. For example, China’s retrofit incentive programmes have supported EE upgrades in existing residential (Li *et al.*, 2022a, b). Such mechanisms, tax rebates, grants, and density bonuses, remain vital for fostering industry-wide commitment to sustainable development (Durdyev *et al.*, 2022).

3.1.4 Users. The “Users” of SBDPs encompass tenants, building owners, facility and property managers, operators, communities, and the general public. They play a crucial role in promoting and optimising the technical and environmental performance of sustainable buildings. Occupants can significantly influence building operations and owners’ decisions during the post-occupancy phase (Li *et al.*, 2022a, b). Users may include built-environment professionals, such as facility managers, whose expertise supports continuous performance improvement. Facility managers are particularly critical during the operational phase, ensuring that sustainability targets achieved at design and construction are maintained through effective management of EE, WE, and IEQ (Li *et al.*, 2022a, b). Occupant behaviour further shapes building performance through interactions with control systems, including HVAC, lighting, shading, and water fixtures, which influence comfort and energy use. Accordingly, understanding and influencing such behaviour are essential for achieving predicted energy performance (Christensen *et al.*, 2022). Key user requirements include maintaining indoor air and acoustic quality, managing daylight, and achieving thermal comfort (Delzende *et al.*, 2017). These dimensions directly affect occupant satisfaction, a primary indicator of operational performance and overall sustainability success (Khoshnava *et al.*, 2020). Therefore, integrating user feedback and behavioural insights into design, operation, and retrofit decisions is fundamental to enhancing the long-term performance of SBDPs.

3.1.5 Academics. The “Academics” of SBDPs include researchers and educators. Researchers frequently question and analyse the effectiveness of a building environmental assessment approach in promoting and disseminating SBDPs within a building community (Wong and Abe, 2014). Educational institutions are at the forefront of sustainable building innovation, aiming to adopt SBDPs and strengthen the sustainable construction market, including new materials, construction techniques, and renewable energy systems (Mulligan *et al.*, 2014; Vujanović *et al.*, 2019). The purpose of the research is to improve EE, WE, IEQ, and overall sustainability of buildings and collaborate with producers, policymakers, and investors to promote the widespread adoption of SBDPs by sharing knowledge and best practices through research papers and participation in conferences (Li *et al.*, 2022a, b; Vujanović *et al.*, 2019). In addition, researchers are responsible for assessing the environmental impact of different architectural components and systems and forecasting energy consumption in sustainable buildings (Delzende *et al.*, 2017), modelling behaviours of developers, government and buyers (Fan and Hui, 2020), and identifying critical incentives for sustainable building adoption (Li *et al.*, 2022a, b). Recently, more researchers have sought to find solutions for IEQ of sustainable buildings, including the impacts of building design and ventilation systems on IAQ, thermal comfort, acoustics, and natural daylighting (Mujan *et al.*, 2019) and seeking solutions to improve building occupants’ well-being, productivity, and health (Shan *et al.*, 2018). Table 1 represents the categorisation of stakeholders.

3.1.6 Stakeholder diversity as a structural condition of SBDPs. Taken together, these five stakeholder groups form an interconnected system in which sustainability outcomes emerge

from interaction rather than isolated action. Each group contributes distinct resources, including capital, expertise, authority, lived experience, and knowledge, while also introducing specific constraints and priorities (Tumpa and Naeni, 2025; Weerakoon and Perera, 2025). The diversity of stakeholder motivations and power positions is therefore a structural condition of SBDPs, not a peripheral challenge. This characterisation highlights that sustainability challenges in the built environment are not purely technical but fundamentally relational and governance-based (Poorisat *et al.*, 2024). Understanding these stakeholder roles and dynamics provides the necessary foundation for examining how collaboration can be strengthened, how conflicts can be addressed, and how legitimate, inclusive decision-making can be achieved. Building on this foundation, the following section (Section 3.2) examines the nature of stakeholder collaboration in SBDPs and identifies mechanisms for enhancing interrelationships and collective action.

3.2 Stakeholder collaboration of SBDPs

Sustainable building projects are complex systems involving various stakeholders who engage at varying levels and often pursue diverse, sometimes conflicting, objectives. Stakeholders are key determinants of a project's success, particularly because one of the primary goals of SBDPs is to create a sustainable environment for present and future generations (Mok *et al.*, 2018). Moreover, collaboration enabled stakeholders to solve a set of problems that neither could solve individually (Hamdan *et al.*, 2021). Accordingly, it is vital to examine the interconnections among stakeholders within SBDPs as well as the measures to enhance their collaboration. This section examines the interconnections among major stakeholder groups, the nature of their collaborative processes, and the critical mechanisms that facilitate and promote consensus-driven decision-making within sustainable construction projects.

3.2.1 Interrelationship among SBDP stakeholders. In SBDPs, stakeholder interrelationships are shaped by shared goals, differing responsibilities, and the need to align actions to achieve sustainable outcomes (Li *et al.*, 2022a, b). The successful implementation of SBDPs depends heavily on the intricate web of interrelationships among diverse stakeholders, each of whom plays a critical yet distinct role in shaping sustainable outcomes (Mok *et al.*, 2018). These relationships are interdependent and dynamic, requiring coordinated contributions across all project phases, from conceptualisation, preparation, and implementation until its closure (Hamdan *et al.*, 2021). The complexity of these interrelationships is underscored by the multifaceted nature of sustainability, which necessitates the integration of environmental, economic, social, and technological considerations (Li *et al.*, 2022a, b). Unlike conventional construction projects, SBDPs require continuous negotiation and alignment of objectives, as stakeholders often pursue competing interests, priorities, and value systems (Wen and Qiang, 2022). As noted by Mok *et al.* (2018), the stakeholder collaboration in SBDPs enables the co-creation of knowledge, facilitates informed decision-making, and enhances the overall performance and acceptance of sustainable buildings. The following section explores the interconnected roles, mutual dependencies, and collaborative dynamics among SBDP stakeholders, thereby elucidating the relational fabric that underpins the delivery of sustainable built environments.

3.2.1.1 Investors. Investors play a pivotal role in advancing SBDPs by providing financial capital and shaping strategic direction (Yamahaki and Marchewitz, 2025). Their collaboration with producers—such as architects, engineers, and contractors creates a framework where commercial feasibility aligns with sustainability objectives (Larsson and Larsson, 2020). This relationship is interdependent: while investors rely on producers for technical expertise and project delivery, they maintain decision-making authority due to their financial leverage (Christensen *et al.*, 2022). Through this influence, investors affect critical project parameters such as material selection, scheduling, and sustainability targets, balancing environmental and social impacts with long-term risk-adjusted returns (Jackson and Orr, 2021). Active engagement between investors and policymakers also shapes the regulatory environment.

By providing feedback on proposed legislation, investors help ensure that sustainability frameworks are both economically viable and practically implementable (Christensen *et al.*, 2022). Institutional investors, in particular, influence firms' governance and decision-making through supervisory mechanisms that promote accountability and sustainable performance (Zhao *et al.*, 2023). Interactions between investors and users are equally significant.

Understanding occupant needs and preferences informs investments that enhance comfort, satisfaction, and occupancy rates, ultimately protecting asset value. Property managers play an intermediary role in translating investors' sustainability goals into operational strategies, including monitoring energy and water use, maintaining IEQ, and ensuring user well-being (Akin and Akin, 2025). Their technical insight and feedback on building performance support future retrofits, certification pursuits, and long-term investment planning (Akin and Akin, 2025). This bidirectional relationship strengthens performance-based outcomes such as carbon reduction, operational efficiency, and regulatory compliance (Poorisat *et al.*, 2024). A strong alignment between investors and property managers also improves tenant retention, reduces operational costs, and sustains compliance with Sustainable Building Rating Systems–SBRS (Poorisat *et al.*, 2024). Moreover, investors who fund academic research and innovation accelerate the development of new technologies and practices that advance SBDPs (Hwang *et al.*, 2018). Investment in research and development enhances productivity, drives innovation, and supports the transition toward smarter, low-carbon infrastructure (Afonso and Rodrigues, 2024). Therefore, fostering mutual understanding and transparent communication between investors and all stakeholder groups is essential for maximising the long-term sustainability and performance of built assets.

3.2.1.2 Producers. Collaboration between producers and other stakeholder groups is crucial for advancing SBDPs (Poorisat *et al.*, 2024). Joint efforts between producers and investors enable the integration of appropriate technologies for HVAC, piping, and electrical systems, aligning technical feasibility with financial viability (Wade *et al.*, 2018). Producers play a vital role in educating investors and users on SBDPs (Shan *et al.*, 2020). This is because increasing awareness of the advantages of SBDPs can encourage their adoption within the industry. Moreover, effective communication between producers, users and investors can enhance EE, WE, and IEQ in buildings due to knowledge and information sharing (Chen *et al.*, 2022).

Additionally, producers can collaborate with academics on research ventures to explore new materials, technologies, and methods, thereby driving continuous advancements in SBDPs (Young and Freytag, 2021). In addition, to achieve the projected energy performance of buildings, producers must understand and influence occupant behaviour directly related to collaboration with users, including facility managers and building tenants (Visscher *et al.*, 2016). However, producers possess technical knowledge essential for implementing SBDPs, but often lack alignment with policymakers' regulatory frameworks, leading to the requirement for better integration of these roles through collaborative platforms and shared sustainability goals (Afful *et al.*, 2024). By leveraging their knowledge, skills, and experience, producers can develop sustainable buildings that minimise environmental impact, reduce energy consumption, conserve resources, and offer occupants healthy and comfortable living spaces (Li *et al.*, 2022a, b). Therefore, the collaboration between producers, investors, and other stakeholders is key to advancing SBDPs. Producers' active engagement in research, education, and communication ensures continuous improvement in SBDPs, ultimately leading to a more sustainable built environment.

3.2.1.3 Policymakers. Collaboration between policymakers and various stakeholders is essential for successfully implementing SBDP because policymakers can support training programs and certifications for producers to ensure the workforce is skilled in SBDP (Graham and Warren-Myers, 2019). Additionally, they can work with producers to develop industry standards and best practices that promote sustainability while being practical and achievable (Komolafe *et al.*, 2020; Olawumi and Chan, 2020). For instance, to formulate effective policies, policymakers require detailed estimates and feedback on their proposals from producers (Vujanović *et al.*, 2019). Additionally, policymakers frequently work

alongside investors and asset managers to ensure that investment products meet environmental sustainability criteria and comply with sustainable investment classifications and guidelines (Li *et al.*, 2022a, b). The policymakers are crucial in this process, as they set regulations, promote initiatives, and offer incentives for SBDPs (Deschryver and De Mariz, 2020). For instance, Poorisat *et al.* (2024) identified the enforcement of building codes and regulations as the most significant factor driving the adoption of SBDPs.

Regarding the relationship between policymakers and academics, the researchers provide evidence-based frameworks that are research-based, which can improve the design and evaluation of public policies (Adams and Mueller, 2022). Policymakers can benefit from these insights when crafting responses to complex societal issues, including education, climate change, and sustainable construction. Conversely, academics gain relevance, funding, and societal impact by informing real-world decisions (Reid and Chaytor, 2022). However, this relationship is often asymmetrical. While academics strive for rigour and long-term knowledge building, policymakers often require timely, actionable insights driven by political pressures and public opinion (O'Flaherty *et al.*, 2024). Consequently, collaboration between policymakers and other stakeholders, including producers, investors, users, and academics, is crucial for successfully adopting SBDPs and achieving environmental objectives. This integrated approach ensures that policies are effective, practical, and aligned with industry standards.

3.2.1.4 Users. User engagement with other stakeholder groups plays a vital role in the success of SBDPs, as users can share valuable insights with investors, producers, policymakers, and academics about O&M issues that influence a building's sustainability and performance (Li *et al.*, 2020). For example, building occupants can complete questionnaires to provide feedback on EE (Morton *et al.*, 2020), WE (Dadvar *et al.*, 2021) and IEQ (Khoshbakhht *et al.*, 2018; Wei *et al.*, 2020). Such feedback is crucial for guiding improvements that enhance the overall efficiency of buildings. By actively adopting SBDPs and engaging in sustainability initiatives within buildings, users make a significant contribution to the effectiveness and long-term success of these projects (Xu *et al.*, 2023). Their involvement fosters collaboration among stakeholders, enabling the achievement of sustainability goals and ensuring that user experiences and perspectives directly inform and strengthen SBDPs.

3.2.1.5 Academics. Collaboration between academics and other stakeholder groups is vital for the successful advancement of SBDPs. Academics serve as key knowledge providers, engaging with policymakers to co-develop evidence-based policies and regulatory frameworks that foster sustainable construction practices (Adams and Mueller, 2022). Their analytical work involves systematically evaluating existing building codes and standards, identifying regulatory gaps, and proposing improvements based on empirical data and global best practices (Wuni *et al.*, 2019). This evidence-driven input strengthens policy effectiveness and also ensures that sustainability targets are realistic, measurable, and aligned with broader climate goals. In parallel, academics collaborate extensively with producers, including architects, engineers, and contractors, through joint research initiatives and pilot projects. Such partnerships are vital in bridging the theory-practice divide by translating academic insights into practical actions. According to Olawumi and Chan (2020), collaborative research can address the limitations of existing sustainability assessment tools by introducing more adaptable and context-sensitive criteria. These joint efforts often involve the co-development of innovative building materials, digital design methodologies, and performance optimisation techniques that enhance the viability of sustainable solutions on the ground (Poorisat *et al.*, 2024).

From a performance evaluation perspective, academics also play a crucial role in monitoring and validating the real-world impacts of SBDPs. Through systematic Post-Occupancy Evaluations (POEs), researchers gather and analyse data obtained from users on a range of performance metrics, including energy and water consumption, IAQ, thermal comfort, and user satisfaction (Geng *et al.*, 2019). These insights are invaluable for refining design strategies,

identifying discrepancies between predicted and actual performance, and informing continuous improvement across the building lifecycle (Perera *et al.*, 2025). Ultimately, the collaborative involvement of academics ensures that SBDPs are underpinned by scientific evidence, technical innovation, and long-term environmental and social value. By acting as the medium between theory, policy, and practice, researchers drive forward the development of healthy, efficient, and sustainable built environments. This multi-stakeholder collaboration fosters an adaptive learning ecosystem that will promote the advancement of SBDPs.

3.2.2 Enhancing SBDP stakeholder collaboration. Building on the interrelationships between stakeholder groups outlined earlier, it becomes evident that fostering effective collaboration is crucial to ensuring the success of SBDPs, which in turn are essential for achieving environmentally sustainable, economically viable, and socially inclusive project outcomes (Wen and Qiang, 2022). This collaboration can be significantly improved through several strategies that address the complexities of communication, conflicting interests, and institutional fragmentation. To fulfil the aim of enhancing stakeholder collaboration, this study integrates Stakeholder Theory (Freeman, 1984) and Habermas' Theory (Habermas, 1984). In the context of SBDPs, stakeholders are categorised into five groups (see Figure 3), and the ST provides a foundation for identifying these actors, mapping their relationships, and analysing their influence on sustainability outcomes.

However, while Stakeholder Theory identifies who should be involved and why, it offers limited normative guidance on how engagement should be conducted (Wojewnik-Filipkowska *et al.*, 2021), this gap is addressed by Habermas' critical social theory, which provides a framework grounded in communicative rationality, discourse ethics, and democratic deliberation, which are principles that foster more inclusive, transparent, and equitable stakeholder interaction (Blau, 2022). As Marcon Nora *et al.*, 2023 asserted, integrating social theory into sustainability research is essential for promoting fair and transformative change. Accordingly, this study recommends a structured, multi-step integration process to ensure that stakeholder engagement is both strategically managed and effectively coordinated.

(1) Establishing Collaborative Rationality as Normative Engagement

Effective collaboration in SBDPs requires a shift from self-interested strategies toward dialogue grounded in mutual understanding. Collaborative rationality, in contrast to strategic manipulation, encourages open, inclusive engagement that allows diverse perspectives to shape sustainable outcomes (Chriss, 2022; Habermas, 1984). To embed this approach, collaborative action should become the normative expectation, ensuring that all stakeholders participate in open, rational dialogue (Al-Otaibi *et al.*, 2025). In practice, financial constraints often dominate design choices (Poorisat *et al.*, 2024). Producers can counterbalance this by presenting lifecycle cost analyses as evidence for the long-term value of sustainable material use (Larsson and Larsson, 2020). Likewise, users' post-occupancy feedback should be systematically incorporated into decision-making through participatory design platforms (Khoshbakht *et al.*, 2018). Beyond rational evidence, however, professionals must also recognise that genuine motivation, emotional as well as intellectual, is essential to drive sustainable action (Grossarth, 2025).

(2) Institutionalising Public Deliberation Across Stakeholder Groups

The public sphere is a discursive space where individuals deliberate on societal issues free from coercion (Habermas, 1991, 2023). In SBDPs, this concept is operationalised through stakeholder forums, green building councils, and digital platforms, which serve as virtual public spheres (Fadeyi, 2017). These forums allow stakeholders to co-create solutions, debate trade-offs transparently, and build consensus (Olawumi and Chan, 2020). For example, green building councils function as institutional arenas where industry actors discuss certification standards and best practices (Wuni *et al.*, 2019). Community consultations, particularly in urban redevelopment, further democratise the planning process (Dadvar *et al.*, 2021).

Moreover, digital technologies such as Building Information Modelling (BIM) further support this collaborative environment by enabling the simulation of design trade-offs, thereby informing collective decision-making (Borkowski *et al.*, 2024; Tumpa and Naeni, 2025).

However, stakeholder engagement in large-scale projects often presents challenges due to competing interests, institutional fragmentation, and power asymmetries (Gray *et al.*, 2022). As such, comprehensive stakeholder analysis frameworks are essential for understanding these dynamics and promoting meaningful dialogue (Mok *et al.*, 2018). Governments and developers must, therefore, adopt dual roles as facilitators and active co-participants in shaping and aligning sustainability objectives (Hori, 2020). Equally important is the formation of a “green public sphere” that extends beyond formal political spaces to include digital environments and environmental discourse, such as social media platforms and open-access databases (Palmer and Udawatta, 2019). This expanded public sphere empowers both professionals and non-professional citizens to contribute to the sustainability agenda, fostering more democratic, inclusive, and resilient development processes.

(3) Institutionalising Public Deliberation Across Stakeholder Groups

The public sphere, as conceptualised by Habermas (1991, 2023), is a discursive space where individuals can deliberate on societal issues free from coercion. Within the context of SBDPs, this concept is operationalised through stakeholder forums, green building councils, and digital platforms, which function as contemporary public spheres (Fadeyi, 2017). These spaces enable stakeholders to co-create solutions, debate trade-offs transparently, and build consensus (Olawumi and Chan, 2020). For example, green building councils serve as institutional hubs where industry actors negotiate certification standards and exchange best practices (Wuni *et al.*, 2019). Likewise, community consultations, particularly in urban redevelopment, can democratise the planning process by integrating diverse local perspectives (Dadvar *et al.*, 2021). Digital technologies, notably BIM, further enhance this collaborative environment by enabling the simulation of design trade-offs and providing data-driven insights to inform collective decision-making (Borkowski *et al.*, 2024).

However, engagement in large-scale projects is often hindered by competing interests, institutional fragmentation, and power asymmetries (Gray *et al.*, 2022). To address these challenges, comprehensive stakeholder analysis frameworks are essential for mapping relationships, diagnosing potential conflicts, and promoting constructive dialogue (Mok *et al.*, 2018). Governments and developers must adopt dual roles, as facilitators who create spaces for inclusive discussion and as active co-participants committed to aligning diverse sustainability objectives (Hori, 2020). Equally critical is the cultivation of a green public sphere that extends beyond formal political arenas to encompass digital environments and environmental discourse spaces, including social media platforms and open-access databases (Palmer and Udawatta, 2019). Such an expanded public sphere empowers both professionals and citizens to contribute meaningfully to the sustainability agenda, fostering development processes that are more democratic, inclusive, and resilient.

(4) Implementing Discourse Ethics For Normative Justification

According to the discourse ethics by Habermas (2004), the only norms agreed upon through inclusive, coercion-free discourse are legitimate. This principle can guide conflict resolution in SBDPs. For example, conflicts between investors prioritising short-term investment and producers advocating for green technologies can be resolved through open forums. In these spaces, participants must justify positions using validity claims, including *truth*, demonstrated through empirical evidence such as lifecycle assessments and post-occupancy evaluations (Tang *et al.*, 2020); *rightness*, reflected in alignment with broader ethical principles such as Environmental, Social, and Governance (ESG) standards (Spanò *et al.*, 2025) and the SDGs; and *sincerity*, expressed through transparent intentions and genuine commitment to sustainability objectives (Moreno *et al.*, 2024). By integrating Habermas’ normative foundation with the

practical stakeholder engagement strategies of Stakeholder Theory, a more robust framework for collaboration in SBDPs emerges. This approach promotes equitable dialogue, mitigates power imbalances, legitimises sustainability norms, and ensures that both ethical ideals and pragmatic objectives are addressed. Ultimately, it enables stakeholders to shape the built environment through deliberation rather than domination. In essence, integrating Habermas' Theory and stakeholder Theory's managerial tools offers a comprehensive framework for improving collaboration in SBDPs. By fostering inclusive, reason-based dialogue, projects can overcome power imbalances, legitimise sustainability standards, and achieve outcomes that reflect both ethical and practical considerations.

3.3 Framework development: integrating Habermas' normative framework with practical enhancements for SBDP stakeholders

While Stakeholder Theory provides a well-established foundation for identifying stakeholder groups and analysing their interests, salience, and influence, it offers limited normative guidance on how stakeholder engagement should be conducted when sustainability objectives conflict or when power asymmetries shape decision-making (Freeman *et al.*, 2021; Mahajan *et al.*, 2023). To address this limitation, this study integrates Habermas's critical social theory, specifically the concepts of communicative rationality, discourse ethics, and the public sphere, to develop a more structured, inclusive, and ethically grounded framework for stakeholder collaboration in SBDPs (Blau, 2022; Habermas, 1984). This integration extends stakeholder engagement beyond managerial coordination by embedding procedural legitimacy, reason-based deliberation, and transparency as core governance principles. The resulting framework is explicitly aligned with the five stakeholder groups identified in this study, ensuring that engagement practices are not only operationally effective but also normatively justified within the broader sustainability context.

Operationally, communicative rationality reframes stakeholder interaction as a deliberative process in which sustainability-related decisions, such as trade-offs between capital cost, lifecycle performance, and operational efficiency, must be justified through evidence-based argumentation rather than authority, financial dominance, or institutional position (Chriss, 2022; Habermas, 1984). Within this framework, investors are encouraged to justify sustainability-oriented investment decisions using lifecycle cost analyses, post-occupancy performance data, and alignment with ESG principles, thereby enhancing the legitimacy and resilience of long-term investment strategies (Furnham *et al.*, 2025). Producers, including architects, engineers, and contractors, are positioned as technical mediators who translate deliberative outcomes into design and construction solutions. Communicative audits and collaborative platforms such as BIM and participatory design charrettes enable producers to integrate user feedback, academic evidence, and regulatory requirements into performance-driven design decisions, particularly in relation to EE, WE, and IEQ (Doan *et al.*, 2021; Gupta, 2020).

Additionally, discourse ethics further strengthens the framework by introducing explicit legitimacy criteria for sustainability decision-making (Habermas, 2004; Nash and Steurer, 2021). Decisions are considered legitimate only when they can be justified through empirically valid evidence, for example, performance simulations, post-occupancy evaluations, normative alignment with shared sustainability commitments such as climate targets and the SDGs, and sincere stakeholder intent (Spanò *et al.*, 2025). These criteria constrain opportunistic behaviour and mitigate power asymmetries that frequently marginalise user experience and academic evidence in favour of short-term financial considerations. Within this governance structure, policymakers play a facilitative role by institutionalising structured forums in which sustainability regulations and incentive mechanisms are collaboratively developed and refined alongside investors and producers, informed by empirical insights from academics (Illeperuma and Abeynayake, 2025). Moreover, users, particularly facility managers and occupants, contribute operational knowledge through structured feedback mechanisms such as post-occupancy evaluations and stakeholder forums, supporting continuous performance

improvement and closing the gap between design intent and realised outcomes (Anand *et al.*, 2022). Academics function as boundary-spanning actors who support evidence-based deliberation, evaluate performance outcomes, and ensure that learning is transferred across projects and policy cycles.

Collectively, the integration of Habermas' normative principles with the managerial tools of Stakeholder Theory provides a governance framework that explains not only who should be involved in SBDPs, but also how sustainability decisions can be negotiated, legitimised, and sustained across the building lifecycle. By aligning diverse stakeholder interests through inclusive, reason-based dialogue and institutionalised deliberation, this framework enhances accountability, mitigates structural power imbalances, and increases the likelihood that EE, WE, and IEQ objectives are translated into durable and measurable real-world performance outcomes.

4. Conclusion

This study provides a critical synthesis of stakeholder characterisation underpinning SBDPs through an integrative literature review and thematic analysis of 86 peer-reviewed journal articles. Five dominant stakeholder groups, including investors, producers, policymakers, users, and academics, were identified and examined, revealing that while their roles are functionally distinct, they are structurally interdependent across the building lifecycle. Rather than positioning stakeholder engagement as a supplementary or managerial activity, the findings demonstrate that engagement functions as a core governance condition that determines whether EE, WE, and IEQ objectives are successfully translated from design intent into sustained operational performance. Importantly, the synthesis indicates that persistent sustainability underperformance in buildings is more frequently attributable to fragmented decision-making, lifecycle discontinuities, and asymmetric power relations than to technological or design limitations. A central contribution of this study lies in advancing stakeholder engagement research beyond descriptive role classification toward an operational and governance-oriented understanding of how engagement quality shapes sustainability outcomes. While existing SBDP literature widely acknowledges the importance of stakeholder involvement, it commonly treats stakeholder groups in isolation and offers limited normative guidance for managing competing claims, legitimising trade-offs, or sustaining collaboration across project phases. To address this gap, the study proposes an integrated stakeholder collaboration framework that combines Stakeholder Theory with Habermas' critical social theory.

By embedding communicative rationality, discourse ethics, and institutionalised deliberation into stakeholder processes, the framework provides a structured and ethically grounded approach to engagement that prioritises reason-based justification, procedural legitimacy, and inclusive decision-making. This integration reframes stakeholder engagement from transactional consultation toward deliberative co-production and offers a coherent explanatory pathway for addressing the persistent design–performance gap observed in SBDPs. From a practical perspective, the findings offer clear implications for stakeholder engagement in sustainable building projects globally. The proposed framework can be operationalised across different building lifecycle phases by aligning engagement mechanisms with phase-specific decision contexts. During early planning and design stages, the framework supports participatory goal-setting, transparent justification of sustainability targets, and lifecycle cost–performance deliberation among investors, producers, and policymakers. During construction and commissioning, communicative rationality can be operationalised through collaborative platforms, for example, integrated design workshops and BIM-enabled decision environments, to resolve trade-offs between cost, constructability, and sustainability performance. In the operational and post-occupancy phases, structured user feedback mechanisms, post-occupancy evaluations, and performance

monitoring forums enable continuous learning, accountability, and adaptive improvement, thereby closing the gap between predicted and realised EE, WE, and IEQ outcomes.

The framework is also applicable across diverse geographical and institutional contexts. While regulatory regimes, market maturity, and cultural norms vary globally, the core principles of inclusive deliberation, legitimacy-based justification, and evidence-informed decision-making remain transferable. In developed contexts, the framework can strengthen existing sustainability governance by addressing coordination failures and power asymmetries across lifecycle phases. In developing and transitional economies, it offers a structured approach for integrating emerging regulatory systems, capacity-building initiatives, and community participation into sustainable building delivery. Importantly, the framework does not prescribe uniform solutions but provides a flexible governance logic that can be adapted to local institutional conditions, policy environments, and stakeholder capabilities. Despite these contributions, the study is constrained by its reliance on secondary data and the predominance of evidence drawn from developed-country contexts, which limits insight into lived experiences, informal governance arrangements, and real-time stakeholder dynamics. Future research should therefore empirically test and refine the proposed framework through mixed-method approaches, including key informant interviews, questionnaire surveys, comparative case studies, and longitudinal post-occupancy evaluations. Accordingly, particular attention should be given to examining how power asymmetries, regulatory enforcement capacity, organisational cultures, and socio-economic conditions influence stakeholder deliberation and sustainability outcomes over time. Empirical validation across diverse geographical contexts will further strengthen the framework's robustness, transferability, and practical relevance, ultimately supporting the global transition toward environmentally responsible, socially inclusive, and economically viable built environments.

Acknowledgments

A shorter version of this paper has been submitted for presentation at the GDI Conference. This study is based exclusively on an integrative review of previously published literature. It does not involve primary data collection and does not include any human participants or animals. As such, ethical approval was not required for this research. Grammarly was used solely to support language editing and grammatical refinement; it had no influence on the intellectual content of the manuscript.

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