Bridging the Gap: Public-Private Partnerships in Sustainable Building for Developing Countries

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4 September 2024

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ABSTRACT

This review evaluates the effectiveness of public-private partnerships (PPPs) in advancing sustainable building projects in developing countries. It highlights key areas such as resource mobilization, expertise utilization, innovation, risk-sharing, and community impact. Findings show that PPPs attract private investment, complement public funds, and drive large-scale sustainable construction. They enhance technical expertise, foster knowledge transfer, and encourage the adoption of advanced technologies. Risk-sharing mechanisms reduce financial burdens, attracting more investors. Additionally, PPPs improve social outcomes, including job creation and community resilience. The review emphasises the need for supportive policies, capacity-building programs, and monitoring systems to strengthen PPPs in sustainable development. Further research should focus on comparative models and long-term impacts.

KEYWORDS: Green construction, regulatory frameworks, technological innovation, capacity building, risk-sharing, strategic collaboration

JEL CODES: L32; O18; Q01; Q56

INTRODUCTION

The increasing urgency of addressing climate change and environmental degradation has intensified global attention on sustainable development (Montt et al., 2018; Park, 2022; Wilkinson et al., 2022). In developing countries, the construction sector is a key driver of economic growth but also a major contributor to carbon emissions and environmental degradation (Akan et al., 2017; Zhou et al., 2019; Ogunmakinde et al., 2022). Sustainable building practices, which minimize environmental impacts while promoting social and economic benefits, are therefore critical (Wong & Zhou, 2015; Ahmed et al., 2020; Foster, 2020; Sizirici et al., 2021). This introduction is framed within the context of sustainable

development theory, which emphasizes balancing economic growth, environmental stewardship, and social inclusion (WCED, 1987).

Public-Private Partnerships (PPPs) have emerged as a strategic approach to advancing sustainable building initiatives in developing countries (Marx, 2019; Wojewnik-Filipkowska & Węgrzyn, 2019; Akomea-Frimpong et al., 2022). PPPs are collaborative frameworks where public and private entities share resources, risks, and rewards to achieve mutual objectives (Cui et al., 2018; Keers & van Fenema, 2018). The theoretical foundation for PPPs is rooted in institutional theory (Meyer & Rowan, 1977; DiMaggio & Powell, 1983; Selznick, 1945; 2020), which highlights how public institutions can create enabling environments for private investment, and in transaction cost theory (Williamson, 1989; Hennart & Verbeke, 2022), which explains the efficiency gains from sharing risks and resources between sectors (Williamson, 1985). The private sector's innovation, technical expertise, and investment capacity are complemented by the public sector's regulatory authority and commitment to public welfare.

However, despite these theoretical advantages, the effectiveness of PPPs in sustainable building in developing countries remains contested. Challenges such as limited financial resources, regulatory hurdles, and socio-political complexities can impede successful implementation (Bolomope et al., 2021; Agarwal et al., 2023; Almeile et al., 2024). These challenges are further compounded by the variability in institutional capacity and governance in developing countries, which adds layers of complexity to PPP arrangements (Homkes, 2011).

This systematic review aims to integrate knowledge from case studies, policy analyses, and academic literature to assess how PPPs can effectively promote sustainable building in developing countries. Drawing on theories of sustainable development, institutional collaboration, and risk-sharing, the review seeks to provide insights into the conditions that enable PPP success. These insights will offer guidance for policymakers and practitioners aiming to optimise PPPs for sustainable construction, particularly in light of global commitments to the United Nations Sustainable Development Goals (SDGs), especially Goal 11, which focuses on creating sustainable cities and communities (Olaniran, 2018; del Hoyo et al., 2021; Mycoo & Bharath, 2021).

Understanding the theoretical underpinnings and practical applications of PPPs in the context of sustainable building is crucial for achieving global sustainability targets. By leveraging both public regulatory frameworks and private sector capabilities, PPPs have the potential to address the financial,

technical, and institutional barriers that currently impede the implementation of sustainable building practices in developing countries (Berrone et al., 2019; Maslova, 2020; Owusu-Manu et al., 2021).

PROBLEM STATEMENT

The effectiveness of public-private partnerships (PPPs) in advancing sustainable building practices in developing countries remains insufficiently understood, pointing to several critical gaps in both research and practice. This gap persists despite the potential of PPPs, as supported by institutional theory, which suggests that public and private entities can achieve greater efficiency and effectiveness when they collaborate within well-established frameworks (Meyer & Rowan, 1977; DiMaggio & Powell, 1983).

However, current evaluations of PPPs often rely on isolated case studies that, while insightful, fail to provide a comprehensive understanding of how PPPs perform across varying socio-economic and political contexts. According to contingency theory (Woodward, 1965; 1980; Lawrence & Lorsch, 2015), organisational success depends on aligning strategies with external environments (Lawrence & Lorsch, 1967), yet this alignment remains underexplored in PPPs for sustainable construction in developing countries.

The socio-economic and political landscapes of developing countries introduce significant variability that can either enable or constrain the success of PPPs. Institutional theory underscores the influence of these external environments on organisational structures and strategies, but a deeper exploration is needed to identify patterns and strategies for overcoming context-specific challenges. Moreover, the absence of knowledge sharing and dissemination of best practices, as emphasised by knowledge management theory (Nonaka & Takeuchi, 2007)), limits the scalability and replicability of successful PPP models, hindering their broader adoption and impact. Addressing this gap is essential for fostering innovation diffusion and enabling widespread implementation of effective approaches across diverse regions.

Additionally, while private sector involvement is recognised for its potential to drive technological innovation, resource-based theory (Barney, 1991; 2000) highlights the role of organisational resources, including technology and expertise, in creating competitive advantages. However, the specific technological innovations facilitated by PPPs and their impact on sustainable construction practices have not been thoroughly documented. This leaves a critical gap in understanding how these innovations contribute to long-term sustainability and development goals.

Addressing these gaps through a theoretical lens is crucial for enhancing the effectiveness of PPPs in promoting sustainable building practices in developing countries. A comprehensive understanding, informed by institutional, contingency, and knowledge management theories, will help policymakers and practitioners develop better policy frameworks, project planning, and implementation strategies. Additionally, resource-based theory can guide the identification and utilisation of key innovations to maximise PPPs' contribution to sustainable development.

This systematic review aims to bridge these gaps by synthesising a wide range of case studies, policy reports, and academic literature to evaluate the effectiveness of PPPs in sustainable building. It provides a holistic assessment, considering socio-economic, political, and regulatory contexts to identify patterns and offer context-specific insights, grounded in institutional theory. Furthermore, by disseminating best practices, this review will enhance knowledge sharing, in line with knowledge management theory, and offer actionable recommendations for future PPP initiatives. It also explores the role of technological innovation, applying resource-based theory to highlight innovations that can be leveraged in future PPPs to support sustainable construction goals.

The specific objective of the study is to investigate how public-private partnerships effectively leverage resources and expertise to support sustainable building initiatives, whereas the study's research question is: How effective are public-private partnerships in leveraging resources and expertise to support sustainable building initiatives in developing countries?

SCOPE AND LIMITATIONS

This review encompasses a comprehensive evaluation and synthesis of current literature and empirical evidence on the effectiveness of public-private partnerships (PPPs) in supporting sustainable building initiatives in developing countries. The scope includes *Resource Leverage***:** Analysis of how PPPs mobilise financial, human, and technical resources to facilitate sustainable construction projects; *Expertise Utilization***:** Examination of the role of private sector expertise in enhancing the quality, efficiency, and innovation of sustainable building practices; *Impact Evaluation***:** Evaluation of the environmental, economic, and social impacts of PPP-supported sustainable building projects, and *Policy Frameworks:* Exploration of national and local policies that enable and regulate PPPs, and how these policies affect the outcomes of sustainable building initiatives.

The study acknowledges its limitations and addresses them accordingly. The limitations are as follows: *Language Limitations:* The review includes studies published in English, potentially excluding relevant research published in other languages. This language limitation may lead to an incomplete representation of global research on public-private partnerships in sustainable construction.

Publication Bias: There may be a bias towards published studies that report positive outcomes, potentially excluding unpublished or negative findings. This could result in an overestimation of the effectiveness of public-private partnerships.

Data Availability: The availability and quality of data on public-private partnerships and their outcomes vary across different regions and countries, affecting the comprehensiveness and accuracy of the review. Inconsistent data availability may lead to gaps in the analysis.

Temporal Scope: The review focuses on recent literature, potentially excluding older studies that may not reflect current practices and technologies but still provide valuable insights into the evolution of public-private partnerships in sustainable construction.

Sectoral Variation: The effectiveness of public-private partnerships may vary significantly across different sectors within the construction industry. This review may not capture all sector-specific nuances and impacts comprehensively.

Regulatory Differences: Variations in regulatory frameworks across different countries can influence the outcomes of public-private partnerships. The review might not fully account for these differences, affecting the applicability of the findings to regions with different regulatory environments.

Context-Specific Challenges: The challenges and barriers faced by public-private partnerships can be highly context-specific, and influenced by local political, economic, and social conditions. This review might not capture all these contextual factors comprehensively.

Despite these limitations, the review aims to provide valuable insights into the role of public-private partnerships in promoting sustainable building practices in developing countries, contributing to informed decision-making and policy development in this critical area.

METHODOLOGY

This systematic review employs a structured and rigorous approach to evaluate and synthesise existing literature on the effectiveness of public-private partnerships (PPPs) in supporting sustainable building initiatives in developing countries. The methodology follows that of previous works such as Linares-Espinós et al. (2018), Torres-Carrión (2018), Newman and Gough (2020), and Belur et al. (2021)

To begin, the review conducts a comprehensive search across multiple electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. The search terms include combinations of "public-private partnerships," "PPPs," "sustainable building," "green construction," "developing countries," "resource leveraging," and "expertise utilisation." The focus is on studies published from 2010 to 2024 to capture the most recent and relevant research, with a language restriction to English.

The review sets specific inclusion and exclusion criteria. It includes studies that examine the role of PPPs in sustainable construction, report on the impact of PPPs in developing countries, and provide empirical data or case studies. It excludes studies that do not focus on PPPs, sustainable building, or developing countries, as well as theoretical papers without empirical evidence.

The next step involves data extraction and synthesis. All identified studies are screened based on titles and abstracts to determine relevance. Full texts of potentially relevant studies are retrieved and assessed against the inclusion criteria. Data from the included studies are systematically extracted using a standardised form, capturing key information such as study objectives, methodology, geographical focus, type of PPP, sustainable building practices examined, outcomes measured, and key findings. Extracted data are then synthesised through thematic analysis to identify common patterns, themes, and discrepancies. Quantitative data are tabulated, and qualitative data are coded to facilitate a comprehensive understanding of the findings.

Quality assessment of the included studies is conducted using established criteria, such as the Mixed Methods Appraisal Tool (MMAT) for mixed-methods studies or the Critical Appraisal Skills Programme (CASP) checklists for qualitative and quantitative studies. Studies are evaluated based on their research design, methodology, sample size, data analysis, validity of findings, and relevance to the review’s objectives.

Data analysis and interpretation involve both descriptive and thematic analysis. A descriptive analysis summarises the characteristics and key findings of the included studies. The thematic analysis identifies and synthesises themes related to the effectiveness of PPPs in leveraging resources and expertise for sustainable building initiatives. Comparative analysis across different regions, types of PPPs, and sectors within the construction industry is conducted to identify variations and contextual factors influencing the effectiveness of PPPs.

To address potential biases, the review includes a diverse range of studies, considers both positive and negative findings, and acknowledges publication bias. The limitations related to geographical focus, language restrictions, data availability, and temporal scope are discussed to provide a balanced interpretation of the review's findings.

Finally, the review draws implications for policymakers and stakeholders in developing countries based on the synthesised findings. Actionable recommendations for optimising PPP frameworks to enhance sustainable construction practices are formulated. The review also identifies gaps in the existing literature and directions for future research to guide subsequent studies in this field.

By following this systematic methodology, the review aims to provide robust insights into the role of public-private partnerships in advancing sustainable building practices in developing countries, contributing to the evidence base and informing policy and practice.

FINDINGS ON THE EFFECTIVENESS OF PUBLIC-PRIVATE PARTNERSHIPS IN LEVERAGING RESOURCES AND EXPERTISE TO SUPPORT SUSTAINABLE BUILDING INITIATIVES IN DEVELOPING COUNTRIES

Public-private partnerships (PPPs) are instrumental in advancing sustainable building initiatives in developing countries through the effective utilisation of resources and expertise across various dimensions (Pinz et al., 2021; Batra et al., 2023).

RESOURCE MOBILISATION

*Financial Resources***:** PPPs attract private sector investment, supplementing limited public funds. This infusion of capital enables the execution of large-scale sustainable construction projects that might otherwise be financially unfeasible (Chandrasekhar, 2014; Gansler & Lucyshyn, 2016; Thoradeniya, 2016; Doyle, 2020). Private sector financing often supports initial high costs associated with sustainable technologies and materials, making projects economically viable in the long run (Bielenberg et al., 2016; Floater et al., 2017; Gatti, 2023).

Human Resources: Collaboration between public and private sectors harnesses diverse expertise critical for sustainable development. Private sector entities bring advanced technical skills in engineering, architecture, and construction management (Elia et al., 2020; Mansell et al., 2020; Chun & Evans, 2023). Their innovative approaches complement the public sector's regulatory and policy frameworks, ensuring projects adhere to environmental standards and local building codes.

EXPERTISE UTILISATION

Technical Expertise: The private sector introduces advanced technical knowledge and cutting-edge technologies in sustainable building practices. This expertise spans energy-efficient designs, renewable energy systems integration, and sustainable materials utilization (Mumovic & Santamouris, 2013; Shaikh, 2017; bin Khodir Gaber, 2023). Such technical advancements enhance building efficiency and environmental performance, contributing to reduced operational costs and lower environmental footprints over the building's lifecycle.

Management Expertise: Effective project management practices from the private sector streamline project execution, improve timelines, and optimise cost management (Beckers et al., 2013; Cole, 2017; Meredith, 2017; Venkataraman & Pinto, 2023). This ensures the successful implementation of sustainable building initiatives within allocated budgets and timelines, enhancing project feasibility and stakeholder satisfaction.

INNOVATION AND TECHNOLOGY TRANSFER

Innovative Solutions: PPPs facilitate the adoption of innovative construction techniques and materials aimed at minimising environmental impacts. These include low-carbon construction methods, efficient waste management systems, and sustainable landscaping practices. By integrating such solutions, PPPs drive the evolution of sustainable building standards and practices in developing countries (Zhou, 2015; Dolla & Laishram, 2018; Hunter et al., 2019; Wang et al., 2020; Penagos, 2021).

Technology Transfer: Developing countries benefit from technology and best practice transfers facilitated by PPPs. Knowledge exchange with more developed economies enhances local capacity in sustainable construction, fostering skills development and innovation adoption (Kang et al., 2019; Nawaz & Koç, 2020; Olojede et al., 2020; Pandey et al., 2022). This transfer empowers local stakeholders with the tools and knowledge necessary to independently sustain and advance sustainable building practices.

RISK SHARING

Risk Mitigation: PPPs distribute risks between public and private partners, alleviating the financial burden on any single entity. This risk-sharing mechanism makes sustainable projects more attractive to investors, particularly in volatile economic conditions (Ahmad et al., 2018; Rouhani et al., 2018; Delmon, 2021; Amedanou, 2023; Gatti, 2023). By diversifying risks, PPPs safeguard project continuity and sustainability, ensuring long-term benefits for stakeholders and communities.

Long-term Commitment: The enduring nature of many PPP agreements promotes sustained investment in maintaining and operating sustainable buildings. This long-term commitment enhances the resilience and effectiveness of sustainable infrastructure, supporting ongoing environmental and socio-economic benefits for local populations Christensen & Gabe, 2019; Mawoli, 2021; Mongalo, 2022; Li & Wang, 2023).

POLICY AND REGULATORY SUPPORT

Enabling Policies: Effective PPPs align with supportive policies and regulatory frameworks that incentivise sustainable practices. These policies may include tax incentives, subsidies for green technologies, and streamlined approval processes for sustainable construction projects (Christensen & Gabe, 2018; Cease et al., 2019; Christensen & Gabe, 2019; Owusu-Manu et al., 2021; Zulu et al., 2023;

Oduro et al., 2024). Such regulatory support fosters an enabling environment for private sector participation and investment in sustainable development initiatives.

Compliance and Standards: Public sector involvement ensures adherence to national building codes, environmental regulations, and sustainability standards (Vierra, 2016; Abraham & Gundimeda, 2018; Lambin & Thorlakson, 2018; Ojo, 2020; Abbott & Snidal, 2021; Owino, 2022). This oversight promotes quality assurance and environmental integrity in sustainable building projects, safeguarding against potential environmental impacts and ensuring project sustainability over time.

COMMUNITY AND SOCIAL IMPACT

Social Benefits: PPP-supported sustainable building initiatives contribute to enhanced living conditions, improved energy access, and increased community resilience (Yu et al., 2018; Vassileva, 2022; Shamanina, 2023; Moghayedi et al., 2024). These projects often prioritise affordable housing developments, benefiting marginalised and low-income populations. (Iroz et al., 2024) By addressing housing shortages and improving living standards, PPPs promote social equity and inclusive development in developing countries.

Job Creation: PPPs generate employment opportunities in green jobs, spanning construction, renewable energy installation, and environmental management sectors (Bimesdoerfer et al., 2011; Yu et al., 2018; Wojewnik-Filipkowska & Węgrzyn, 2019; Auktor, 2020; Maslova, 2020; Moszoro, 2021; Wang & Ma, 2021; Kim & Mohommad, 2022; Batra, 2023). This job creation supports local economic development, reduces unemployment rates, and contributes to poverty reduction efforts. By integrating local communities into sustainable development initiatives, PPPs foster socio-economic empowerment and community engagement.

SYNTHESIS FOR THE REVIEW

Public-Private Partnerships (PPPs) play a crucial role in advancing sustainable building initiatives in developing countries by effectively leveraging resources and expertise across various dimensions. This synthesis highlights the key aspects where PPPs contribute significantly to sustainable development.

Resource Mobilization

Financial Resources: PPPs attract substantial private sector investment, which complements limited public funds. This infusion of capital is essential for executing large-scale sustainable construction projects that might otherwise be financially unfeasible. The private sector's ability to finance initial high costs associated with sustainable technologies and materials makes such projects economically viable in the long term.

Human Resources: The collaboration between public and private sectors harnesses a diverse range of expertise critical for sustainable development. The private sector brings advanced technical skills in engineering, architecture, and construction management, which, when combined with the public sector's regulatory and policy frameworks, ensures projects meet environmental standards and local building codes.

Expertise Utilization

Technical Expertise: The private sector introduces advanced technical knowledge and cutting-edge technologies in sustainable building practices. This includes energy-efficient designs, renewable energy systems integration, and the use of sustainable materials, which enhance building efficiency and reduce environmental footprints over the building's lifecycle.

Management Expertise: Effective project management practices from the private sector streamline project execution, improve timelines, and optimize cost management. This ensures the successful implementation of sustainable building initiatives within allocated budgets and timelines, enhancing project feasibility and stakeholder satisfaction.

Innovation and Technology Transfer

Innovative Solutions: PPPs facilitate the adoption of innovative construction techniques and materials aimed at minimizing environmental impacts. These include low-carbon construction methods, efficient waste management systems, and sustainable landscaping practices, driving the evolution of sustainable building standards in developing countries.

Technology Transfer: PPPs enable developing countries to benefit from technology and best practice transfers. This knowledge exchange enhances local capacity in sustainable construction, fostering skills development and innovation adoption, empowering local stakeholders with the tools and knowledge necessary to sustain and advance sustainable building practices independently.

Risk Sharing

Risk Mitigation: PPPs distribute risks between public and private partners, alleviating the financial burden on any single entity. This risk-sharing mechanism makes sustainable projects more attractive to investors, especially in volatile economic conditions, safeguarding project continuity and sustainability.

Long-term Commitment: The enduring nature of many PPP agreements promotes sustained investment in maintaining and operating sustainable buildings. This long-term commitment enhances the resilience and effectiveness of sustainable infrastructure, supporting ongoing environmental and socio-economic benefits for local populations.

Policy and Regulatory Support

Enabling Policies: Effective PPPs align with supportive policies and regulatory frameworks that incentivise sustainable practices. These policies may include tax incentives, subsidies for green technologies, and streamlined approval processes for sustainable construction projects, fostering an enabling environment for private sector participation and investment.

Compliance and Standards: Public sector involvement ensures adherence to national building codes, environmental regulations, and sustainability standards. This oversight promotes quality assurance and environmental integrity in sustainable building projects, safeguarding against potential environmental impacts and ensuring project sustainability over time.

Community and Social Impact

Social Benefits: PPP-supported sustainable building initiatives enhance living conditions, improve energy access, and increase community resilience. These projects often prioritise affordable housing

developments, benefiting marginalised and low-income populations and promoting social equity and inclusive development.

Job Creation: PPPs generate employment opportunities in green jobs, supporting local economic development and reducing unemployment rates. This job creation fosters socio-economic empowerment and community engagement, integrating local communities into sustainable development initiatives.

DISCUSSION ON THE INTERPLAY OF FACTORS IN PUBLIC-PRIVATE PARTNERSHIPS FOR SUSTAINABLE BUILDING INITIATIVES

The effectiveness of public-private partnerships (PPPs) in sustainable building initiatives in developing countries hinges on the interplay of various factors-resource mobilisation, expertise utilisation, innovation, risk-sharing, policy support, and community impact. By leveraging institutional theory, resource-based theory, and contingency theory, we can better understand how these factors interact to influence the success of PPPs in this context.

Resource Mobilisation and Institutional Theory

Institutional theory emphasises the importance of aligning organisational practices with external societal norms and expectations (Meyer & Rowan, 1977; DiMaggio & Powell, 1983). In the context of sustainable building, the mobilisation of financial and human resources from the private sector is driven by institutional pressures for legitimacy, both locally and internationally. Developing countries often face financial constraints, and PPPs attract private-sector investment, supplementing public funds to initiate large-scale projects (Chandrasekhar, 2014; Bielenberg et al., 2016). This alignment with institutional norms-such as international sustainability goals- encourages private sector involvement, enhancing resource mobilisation.

However, resource-based theory complements this view by focusing on how the private sector brings valuable, rare, inimitable, and non-substitutable (VRIN) resources as advanced technical skills and project management expertise that contribute to competitive advantage and project success (Barney, 1991). The public sector's role in setting regulatory frameworks ensures that these resources are directed towards sustainable outcomes, bridging gaps in public capacities (Elia et al., 2020).

Expertise Utilization and Contingency Theory

The effectiveness of PPPs in sustainable building hinges on the alignment of technical and management expertise with the specific needs of the project, as emphasised by contingency theory (Lawrence & Lorsch, 1967). In developing countries, where environmental challenges and regulatory complexities differ, PPPs must tailor their approaches to match these external contingencies. For example, the private sector introduces energy-efficient designs and renewable energy systems, which align with the local context of energy shortages and environmental degradation (Mumovic & Santamouris, 2013).

The public sector, in turn, ensures that projects adhere to national building codes and sustainability standards (Vierra, 2016). This interplay between private technical expertise and public regulatory oversight demonstrates how organizations adapt to external contingencies to achieve sustainable outcomes. Effective management practices, such as streamlined project timelines and cost optimization (Beckers et al., 2013), further illustrate how PPPs are structured to meet specific environmental and socio-political conditions.

Innovation and Technology Transfer Through Resource-Based Theory

Resource-based theory is pivotal in explaining how the private sector's technological innovations contribute to sustainable building practices. The private sector's involvement brings advanced, cutting-edge technologies and innovative solutions to projects, such as low-carbon construction methods and sustainable waste management systems (Zhou, 2015; Dolla & Laishram, 2018). These innovations serve as unique resources that enhance the long-term sustainability and economic viability of building initiatives. The transfer of technology and best practices from developed economies to developing countries expands local capacities and fosters innovation adoption, which is crucial for addressing local sustainability challenges (Kang et al., 2019).

This knowledge transfer is also supported by knowledge management theory (Nonaka & Takeuchi, 1995), which suggests that sustainable building practices are improved through the continuous exchange of tacit and explicit knowledge. PPPs create an environment conducive to knowledge diffusion, where local stakeholders can adopt best practices and innovative technologies for sustainable development.

Risk Sharing and Institutional Theory

The institutional theory also sheds light on the risk-sharing mechanisms within PPPs, which are crucial in ensuring project continuity and attracting investment (Ahmad et al., 2018; Delmon, 2021). By distributing

financial and operational risks between public and private entities, PPPs align with institutional demands for risk mitigation and financial sustainability. This risk-sharing mechanism allows the private sector to confidently invest in sustainable building projects, knowing that the public sector provides regulatory backing and long-term support.

The public sector's involvement ensures compliance with environmental regulations, while the private sector's ability to manage financial risks through long-term commitment ensures the sustainability of projects over time (Mawoli, 2021). Institutional pressures, such as international environmental standards and global development goals, further reinforce the importance of such risk-sharing mechanisms to promote sustainable outcomes.

Policy and Regulatory Support Through Contingency and Institutional Theories

The role of enabling policies and regulatory frameworks in PPPs is closely aligned with both contingency and institutional theories. Policies such as tax incentives, subsidies, and streamlined approval processes (Christensen & Gabe, 2018) create an environment that supports private sector participation in sustainable development. According to contingency theory, these regulatory frameworks must adapt to the specific socio-economic conditions of each country to ensure project success. Effective PPPs are thus contingent upon aligning regulatory support with the local context, ensuring that private sector resources are effectively utilized (Owusu-Manu et al., 2021).

From an institutional perspective, the public sector's role in ensuring compliance with national and international environmental standards provides the legitimacy required to attract private investment. This regulatory oversight not only ensures adherence to sustainability standards but also promotes the long-term environmental integrity of projects (Vierra, 2016).

Community and Social Impact Through Institutional Theory

Institutional theory highlights the importance of aligning PPPs with broader social goals, such as improving living conditions and fostering inclusive development. PPP-supported sustainable building initiatives often prioritize affordable housing and community resilience (Vassileva, 2022; Iroz et al., 2024), which aligns with institutional pressures for social equity and sustainable development. By addressing housing shortages and creating jobs in the green economy, PPPs contribute to social empowerment and poverty reduction, reinforcing their legitimacy within the communities they serve.

This community-oriented focus is crucial for the long-term sustainability of PPP projects, as it enhances stakeholder engagement and ensures that projects are not only environmentally sustainable but also socially inclusive. The creation of green jobs (Yu et al., 2018; Wojewnik-Filipkowska & Węgrzyn, 2019) further exemplifies how PPPs contribute to local economic development, supporting social empowerment through employment opportunities in the construction and environmental management sectors.

Synergizing Theories to Maximize PPP Effectiveness

By synthesizing resource-based, contingency, and institutional theories, the effectiveness of PPPs in sustainable building initiatives can be better understood as the result of a dynamic interplay between resources, expertise, innovation, and regulatory frameworks. Institutional theory underscores the importance of legitimacy and compliance, while resource-based theory highlights the value of unique technical innovations and expertise brought by the private sector. Contingency theory, on the other hand, illustrates the need for aligning strategies with local socio-economic and environmental conditions to achieve success.

Through these theoretical lenses, it is clear that PPPs are most effective when they can mobilize and utilise resources, foster innovation, mitigate risks, and create positive social impacts, all while adapting to and complying with the unique contexts of developing countries. This multi-theoretical approach provides valuable insights for policymakers and practitioners seeking to enhance the effectiveness of PPPs in promoting sustainable development.

CONCLUSIONS

The exploration of public-private partnerships (PPPs) in advancing sustainable building initiatives in developing countries reveals several critical insights, emphasising the need for a multi-faceted approach to enhance their effectiveness. The interplay of various factors-including resource mobilisation, expertise utilisation, innovation, risk-sharing, policy support, and community impact-underscores the complexity of these partnerships and their potential for driving sustainable development.

The capacity of PPPs to attract private sector investment is crucial for overcoming financial constraints in developing countries. By supplementing limited public funds, PPPs facilitate large-scale sustainable construction projects that contribute significantly to economic and environmental goals. This mobilization

of resources is further enhanced by institutional pressures for legitimacy, ensuring that private sector participation aligns with broader sustainability objectives.

Moreover, the diverse expertise brought by private sector partners is essential for the successful implementation of sustainable building practices. The combination of technical knowledge and effective management practices allows for the tailoring of strategies to meet specific project needs, which is vital in the context of varying socio-economic and political conditions. The alignment of these skills with local requirements, as emphasised by contingency theory, ensures that projects are both feasible and impactful. PPPs also serve as platforms for technological innovation and knowledge transfer, empowering local stakeholders with cutting-edge practices and skills necessary for sustainable construction. The role of resource-based theory highlights how these innovations create competitive advantages that contribute to the long-term sustainability of projects. As developing countries adopt these technologies, they enhance their capacity to address local challenges, reinforcing the importance of continuous knowledge exchange.

Another pivotal aspect of PPPs is their risk-sharing mechanism, which is crucial for attracting private investment and ensuring project viability. By distributing risks between public and private entities, these partnerships create a more secure environment for investment, particularly in volatile economic conditions. This not only enhances project sustainability but also aligns with institutional demands for accountability and financial stability.

Enabling policies and regulatory frameworks play a critical role in facilitating the success of PPPs. The alignment of these frameworks with sustainable practices, as seen through institutional theory, fosters an environment conducive to private sector involvement. Policymakers must ensure that regulatory support is tailored to local contexts, providing incentives that encourage participation and adherence to sustainability standards.

Lastly, the social dimensions of PPPs cannot be overlooked, as these partnerships have the potential to significantly enhance community welfare. By prioritising affordable housing, job creation, and social equity, PPPs contribute to the resilience of local communities. The focus on community benefits reinforces the legitimacy of these partnerships and ensures their long-term sustainability.

In conclusion, the effectiveness of public-private partnerships in advancing sustainable building initiatives in developing countries is contingent upon a synergistic approach that integrates various factors and

theoretical frameworks. Policymakers, practitioners, and stakeholders must recognise the dynamic interplay of resources, expertise, innovation, risk-sharing, and community impact to maximise the potential of PPPs. By addressing the identified challenges and leveraging the strengths of both sectors, PPPs can significantly contribute to achieving sustainable development goals, fostering inclusive growth, and promoting environmental stewardship in developing countries.

POLICY IMPLICATIONS

Based on these insights provided in the conclusions, several policy recommendations can be made to enhance the effectiveness of PPPs in promoting sustainable building practices in developing countries.
First, governments should develop comprehensive frameworks that define the roles and responsibilities of public and private partners in PPP agreements. Clear guidelines can streamline processes, mitigate misunderstandings, and facilitate smoother collaboration.

Second, it is essential to establish financial mechanisms such as grants, tax incentives, and low-interest loans to attract private sector investment in sustainable projects. These incentives can help offset initial costs and improve the economic viability of sustainable construction initiatives.

Third, governments should prioritize capacity-building programs that provide training and resources to local stakeholders. This can enhance technical skills and ensure that communities are equipped to engage meaningfully in PPP initiatives, thereby improving project outcomes.

Fourth, fostering a culture of innovation through research and development grants can further encourage the adoption of cutting-edge technologies in sustainable building practices. By promoting collaboration between academic institutions and the private sector, developing countries can facilitate knowledge exchange and improve local expertise.

Lastly, robust monitoring and evaluation systems should be implemented to assess the outcomes of PPPs regularly. By collecting and analyzing data on project performance, stakeholders can identify best practices, learn from failures, and continuously improve the effectiveness of PPP initiatives.

The effectiveness of public-private partnerships in advancing sustainable building initiatives in developing countries is contingent upon a synergistic approach that integrates various factors and theoretical

frameworks. Policymakers, practitioners, and stakeholders must recognize the dynamic interplay of resources, expertise, innovation, risk-sharing, and community impact to maximize the potential of PPPs.

By addressing the identified challenges and leveraging the strengths of both sectors, alongside the recommended policies, PPPs can significantly contribute to achieving sustainable development goals, fostering inclusive growth, and promoting environmental stewardship in developing countries.

DIRECTIONS FOR FUTURE RESEARCH

Directions for future research should focus on several key areas. First, there is a need for comparative studies that evaluate the effectiveness of PPP models across different developing countries. Such studies can identify contextual factors that influence success and provide a richer understanding of best practices that can be adapted to various local settings.

Second, longitudinal research that examines the long-term impacts of PPPs on community welfare and environmental sustainability is crucial. This can help establish causal relationships and provide evidence of the sustainability of outcomes achieved through PPP initiatives.

Third, further exploration into the role of digital technologies and innovations in enhancing PPP performance could yield significant insights. Investigating how emerging technologies-such as blockchain, artificial intelligence, and data analytics-can improve transparency, efficiency, and accountability in PPPs can inform future practices.

Additionally, research should investigate the challenges faced by marginalised communities in engaging with PPPs. Understanding barriers to participation can lead to the development of more inclusive policies and practices that ensure equitable benefits from sustainable initiatives.

Lastly, future studies could assess the effectiveness of specific policy interventions in enhancing PPP outcomes. This could involve analysing the impact of regulatory frameworks, financial incentives, and capacity-building initiatives on the performance of PPPs in sustainable building projects.

By addressing these areas, future research can contribute to a deeper understanding of the dynamics of PPPs in sustainable development and provide valuable insights for policymakers, practitioners, and communities engaged in these partnerships.

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