CLIMATE FINANCE MOBILIZATION AND SUSTAINABLE HOUSING DEVELOPMENT IN NIGERIA: EVIDENCE FROM HOUSING SECTOR STAKEHOLDERS

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International Academic Journal of Economics and Finance (IAJEF) | ISSN 2518-2366

Received: 18th August 2026

Published: 4th September 2026

Full Length Research

Available Online at: https://iajournals.org/articles/iajef_v5_i4_465_478.pdf

Citation: Ogonegbu, E. A. (2026). Climate finance mobilization and sustainable housing development in Nigeria: evidence from housing sector stakeholders. *International Academic Journal of Economics and Finance, 5*(4), 465-478.

ABSTRACT

While climate finance is increasingly acknowledged as a key enabler for sustainable housing development, empirical evidence on the impact of climate finance on housing outcomes is still limited in developing countries. This study examined the effect of climate finance mobilization on sustainable housing development in Nigeria. It was based on Financial Intermediation Theory, and had a positivist philosophy and an explanatory cross-sectional design. The target population comprised 711 institutions involved in climate finance and sustainable housing development. The number of respondents targeted was 399, obtained by applying Yamane's formula, and 260 valid responses were obtained by stratified non-probability sampling using purposive sampling. The data were gathered by a structured questionnaire with a 5-point Likert scale and analyzed with PLS-SEM in SmartPLS 4. The results indicated that the mobilization of climate finance had a positive and statistically significant impact on sustainable housing development ($\beta = 0.177$, $t = 3.985$, $p < .001$), and a small substantive effect ($f^2 = 0.048$). The study finds that enhanced mobilization of climate finance through diversified funding sources, innovative financing instruments, and enhanced geographic distribution can support sustainable housing development in Nigeria.

Key words: Climate finance mobilization; sustainable housing development; housing finance; environmental sustainability; housing affordability; Nigeria.

INTRODUCTION

Background to the Study

The effects of climate change have increased the urgency to advance sustainable development in various economic sectors, such as housing (UN-Habitat, 2022; IEA, 2023). The built environment is a significant source of GHGs and is vulnerable to climate risks, and it is essential to develop environmentally sustainable, climate-resilient, and affordable housing systems (Tripathi et al., 2022; Bungau et al., 2022). Climate finance has become an important tool to achieve these goals (UNFCCC, 2022; Prasad et al., 2022). Global climate finance is estimated to have reached US$653 billion per year in 2019-2020, but there are concerns about its mobilization and deployment in developing countries (Naran et al., 2022; Long, 2021).

The financing gap is particularly large in Africa, where financial markets are less developed and institutional capacity is limited, which hinders investment in climate-resilient housing (Belianska

et al., 2022; Stout et al., 2024; Beavor et al., 2023). Nigeria, as one of the largest economies in Africa, has a housing deficit of over 20 million units, high urbanization rates, shallow mortgage markets, and low adoption of sustainable building practices (CAHF, 2024; UN-Habitat, 2022). Climate finance for Nigeria has focused on energy, and there has been relatively little investment in sustainable housing (Beavor et al., 2023; Stout et al., 2024). Empirical evidence on the impact of climate finance mobilization on sustainable housing development in Nigeria is still limited, despite the increasing interest in climate finance (Edeminam & Akpasoh, 2023). This study fills this gap.

Statement of the Problem

The housing deficit in Nigeria is over 20 million units, and the rate of sustainable and affordable housing development is relatively low (CAHF, 2024; Ezennia, 2022). The use of green building is still in its infancy (Unegbu et al., 2025), and the challenges are exacerbated by climate risks such as flooding and heat stress (Awolala et al., 2022; Amhenya et al., 2025). The housing finance market is shallow, with low mortgage penetration and high financing costs (CAHF, 2024; Ojo et al., 2022). Climate finance has not been effectively mainstreamed into Nigeria's housing sector (Awolala et al., 2022), and there is little tracked finance directed towards climate-resilient housing infrastructure (Stout et al., 2025). Previous studies have been conducted on the energy and industrial sectors (Prasad et al., 2022; Moore & Doyon, 2023) or macroeconomic analysis of climate finance (Kouwenberg & Zheng, 2023; Lee et al., 2022), but with little focus on Nigeria's housing sector. There are few studies that have explored climate finance mobilization as a multi-dimensional phenomenon (Bhandary et al., 2021).

Objective of the Study

To examine the effect of climate finance mobilization on sustainable housing development in Nigeria.

Research Hypothesis

H_0: Climate finance mobilization has no significant effect on sustainable housing development in Nigeria.

H_1: Climate finance mobilization has a significant effect on sustainable housing development in Nigeria.

LITERATURE REVIEW

Climate Finance Mobilization

Climate finance mobilization is the process of mobilizing and allocating public and private funds for climate mitigation and adaptation (UNFCCC, 2022). Prasad et al. (2022) suggest that the magnitude of the climate investment requirements in emerging economies calls for a substantial increase in private investment and public funding. A significant step was taken at COP15 in 2009,

when developed countries committed to providing USD 100 billion per year to developing countries, which was formalized in the Green Climate Fund at COP16 (Kouwenberg & Zheng, 2023). While diversified funding bases are supported by the literature, there is evidence that financial flows are still focused on mitigation activities, systematically excluding housing (Naran et al., 2022; Bhandary et al., 2021; Chelminski, 2022; Beavor et al., 2023).

Diversification of funding can lower reliance on specific channels and may lead to more stable flows of climate finance (Belianska et al., 2022), but it does not necessarily mean that funding is accessible, as private adaptation finance is still limited by investment risk and poor enabling conditions (Stoll et al., 2021; Kawabata, 2023). While the proliferation of instruments has grown from carbon-market mechanisms to green bonds, sustainability bonds, concessional loans and guarantees (Rossitto, 2020; Bhandary et al., 2021), instrument proliferation does not ensure availability in Nigeria's housing sector (Islam, 2022; Beavor et al., 2023). As far as geographic distribution is concerned, highly vulnerable countries might be less likely to receive climate finance than countries with better institutional readiness (Islam, 2022; Price, 2021), and national-level mobilization may coexist with unequal access across Nigeria's geopolitical zones (Skovgaard et al., 2023; Funder & Dupuy, 2022; Stout et al., 2024).

Sustainable Housing Development

Sustainable housing development comprises environmental sustainability and housing affordability (Bungau et al., 2022; Galster & Lee, 2021). Environmental sustainability is achieved by minimizing environmental impacts during the building's life cycle by implementing energy-efficient systems, sustainable materials, and climate-responsive design (Winston, 2021; Waqar et al., 2023; Almusaed et al., 2024; Rezvani et al., 2023). But scaling environmental sustainability is challenging in low finance access environments (Debrah et al., 2022). Housing affordability is linked to income, housing supply, and financial accessibility (Haffner & Hulse, 2019; Galster & Lee, 2021), and is especially difficult in developing markets where high interest rates, low mortgage penetration, and construction inflation make it less accessible (Moghayedi et al., 2022; Bhanye et al., 2024; Michaelowa et al., 2021).

Theoretical Framework

The study is based on Financial Intermediation Theory (Gurley & Shaw, 1960) which is the theory that describes the process of financial institutions raising funds from savers and lending them to productive investment. The theory acknowledges that transaction costs and information asymmetry affect financial markets (Allen & Santomero, 1997), that intermediaries serve delegated monitoring functions (Diamond, 1984), and that liquidity transformation is an important function of intermediaries in the context of capital-intensive housing investment (Diamond & Dybvig, 1983). Modern financial intermediation includes risk management, financial product development, and capital allocation (Boot & Thakor, 2009), including guarantees, concessional finance, blended finance, and sustainable debt arrangements relevant to climate finance (Griffith-Jones et al., 2020; OECD, 2025). Climate finance mobilization is a classic intermediation process

of linking up surplus financial resources and investment opportunities, particularly in Africa where the need for climate finance is greater than the supply (Stout et al., 2024; Belianska et al., 2022).

Empirical Review and Research Gap

Evidence at the national or cross-country level indicates that climate finance has a positive impact on environmental outcomes, while evidence on housing is scarce (Lee et al., 2022; Liu et al., 2024; Liu & Paan, 2024; Zoungrana et al., 2024). Agyekum et al. (2022) list the drivers of green-building finance in Ghana without separating out the mobilization. Beavor et al. (2023) demonstrate that the buildings sector in Nigeria is a small recipient of climate finance, but they do not statistically estimate the mobilization effects. Stout et al. (2024) offer descriptive mapping without causal modelling. The key gaps are: climate finance as an aggregate concept; limited housing-specific outcomes; affordability not considered in relation to environmental sustainability; limited use of structural modelling in Nigeria (Odoyi & Riekkinen, 2022; Obianyo et al., 2021; Galster & Lee, 2021; Bhandary et al., 2021). This study aims to fill these gaps with the primary survey data and PLS-SEM.

RESEARCH METHODOLOGY

Research Philosophy and Design

The study adopted a positivist paradigm and quantitative explanatory cross-sectional design (Creswell & Creswell, 2018; Saunders et al., 2019).

Population, Sample Size, and Sampling

The target population comprised 128,320 eligible professionals from 711 institutions in Nigeria's climate finance and sustainable housing sectors (CAHF, 2024). Using Yamane's (1967) formula at 5% margin of error, a sample of 399 respondents was determined. Stratified non-probability sampling with purposive selection was employed (Saunders et al., 2019).

Table 1: Sample Size Distribution

Category	Institutions	Target Population	Sample
Commercial Banks	28	112,000	50
Primary Mortgage Banks	33	3,300	45
Development Finance Institutions	2	1,200	15
International DFIs	3	800	15
Other Housing Investment Institutions	2	350	10
Real Estate Development Companies	637	6,370	226
Government Agencies	5	4,200	28
Standard-Setting and Advocacy Bodies	1	100	10
Total	**711**	**128,320**	**399**

Note. Compiled by the researcher based on institutional records and official directories (2026).

Data Collection, Reliability, and Validity

The data were gathered by a structured questionnaire with a five-point Likert scale (Hair et al., 2022). The diversity of funding sources, climate finance instruments, and geographic distribution of climate finance mobilization were used to measure climate finance mobilization. Environmental sustainability and housing affordability were used to measure sustainable housing development. The data was gathered through email, Google Forms and printed questionnaires in all six geopolitical zones (Sekaran & Bougie, 2020). The Cronbach's Alpha values for the pre-test were 0.871 (mobilization) and 0.860 (SHD), both of which were above the 0.70 threshold (Kawakami et al., 2020). Face, content and construct validity were used to establish the validity of the instrument (Hassan, 2024).

Table 2: Operationalization and Measurement of Study Variables

Variable	Indicator	Operationalization	Scale
Climate Finance Mobilization (IV)	Diversity of Funding Sources	Extent of access to public, private, domestic, and international climate finance sources	Five-point Likert
	Climate Finance Instruments	Availability and use of green bonds, sustainability bonds, concessional loans, guarantees, and blended finance	Five-point Likert
	Geographic Distribution	Extent to which climate finance reaches different regions, urban-rural areas, and stakeholder groups	Five-point Likert
Sustainable Housing Development (DV)	Environmental Sustainability	Extent of renewable energy use, water efficiency, green building practices, waste reduction, sustainable materials, and climate-responsive features	Five-point Likert
	Housing Affordability	Affordability relative to household income, access to concessional finance, mortgage accessibility, and rent-to-own arrangements	Five-point Likert

Note. Table developed by the researcher based on the reviewed literature and the conceptual framework of the study.

Data Analysis

Data were analyzed using IBM SPSS Version 28 and SmartPLS 4. PLS-SEM was used to assess measurement and structural models (Hair et al., 2022; Henseler et al., 2015). Statistical inference was based on bootstrapping with 5,000 resamples at 5% significance (Chin et al., 2003; Streukens & Leroi-Werelds, 2016). The model was specified as:

$$SHD = \beta_0 + \beta_1(CFM) + \zeta$$

Where SHD = Sustainable Housing Development, CFM = Climate Finance Mobilization, and ζ = residual.

The broader doctoral study examined three climate finance mechanisms, namely mobilization, capitalization and incentivization, together with the moderating role of Government Policy. This article presents a focused analysis of the Climate Finance Mobilization–Sustainable Housing Development relationship from the broader structural model.

RESEARCH RESULTS

Response Rate and Respondent Characteristics

Of 399 distributed questionnaires, 260 were returned complete and usable (65.2% response rate), all free of missing data. The majority of respondents (83.8%) were male; 65.0% held a Master's degree and 8.8% a PhD. Professional experience was substantial: 35.8% had over 20 years. Regarding institutional affiliation, 76.5% were from real estate development companies, 5.0% each from primary mortgage banks and government agencies, and 3.8% from commercial banks.

4.2 Descriptive Statistics

Table 3: Descriptive Statistics of Study Variables

Construct	N	Average Item Mean	Item Mean Range	Item SD Range
Climate Finance Mobilization	260	2.13	1.88–3.34	1.012–1.218
Sustainable Housing Development	260	2.71	2.13–3.50	0.896–1.244

Note. Average item mean is the arithmetic average of the individual item means. Source: Researcher's computation using IBM SPSS Version 28 from field survey data (2026).

The lowest average item rating (2.13) was for climate finance mobilization, which indicates that access to a variety of funding sources and climate finance instruments is limited. Sustainable housing development had a combined average of 2.71, with the perceptual dimension (2.31) being lower than the objective dimension (3.11).

Reliability, Validity, and Correlation

Table 4: Measurement Model: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (ρc)	AVE
Climate Finance Mobilization	0.881	0.905	0.523
Sustainable Housing Development	0.860	0.890	0.479

Note. Source: Researcher's computation using SmartPLS 4 from field survey data (2026).

All constructs exceeded the 0.70 Cronbach's Alpha threshold (Nunnally, 1978). Composite reliability values of 0.905 and 0.890 fell within the recommended 0.70–0.95 range (Hair et al., 2021). Climate finance mobilization achieved an AVE of 0.523, satisfying the 0.50 criterion (Fornell & Larcker, 1981). Sustainable housing development recorded an AVE of 0.479, slightly

below the threshold, but was retained for its theoretical importance. All HTMT values fell below 0.85, confirming discriminant validity (Henseler et al., 2015). Spearman's correlation showed a significant positive association between the constructs ($\rho = 0.444$, $p < 0.01$).

Structural Model and Hypothesis Testing

Inner VIF was 1.501, well below the 3.0 threshold (Hair et al., 2022). The structural model was estimated using bootstrapping with 5,000 resamples.

Table 5: Structural Model: Direct Effect of CFM on SHD

Relationship	β	STDEV	t-statistic	p-value	Decision
CFM → SHD	0.177	0.044	3.985	< .001	H_0 Rejected

Note. $R^2 = 0.560$ (direct model); $f^2 = 0.048$ (small effect). Source: SmartPLS 4 bootstrapping output based on field survey data (2026).

Climate finance mobilization had a positive and statistically significant effect on sustainable housing development ($\beta = 0.177$, $t = 3.985$, $p < .001$), with a small substantive effect ($f^2 = 0.048$) per Cohen's (1988) guidelines. The null hypothesis was rejected.

RESEARCH DISCUSSION OF FINDINGS

The findings show that climate finance mobilization had a positive and statistically significant effect on sustainable housing development in Nigeria ($\beta = .177$, $p < .001$). The relatively low descriptive rating of 2.13, together with the positive structural relationship, suggests that mobilization remains limited in practice, although greater availability of climate-aligned financial resources is associated with better sustainable housing outcomes (Edeminam & Akpasoh, 2023; Beavor et al., 2023).

The discovery aligns with the findings of Edeminam and Akpasoh (2023) which noted that Nigeria's mobilization of climate finance needs to be strengthened through domestic resource mobilization and international support. It also supports the findings of Beavor et al. (2023) who found that there are major financing challenges in Nigeria's shift to low-carbon buildings. The finding is also corroborated by Lee et al. (2022) who reported positive climate-finance impacts on environmental outcomes in developing countries and Belianska et al. (2022) who identified a variety of financial instruments for climate-finance needs in Sub-Saharan Africa. Prasad et al. (2022) and Griffith-Jones et al. (2020) also highlighted the importance of development finance institutions and public-private mechanisms in unlocking private climate capital.

The positive effect supports the Financial Intermediation Theory. Gurley and Shaw (1960) conceptualized intermediaries as mobilizers of financial resources, and Diamond (1984) emphasized their role in reducing information asymmetry. Commercial banks, mortgage institutions and development finance institutions can play a role in sustainable housing by bringing in climate-aligned resources and channelling them into viable investments. The discovery also

aligns with Sustainable Development Theory, which states that funds allocated to climate goals can be used to achieve results that include economic, environmental, and social factors (WCED, 1987; Sachs, 2015).

But the size shouldn't be exaggerated. The path coefficient ($\beta = 0.177$) was modest and the effect size small ($f^2 = 0.048$), suggesting that mobilization is necessary but not sufficient (Cohen, 1988). The mobilised finance should also be structured, allocated and applied to viable projects (Prasad et al., 2022; Griffith-Jones et al., 2020; Casady et al., 2024). The finding should also be understood in the light of the limitations of the cross-sectional design, which does not imply temporal causation (Wang & Cheng, 2020).

CONCLUSION AND POLICY IMPLICATIONS

Conclusion

The study results indicate that the mobilization of climate finance has a positive and statistically significant impact on sustainable housing development ($\beta = 0.177$, $p < .001$), but the substantive impact is small ($f^2 = 0.048$). The ability to mobilise financial resources from a variety of sources is relevant to supporting sustainable housing in Nigeria (Belianska et al., 2022; Prasad et al., 2022), but mobilising financial resources is not enough; they need to be structured and translated into viable housing investments (Griffith-Jones et al., 2020; Casady et al., 2024).

Policy Implications

The Federal Government, financial institutions and development finance institutions should diversify the sources of climate finance for the housing sector, including through domestic public funding, international climate funds, green debt markets and public-private partnerships (UNFCCC, 2022; Belianska et al., 2022). The CBN should enhance Sustainable Banking Principles to incorporate provisions for housing finance that are climate aligned (CBN, 2012). The Federal Ministry of Housing and Urban Development should work with the National Council on Climate Change to create a specific climate finance plan for housing (Climate Change Act, 2021; Climate Policy Initiative, 2024). Financial institutions should develop products that are accessible, such as green mortgages, concessional credit lines, and blended-finance products (CAHF, 2024; Haffner & Hulse, 2019).

Limitations and Suggestions for Future Research

The cross-sectional design restricts causal inferences (Creswell & Creswell, 2018). The study was self-reported, primarily included real estate development respondents, and used a composite measure of mobilization rather than breaking down individual funding sources (Sekaran & Bougie, 2020). Longitudinal designs, incorporation of independently verified project-level data, and comparative studies across African countries should be used in future studies (Hair et al., 2022; Stout et al., 2024; Agyekum et al., 2022). Research on the demand side of sustainable housing,

such as willingness to pay and access to green mortgages, is also warranted (Galster & Lee, 2021; Bhanye et al., 2024).

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