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RESEARCH ARTICLE

Sustainable Housing and Market Adoptability in Urban and Peri-Urban Nigeria: Bridging Architectural Innovation and Real Estate market Demand

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Abstract

The rapid rate of urbanization in Nigeria has intensified the urgent need for housing that balances environmental sustainability with market attractiveness. Hence, the study examines sustainable housing features, its adoptability and integration in the Osogbo and Ofatedo neighbourhoods in Osun State. The study adopted mixed-methods research approach which allow for the integration of physical field surveys, interviews, and architectural design assessments. Both descriptive and inferential statistical tool were employed in the analysis of the data collected. 300 respondents were sample for the study based the availability and their willingness to participate in the exercise. The study apart from exploring how innovative housing features align with the preferences of the residents, underscore the gap between sustainable housing features integration, innovation and market adoptability. Data from the field reveal locational-specific differences between urban and peri-urban residents. The urban resident prioritizes renewable energy sources and the use of energy-efficient materials, while peri-urban residents place more emphasizes on availability, affordability, and cheap-maintenance finishes. Basic limitations to the current research are the unwillingness of respondents to divulge real estate market information and the lack of adequate knowledge on latest architectural innovative technologies. The study recommends among others, the need for a context-driven design that infuses sustainable housing models that reflect local realities. *The paper is among the few indigenous papers to have highlighted the need for a tailored strategies that harmonizes sustainability with socio-economic realities.*

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1. INTRODUCTION

The concept of sustainable housing has recently emerged as a cardinal focus area in the global urban development discourse. This is more pronounce in the context of the rapidly urbanizing economies as Nigeria. The unprecedented rate of urbanization, population explosion and cities expansion subsuming the peri-urban settlements signifies imminent danger. Situation as this, often exacerbated momentous pressures on housing availability, which meets the social, economic and environmental components of housing sustainability criteria. However, the quality of life and long-term resiliency could be enhanced through the fusion of climate responsive architecture, energy efficiency with resource conservation. Previous researchers have seen this concept of variable integration as sustainable design concepts into housing design, that if adequately implemented could reduce environmental impacts (Adediran *et al*., 2022;

Olajide & Akinyemi, 2021). Nonetheless, the success or otherwise of housing sustainability is not only measured through innovative design model. The integration of the knowledge of real estate market adoptability plays significant role in the determination of the relevant solutions to be integrated and maintained by real estate owners.

Nonetheless, Olotuah and Adegoke, (2020) argued that issues of housing demand in Nigeria, continues to outpace the supply side of housing. The urban neighbourhoods often witness fast densification rate with the peri-urban settlements experiencing its spillover effect of the neighbouring city growth. Although Akinwale and Obafemi, (2019) asserted that, urban residents oftentimes exhibited some level of sustainability awareness and willingness to invest in environmentally sustainable features, as improved insulation, solar energy, and water-efficient systems, provided it align with the expected city lifestyle and aesthetic preferences of the residents. On the other hand, as peri-urban neighbourhoods are becoming more progressively exposed to sustainable innovative technologies, they often become inclined to socio-economic restraint that delimit their acceptance of costly features or expensive innovative design, thereby making availability, affordability and functionality to become a more critical priority than the cutting-edge architectural solutions. Contextually, Osun State presents a compelling environment for the investigation of these dynamics. Osogbo, is the state capital of Osun state, Nigeria, which combines both cultural heritage with contemporary urbanization physical phenomenon. Hence, creating a real property market where purchasers are exposed to modern building design disposition but are often mindful of the sensitivity of such design features due to cost and livability issues. Ofatedo, on the other hand is an exemplify peri-urban locality, located on the urban fringe of Osogbo, with a rising housing demand. Most of the residents have limited access to financial capacity that could support and encourage sustainable expensive building materials usage. In the consideration of these two localities, the study thereby compared both neighbourhoods to expose how sustainable housing design features could be tailored towards diverse market contexts. The aim is to enhance its adoption rates while at the same addressing the socio-cultural and environmental objectives; hence, a major novelty of the current study.

Earlier studies in Nigeria paid more attention to either issues on sustainable housing design or market preferences (Bello & Salami, 2021 and Ogunmakin *et al*., 2020). Though, few Nigerian studies have systematically ventured into the analysis of the understanding of the intersection between architectural innovative design features and real property demand in the context of population explosion and the rapid urbanization rate. Therefore, the comprehensive understanding of the interplay of these variables may be crucial in this context. The current study is situated at the intersection between real estate practice, architecture and sustainability. This is to provide unjust insights for real estate developers, policymakers, and architects with the quest of creating housing solutions that are sustainable, innovative and market oriented. The central research themes used to guide the study are among others, the determination of the most valued sustainable housing design characteristics by the respondents; the variance in the preferences of the urban and peri-urban markets and the possible strategies that can be adopted to fill the observed gap between market adoptability and sustainable design feature innovations in the study area..

2. LITERATURE REVIEW

The rate of urban expansion and population explosion in most Nigerian cities has greatly exacerbated the intensity of market demand for housing, particularly at the urban and peri-urban areas, which balances environmental sustainability with market appeal. This section of the research work evaluates urban and peri-urban zones' sustainable housing features, its adoptability and marketability in Nigeria, with specific focus on Osogbo and Ofatedo urban and peri-urban neighbourhoods in Osun State, Nigeria. The concept of sustainable housing design characteristics covers strategies oftentimes adopted to support skillful and productive energy usage, environmental preservation, and the utilization of local materials. The significance of infusing passive design methodologies and ways through which ecological footprint in residential buildings can be reduced was detailed by Ogunmakin *et al*. (2020). Likewise, Akinwale and Obafemi (2019) accentuated the possibilities of adopting vernacular architecture to achieve sustainability goals, thereby, propaedeuting designs that are conventional but contextually appropriate and resource efficient.

The current situation in Nigeria, particularly, in the areas of building material cost and energy crisis, has prompted more recent studies on ways through which sustainable design feature concept adoption and integration can be explored and possibly injected into mass housing projects ideology without significantly

adding to the building costs. Ajayi *et al*. (2024) pointed out ways through which sustainable design concept can be incorporated into mass housing projects, which will guarantee home availability, affordability and environmental friendliness. Though the study further identified issues on housing solutions that suit both short-term demands and long-term community viability on sustainable design principles in the emerging nations. This therefore, leads to other issues of market acceptability of sustainable housing feature concepts in the developing nations. More so, several other factors have been identified to be the influencing or determining variables of market acceptability of sustainable housing in Nigeria. These factors are among others: availability and affordability factors, cultural and religious preferences, and awareness of other environmental issues. In line with this assertion, Olubi and Aseyan (2022) argue that, despite the growing interest in the need for sustainable housing features, particularly among urban dweller, economic constraints and limited access to green technologies hinder its widespread adoption. While affordability and cost are identified as the basic constraints among the peri-urban homeowners, the dearth of technological expertise is another area of critical concern. This was further affirmed by Mokunfayo and Babatunde (2024) in their study of peri-urban impact on housing, environmental quality, and residents' socio-demography. An effective and consistent policy and institutional framework plays a vital role in the promotion, adoption and implementation of the sustainable housing concept in Nigeria. Though it is on record that, the Nigerian government has initiated a series of programs and initiatives targeted at promoting and encouraging green building practices, which implementation remains inconsistent and unachievable. Nevertheless, despite the high-level awareness of sustainable housing features among the built environment professionals, its acceptability and integration level according to Oke (2025), remains low due to financial and other pecuniary constraints as well as an inconsistent regulatory framework.

3. METHODOLOGY

3.1 Study Area

Osogbo (Figure 2) is the capital city of Osun state in Southwestern Nigeria. Osogbo is located at the center of the state and lies approximately between latitudes 7°46′N and longitudes 4°34′E, known for its cultural heritage and significance. Osogbo shares boundaries with Ede, Ilesha, Iragbiji, and Ikirun. The topography of Osogbo is generally undulating, with an elevation of about 320 meters (1,050 feet) above sea level, with some areas slightly rising higher. It is the home of the Osun-Osogbo Sacred Grove. The famous Osun River flows across the city. The town is a vibrant commercial hub that blends culture with modern development.

Ofatedo (Figure 1) is a historical town of migrants from Offa after the fall of Offa to the Ilorin warriors. The fortune of the city is tied to Ede and other Yoruba towns. Ofatedo is in the Egbedore Local Government Area but is found near Osogbo and Ido Osun. Ofatedo is a peri-urban settlement found along the Osogbo – Oke-gada road. Osogbo is the capital city of Osun state, Nigeria.

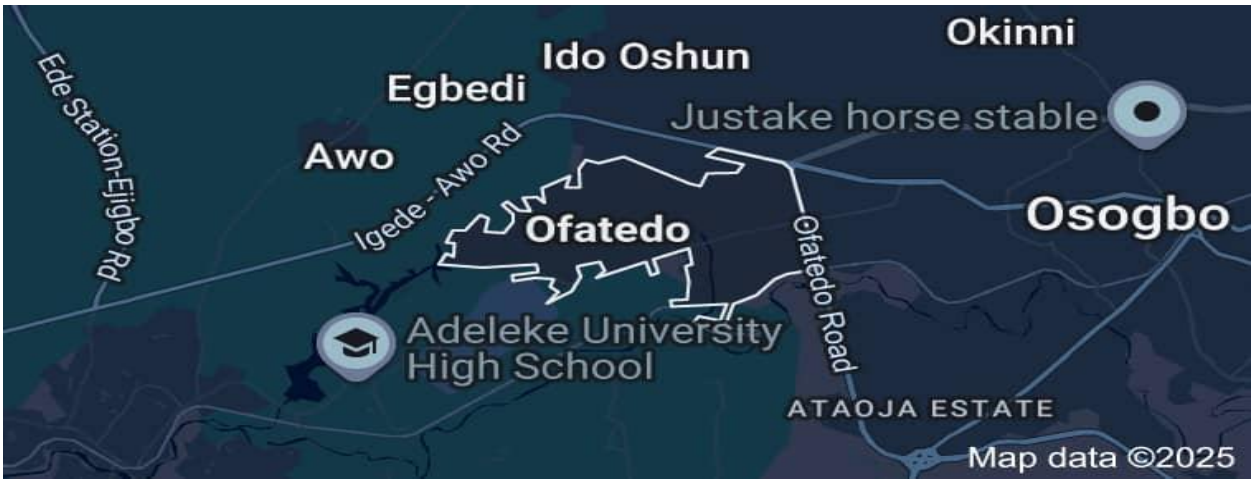

Figure 1: Map of Ofatedo in Egbedore Local Government Area

Figure 2: Map of Osogbo, the capital of Osun State

3.2 Method

The study adopted a mixed methods research approach, integrating both quantitative and qualitative approaches to investigate sustainable housing features and real estate market demand in Osogbo (urban) and Ofatedo (peri-urban) zones of Osun state. The targeted population for the study is landlords, prospective developers/tenants, estate managers, and architects. A stratified random sampling technique was used to ensure adequate representation of the sample across income levels. Three hundred (300) respondents were randomly selected and used for the study based on their availability and willingness to participate in the exercise. furthermore, twenty (20) key informants who are either developers/tenants, architects, or estate managers were purposively selected and used for the focus group discussion/interviews. In the collection of data that captures the true picture of the respondent's perceptions on sustainable housing features, factors influencing choices of housing features, and the willingness to pay, were considered. The study used structured questionnaires, while issues on the challenges, opportunities, and professional perspectives were explored using semi-structured interviews. The data collected were analyzed using descriptive and inferential statistical tools. The qualitative data were transcribed, triangulated, and thematically analyzed.

The study established content validity by aligning the questionnaire contents with current relevant literature, sustainable housing, and real estate market adaptability frameworks. Cronbach's Alpha was conducted, and a reliability coefficient gave the result of 0.79 was obtained. This falls within an acceptable level of internal consistency. An independent researcher was consulted to examine the interview transcripts to ensure objectivity and credibility of the analysis.

4.0 RESULTS AND DISCUSSIONS

Data obtained from the field were analyzed, and the results of the findings are presented in Tables. Results of findings on the determiner of the critical sustainable housing features in the study area, the variance in the respondents' preferences in both the urban and peri-urban real property markets and the possible strategies that can be adopted to fill the observed gap between market adoptability and innovative sustainable design in the study area are presented in Tables. The study delimit it scope to the integration of sustainable features in buildings rather than the building design itself.

4.1 Demographic Profile of Respondents

The survey questionnaires administered on 300 respondents comprises of 150 respondents each from the urban zone (Osogbo) and the peri-urban area (Ofatedo) respectively. The demographic breakdown is presented in Table 1.

Table 1: Demographic Profile of the Respondents

Category	Urban Area (Osogbo)	Peri-urban Area (Ofadeto)	Total	% Rate
Gender				
Male	130	110	240	80
Female	20	40	60	20
Total	**150**	**150**	**300**	**100**
Age Group				
18 – 35	60	50	110	37
36 – 55	70	60	130	43
56 + years	20	40	60	20
Total	**150**	**150**	**300**	**100**
Education				
ND and below	15	20	35	11.70
B. Sc/HND	55	80	135	45
Postgraduate	80	50	130	43.30
Total	**150**	**150**	**300**	**100**
Income bracket				
Low income	05	10	15	05
Middle income	15	120	135	45
High income	130	20	150	50
Total	**50**	**50**	**150**	**100**

*Source: Field Survey (2025) *ND = National Diploma, *HND =Higher National Diploma*

Table 1 shows that the urban and peri-urban respondents were predominantly young male adults that are within the active working age of the population (18 – 55 years old), representing 63.30% of the total sample population. It was also observed that 50% of the respondents in the urban area are within the high-income bracket range. A reasonable percentage of the peri-urban zone inhabitants are those within the middle-income range; hence, prioritized affordability and cost effectiveness. More so, the study revealed that most of the respondents in the urban and peri-urban areas are highly educated as 265 of the respondents, representing 88.30% either possesses First Degree/Higher National Diploma or Postgraduate Certificates. The peri-urban centers accommodate more of the middle-income class, fresh graduates and middle-class workers.

4.2 The Relative Importance Index, Mean Ratings Score and Standard Deviation

To effectively measure the central tendency of the responses through the average percieved importance or the value of a factor, the variability or the dispersion of the respondents' responses as to determine the consistencies or otherwise in their opinion and to be able to rank these opinions base on their overall importance; hence, providing access for prioritization criteria, the study conducted mean rating, standard deviation and relative importance index test on the data collected on sustainable housing feature. The outcome of the test is presented in Table 2.

Table 2: ***The Relative Importance Index, Mean Ratings Score and Standard Deviation***

Sustainable Feature	Urban Mean	Urban SD	Urban RII	Peri-Urban Mean	Peri-Urban SD	Peri-Urban RII
Energy-efficient materials	4.60	0.52	0.92	3.90	0.73	0.78
Solar panels / renewable energy	4.40	0.61	0.88	3.60	0.81	0.72
Natural ventilation / airflow	4.50	0.57	0.90	3.70	0.76	0.74
Flexible / adaptable layouts	4.20	0.63	0.84	4.10	0.69	0.82
Low-maintenance finishes	4.00	0.71	0.80	4.20	0.64	0.84

Cost-effectiveness and affordability	3.80	0.79	0.76	4.50	0.58	0.90

Source: Field Survey (2025)

To provide a nuanced understanding of the perception of urban and peri-urban respondents and how sustainable housing features are prioritized, the earlier identified sustainable housing features in literature were isolated and presented to the respondents. The outcome of the Relative Importance Index (RII), mean ratings, and standard deviation are presented as thus: That energy efficient materials with the highest mean score and RII of 4.60 and 0.92 respectively were rated high in the urban area while the peri-urban area rated the same factor low. The rating of this factor at the urban area shows that, the urban inhabitants' value advanced sustainable features with a staunch support for the use of materials that enhances environmental performances and comfort. This according to Olajide and Akinyemi (2021) indicated the increasing level of sustainable feature awareness among Nigerian urban dwellers, particularly, around its long-term economic and ecological benefits. The urban residents place more emphasis on quality of life, aesthetics and comfort, than the cost involved in its procurement and installation. Conversely, the Peri-urban respondents, gave a different but lower rating of the variable with Mean = 3.9, and RII = 0.78. Despite recognizing the need and the value of energy efficiency, energy cost remains a critical factor considered at the peri-urban areas and a major barrier to widespread sustainable housing feature installation and adoption in the study areas. A similar finding has been reported in Lagos, Nigeria where Akinwale and Obafemi (2019) observed that, urban residents showed a stronger willingness to pay and invest in energy-efficient homes than peri-urban dwellers due to their higher disposable incomes. The study further noticed a significant gap in attitudes of the urban dwellers toward solar and renewable energy solutions. Likewise, the urban residents place a much higher premium (Mean = 4.4, RII = 0.88) on solar and renewable energy solutions, than the peri-urban residents. This is consistent with the findings of Ajayi and Olotuah (2024) who observed that urban settlers in Nigeria are increasingly becoming more aware and perceiving renewable energy as a means of reducing reliance on the erratic public power supply. The Peri-urban respondents on the other hand rated this feature lower (Mean = 3.6, RII = 0.72), highlighting affordability and maintenance cost as a major concern. This aligns with Oke *et al*. (2025), who noted that despite the rising awareness of green technologies, financial constraints limit adoption in lower-income communities. Although, the urban and peri-urban inhabitants places high value on natural ventilation, with the urban dwellers attaching a higher importance with a mean score of 4.5 and RII of 0.90. Ogunmakin *et al*., (2020) opined that, the preference for passivity in design solution explain the rising awareness on the energy cost for cooling in the urban environment. However, the lower rating of this factor by the peri-urban respondents compare with those in the urban areas, may not be far from the availability of larger plot size at cheaper cost, reduce congestion and pollution rate and the lesser dense settlements that engender natural free flow of air, thus, reduced its perceive priority in the peri-urban zones.

Furthermore, the synthesis of the research findings from the test conducted (relative importance index and the mean ratings) revealed a clear divergence between urban and peri-urban market situations and the preferences of sustainable features in building design. The demonstration of a higher preferences for innovative technologies, efficient energy usage and other environmentally friendly features were more pronounced among the urban respondents, while durability, and practicability, flexibility cost implications and ease of maintenance, availability and affordability were highly prioritized by the peri-urban respondents. These findings are in consonant with broader literature on sustainable urban housing in the emerging nations, which underscores the socio-economic realities that positively and strongly shape sustainable housing design preferences, adoption and the integration of green innovative technologies (Ankeli *et al*., 2025; Adediran and Ali, 2024; Olubi and Aseyan, 2022).

Conclusively, the relatively low standard deviations figures recorded across most features signal a strong agreement within each group; hence reinforcing the strength or the robustness of the observed trends. This imply that sustainable features in housing designs and policies must be context-sensitive, addressing the dual realities of the aspiration and psychological perspective of the dwellers, urban demand for advanced sustainable features and the peri-urban demand for affordability and low-maintenance solutions.

Table 3: ANOVA Test Result

Source of Variation	SS	df	MS	F	p-value
Between Groups	18.56	5	3.712	12.47	0.000*
Within Groups	87.23	294	0.297		
Total	105.79	299			

The Analysis of Variance (ANOVA) test revealed significant differences in the level at which sustainable housing features are rated among the urban and peri-urban respondents ($F = 12.47$, $p < 0.05$). This suggested a non-uniformity in the preferences rating of sustainable design elements as the elements vary according to residential area context. Specifically, urban respondents consistently rated features as energy-efficient materials, natural ventilation, and renewable energy higher than peri-urban respondents. This outcome supports Olajide and Akinyemi (2021), who argue that exposure to modern technologies and higher income levels often drive stronger adoption of sustainable housing in urban areas. The ANOVA results confirm that location and income play a critical role in shaping the market acceptability of sustainable design in Nigeria.

Table 4: Post Hoc (Tukey HSD)

Sustainable Feature	Urban Mean	Peri-Urban Mean	Mean Difference	P- value
Energy-efficient materials	4.6	3.9	0.7	0.001*
Solar panels / renewable energy	4.4	3.6	0.8	0.002*
Natural ventilation/airflow	4.5	3.7	0.8	0.001*
Flexible/adaptable layouts	4.2	4.1	0.1	0.324
Low-maintenance finishes	4.0	4.2	-0.2	0.118
Cost-effectiveness/affordability	3.8	4.5	-0.7	0.004*

To further explore these differences, Tukey's Post Hoc test was conducted. The analysis showed that urban respondents placed significantly higher value on energy-efficient materials (Mean Difference = 0.7, $p = 0.001$), solar panels/renewable energy (Mean Difference = 0.8, $p = 0.002$), and natural ventilation (Mean Difference = 0.8, $p = 0.001$) compared to peri-urban respondents. In contrast, peri-urban respondents prioritized affordability, with a significantly higher mean rating than their urban counterparts (Mean Difference = -0.7, $p = 0.004$). This confirms earlier observations by Olotuah and Adegoke (2020) that cost-effectiveness is the dominant factor influencing housing decisions in peri-urban Nigeria. Interestingly, no significant differences were found for adaptable layouts and low-maintenance finishes, suggesting that these features are universally valued across both contexts; hence, consistent with Bello and Salami's (2021) assertion that Nigerian households universally seek durability and flexibility in housing.

Table 5: The Chi-Square

Variable	χ^2	df	p-value	Interpretation
Income vs. Adoption	28.45	4	0.002*	Significant association
Education vs. Adoption	14.32	3	0.006*	Significant association
Age vs. Adoption	5.12	3	0.164	Not significant
Gender vs. Adoption	2.87	1	0.091	Not significant

The Chi-Square analysis provided further insights into the problem under investigation through the examination of the relationship between socio-demographic variables and respondents' willingness to adopt sustainable features in housing design. Results revealed that income ($\chi^2 = 28.45$, $p < 0.05$) and education ($\chi^2 = 14.32$, $p < 0.05$) were important predictors of adoption. This indicates that households with higher incomes and better educational accomplishment are more likely to embrace the concept of sustainable housing; this is congruent with Ankeli *et al*., (2025) and Oke *et al*. (2025), who observed that the financial capacity and the knowledge of the respondents play significantly role in influencing the uptake of green building practices in Nigeria. Conversely, age ($\chi^2 = 5.12$, $p > 0.05$) and gender ($\chi^2 = 2.87$, $p > 0.05$) were not significant, suggesting that sustainable housing acceptability cuts across these demographic

categories. This aligns with international evidence that socio-economic status often outweighs demographic variables in predicting sustainable housing choices (Ajayi and Olotuah, 2024).

Conclusively, it was observed that the priority of the urban residents is more of features that can enhance energy-efficiency and renewable energy, while the concern of the peri-urban residents is more of availability and affordability with practical functionality and ease of maintenance. Socio-economic factors such as income and education significantly influence adoption, reflecting prior findings of Ajayi and Olotuah (2024); Mokunfayo and Babatunde (2024).

5.0 Conclusion and Recommendations

This study has shown that the adoption of sustainable features in the Nigerian housing design is shaped not only by design innovation but also by the socio-economic realities of urban and peri-urban markets and preferences. Evidence from the Osogbo (urban) and Ofatedo (peri-urban) housing market revealed that while urban residents are more inclined toward advanced features, peri-urban households prioritize affordability, modest maintenance costs, and adaptable layouts. The Relative Importance Index (RII) confirmed affordability as a dominant factor in peri-urban areas, while ANOVA and Post Hoc tests highlighted significant location-based differences in preferences. The Chi-Square results further demonstrated that income and education are strong predictors of adoption, reinforcing earlier findings that socio-economic status often outweighs demographic factors in driving sustainable housing choices (Ajayi & Olotuah, 2024; Oke *et al*., 2025).

Overall, the findings underscore the persistent gap between architectural innovation and market acceptability, particularly in peri-urban contexts. As Olotuah and Adegoke (2020) emphasize, the success of housing interventions in Nigeria depends on striking a balance between affordability and quality.

Bridging the observed gap requires context-sensitive strategies that align environmental sustainability with local economic conditions. The study therefore recommends:

1. The need for a context-driven design that infuses sustainable housing models. The model should reflect local realities, emphasizing affordability in the peri-urban zones and advanced technologies in urban settings.
2. The government should emphasize the need for tax reliefs/holidays, subsidies, and other low-interest financing models to cut down the effect of cost.
3. The idea of public awareness campaigns and community-based training on the benefits of sustainable housing features should be intensified.
4. More so, public-private collaboration, research on innovative technology, and research feedback should be institutionalized to track adoption trends and refine strategies.

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