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Sustainable Urban Renewal and Green Housing Innovations: A Valuer's Perspective on Emerging Trends in Nigerian Cities

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Abstract

This study investigates professionals' perspectives on the valuation of green housing features in the context of urban renewal in Benin City, Nigeria. The objective was to assess levels of awareness, adoption, willingness to pay (WTP) and perceived valuation impacts of sustainable features, as well as to identify barriers to mainstream adoption. A mixed-methods approach was employed, involving survey data from 97 professionals, which are, estate surveyors and valuers, developers, planners and policymakers, and 15 follow-up interviews. Descriptive statistics, correlation, regression and ANOVA were applied. Results indicate moderate awareness, with energy efficiency (M = 3.42) and solar systems (M = 3.05) most widely recognized. WTP analysis revealed that 59.8% of respondents believed buyers would pay premiums averaging 8.5%. Regression results showed that energy efficiency, solar systems, water management and indoor environmental quality significantly predicted valuation premiums (Adjusted R^2 = 0.53). ANOVA indicated significant differences across professional groups ($F = 3.20$, $p = 0.024$), with developers projecting higher premiums. Qualitative findings emphasized barriers including lack of valuation guidelines, high costs and limited policy incentives. Triangulation confirmed that energy efficiency and solar systems are regarded as the most value-enhancing features. The study concludes that green housing has measurable potential to enhance property values and support sustainable urban renewal in Benin City. It recommends standardized valuation guidelines, fiscal incentives, consumer sensitization and professional training to mainstream adoption and strengthen sustainability integration in the housing market.

Keywords
Green housing, Property valuation, Willingness to pay, Urban renewal, Estate surveying, Benin City

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1. Introduction

Urbanization continues to reshape the social, economic, and environmental landscapes of cities in both developed and developing nations. Across sub-Saharan Africa, urban areas are experiencing rapid demographic growth, placing pressure on housing, infrastructure, and basic services (UN-Habitat, 2020). Nigeria exemplifies this trend, with its urban population expanding at about 4.3% annually, resulting in a widening housing deficit of more than 17 million units (National Bureau of Statistics, 2022). Alongside this shortage, Nigerian cities contend with infrastructural decay, informal settlements, rising energy costs, and climate vulnerability (Ebekozien, 2019). These challenges have heightened calls for urban renewal strategies that expand housing supply while embedding sustainability into the built environment.

Within this discourse, green housing has emerged as a critical dimension of sustainable renewal. Green housing involves designing, constructing, or retrofitting buildings to minimize environmental impact, promote energy and water efficiency, utilize eco-friendly materials, and enhance indoor environmental quality (Ifeanyi-Ugulu, 2019; Ugulu, 2019). Beyond environmental concerns, it offers social and economic benefits, including reduced utility costs, improved health, and resilience against climate risks. For urban renewal, it functions both as a technical solution through sustainable innovations and a market-driven strategy by enhancing property value and attractiveness within renewal zones.

Yet, in Nigeria, the potential of green housing is far from realized. Adoption remains modest, constrained by high initial costs, weak policy incentives, and limited public awareness (Windapo & Ogunsanmi, 2015; Taiwo & Adeboye, 2014). A central barrier lies in property valuation. Valuation – estimating the monetary worth of real estate – provides key signals to investors, developers, financiers, and policymakers. If valuers consistently recognize green features as adding value, market actors are more likely to invest in them.

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Conversely, if valuers struggle to incorporate sustainability into standard valuation methods, the market underappreciates such innovations, slowing adoption (Babawale & Oyalowo, 2011; Babawale & Omirin, 2012).

Globally, evidence shows that green features often attract valuation premiums. Studies in Europe, North America, and Asia reveal that energy efficiency, water conservation, renewable energy installations, and green certifications translate into measurable increases in rental income and sales prices (Fuerst, McAllister, Nanda, & Wyatt, 2015; Eichholtz, Kok, & Quigley, 2010; Deng, Li, & Quigley, 2012). These premiums arise from reduced operating costs, reputational benefits, and compliance with regulations. However, emerging economies face complexities: market comparables for green properties are scarce, data remain fragmented, and valuation standards lack clear sustainability guidelines (Sayce, Sundberg, & Clements, 2010; RICS, 2019).

In Nigeria, research on green housing and valuation is still developing. Most studies have concentrated on Lagos and Abuja, the main hubs of real estate investment where sustainability discourse is relatively advanced. They document growing awareness of energy-efficient appliances, solar photovoltaic systems, and eco-friendly designs among professionals and homebuyers (Agbola & Alabi, 2000; Oduwaye, 2009; Ifeanyi-Ugulu, 2019; Ugulu, 2019). However, significant gaps persist. First, attention has focused on the largest metropolitan areas, neglecting medium-sized but historically significant cities. Second, while stressing the importance of sustainability, existing studies rarely provide localized evidence on how valuers perceive or quantify the added value of green features in practice.

Benin City, the capital of Edo State, offers a unique context to address these gaps. As one of Nigeria's oldest cities, it embodies tensions between heritage, modernization, and renewal. It faces multiple urban challenges, including inadequate housing, aging infrastructure, energy insecurity, and environmental pressures such as flooding (Ebekozien, 2019). At the same time, Benin City hosts over 60 registered estate surveying and valuation firms, providing a strong professional base for assessing how valuers interpret green housing in practice. Unlike Lagos and Abuja, it represents a medium-sized city where renewal unfolds under more constrained financial and institutional conditions. Studying valuation in Benin City thus offers insights more generalizable to secondary cities across Nigeria and sub-Saharan Africa.

This study investigates the valuation of green housing features within the context of urban renewal in Benin City. Specifically, it examines professionals' levels of awareness, adoption, and willingness to assign premiums to green features, while identifying institutional and methodological challenges affecting valuation practice. The study makes three contributions. First, it extends the literature beyond major metropolitan centres by offering localized empirical evidence from a historically important but under-researched city. Second, it deepens understanding of how estate surveyors and valuers interpret sustainability innovations within existing frameworks. Third, it provides actionable insights for policymakers, developers, and professional bodies on integrating green housing more effectively into urban renewal strategies in medium-sized African cities.

The remainder of the paper is structured as follows: Section 2 reviews literature on green housing, valuation, and urban renewal, highlighting the Nigerian context and research gaps. Section 3 outlines the methodology. Section 4 presents data analyses, while Section 5 discusses empirical results. Section 6 engages findings, and Section 7 concludes with recommendations and suggestions for future research.

2 Literature Review

2.1 Conceptualizing Green Housing and Urban Renewal

Urban renewal and green housing have become increasingly intertwined in the discourse on sustainable development. Urban renewal refers broadly to processes aimed at revitalizing deteriorating or underutilized urban spaces, often through housing improvement, infrastructure upgrading and environmental rehabilitation (Roberts & Sykes, 2000). Traditionally, renewal policies in Nigeria focused on clearance and redevelopment, but recent debates emphasize sustainability, inclusiveness and resilience (Ebekozien, 2019). Green housing entails the adoption of environmentally responsible practices in the design, construction and operation of residential buildings.

Key features include energy-efficient appliances, solar photovoltaic systems, water recycling technologies, low-carbon building materials and improved natural ventilation (Ifeanyi-Ugulu, 2019; Ugulu, 2019).

The connection between green housing and urban renewal lies in their shared goals of improving urban living conditions, reducing environmental footprints and enhancing property market attractiveness. Urban renewal projects that integrate green housing not only revitalize physical spaces but also reduce long-term operating costs, support climate adaptation and create healthier environments. From a valuation perspective, these benefits should theoretically translate into higher property values, provided they are recognized by buyers, tenants and valuers.

2.2 Global Evidence on Valuation of Green Housing

Empirical evidence from advanced economies suggests that green housing features contribute positively to property valuation outcomes. In the United States, Fuerst, McAllister, Nanda and Wyatt (2015) documented significant sales premiums for energy-efficient and green-certified buildings. Similarly, Eichholtz, Kok and Quigley (2010) found that certified sustainable commercial buildings commanded higher rents and asset values. Comparable findings have emerged in Asia, with Deng, Li and Quigley (2012) reporting that green-certified housing units in Singapore sold at higher prices.

These studies attribute valuation premiums to several mechanisms:

(i) Lower operating costs: households save on electricity and water bills.
(ii) Health and comfort: improved indoor air quality and thermal comfort.
(iii) Regulatory compliance: alignment with energy codes and environmental standards.
(iv) Market differentiation: green features act as reputational signals of modernity and responsibility.

However, the incorporation of green features into valuation practice is not without challenges. Appraisers and valuers often face difficulties in finding market comparable, especially when green properties are few relative to conventional stock. Methodological debates persist over whether to use sales comparison, income capitalization, or cost approaches and how to adjust for intangible benefits such as health or reputational gains (Sayce, Sundberg, & Clements, 2010). Nevertheless, international valuation standards are gradually evolving to recognize sustainability explicitly (RICS, 2019).

2.3 The African Context

In Africa, the discourse on green housing is relatively recent, reflecting broader challenges of urbanization, informality and infrastructural deficits. According to UN-Habitat (2020), over 60% of urban residents in sub-Saharan Africa live in informal or inadequate housing, making affordability the central concern. Within this environment, the uptake of green housing features has been slow, constrained by limited financing, lack of incentives and poor awareness among both consumers and professionals.

Valuation practices across African countries also reflect these structural weaknesses. Research in South Africa, Kenya and Ghana highlights that valuers often acknowledge the environmental and social benefits of sustainability but struggle to translate them into quantifiable market value (Awuah & Gyamfi-Yeboah, 2017). Without sufficient sales evidence or standardized methodologies, valuers resort to subjective adjustments which limits consistency. This undermines the signalling role of valuation and discourages developers from investing in green features.

Nonetheless, there are emerging positive signals. In South Africa, the Green Building Council's certification programs have begun to influence investor behaviour, particularly in the commercial real estate sector. In Kenya, solar energy installations are becoming more visible in housing markets, partly driven by energy insecurity. These experiences suggest that African housing markets are at an early but important stage of integrating sustainability into valuation practice, with potential for significant expansion if institutional barriers are addressed.

2.4 Nigerian Evidence

Nigeria presents a complex housing landscape shaped by rapid urbanization, a persistent housing deficit and weak regulatory enforcement. The National Housing Policy emphasizes the need for sustainable housing, but implementation remains inconsistent (Federal Ministry of Works and Housing, 2016). Energy insecurity has prompted growing interest in solar systems, while high utility

costs have made efficiency measures increasingly attractive.

Scholarship on green housing in Nigeria is expanding. Windapo and Ogunsanmi (2015) and Taiwo and Adeboye (2014) examined the adoption of sustainable and indigenous building materials, noting that while professionals recognize the benefits, adoption remains low due to cost and availability constraints. Ifeanyi-Ugulu (2019) and Ugulu (2019) focused on solar photovoltaic adoption, highlighting affordability and technical challenges. Agbola and Alabi (2000) and Oduwaye (2009) explored sustainable urban housing provision, emphasizing the need for integrated planning and policy enforcement.

Valuation-specific studies reveal a gap between awareness and practice. Babawale and Oyalowo (2011) found that valuers acknowledge sustainability as important but lack practical tools for consistent integration into valuation methods. Babawale and Omirin (2012) further observed that firm characteristics and market conditions influence the ability to value green features accurately. These findings indicate that green features often go unrecognized in property valuation, perpetuating underinvestment in sustainable housing.

2.5 Benin City as a Research Gap

While Lagos and Abuja have attracted scholarly attention, medium-sized Nigerian cities like Benin City remain under-researched. Benin City, the capital of Edo State embodies characteristics that make it an important case for studying green housing valuation, such as, rapid urban growth, energy insecurity and environmental vulnerability including flooding, waste management and deforestation.

Moreover, Benin City has a strong professional base, with over 60 registered estate surveying and valuation firms, providing a well-defined sample for exploring valuers' perceptions of green housing. Despite these dynamics, no significant empirical study has focused on Benin City's housing valuation practices in relation to sustainability, leaving a critical gap in both Nigerian and African scholarship.

By focusing on Benin City, this study not only provides localized insights but also contributes to broader debates on integrating green housing within urban renewal strategies, informing professional practice, guiding policy reforms and contributing to the mainstreaming of sustainability in Nigerian housing markets.

Table 1: Key Green Housing Features and Their Potential Valuation Impacts

Green Housing Feature	Description/Examples	Potential Benefits	Potential Valuation Impacts
Energy Efficiency	Insulation, energy-efficient appliances, natural ventilation, LED lighting	Reduced energy consumption and utility bills; improved comfort	Higher rental/sales values due to lower running costs; enhanced marketability; potential "green premium" in valuations
Solar Power Systems	Rooftop solar panels, solar water heaters, hybrid solar–grid systems	Alternative energy source, reduced dependence on unreliable national grid	Increased capital value due to long-term energy savings; growing demand among middle- and high-income buyers; higher willingness-to-pay
Water Management	Rainwater harvesting, greywater recycling, low-flow fixtures	Reduced water costs, improved resilience to shortages	Adds to property desirability; modest upward adjustment in value depending on market awareness
Sustainable Waste Management	Recycling facilities, composting systems, waste-to-energy technologies	Cleaner living environment, reduced waste disposal costs	May not yet significantly affect value in Nigerian markets, but could enhance desirability in high-end or eco-conscious developments
Eco-Friendly Materials	Locally sourced, recycled, or low-carbon building materials (e.g., bamboo, compressed earth blocks)	Reduced construction costs in some cases, improved durability, lower embodied carbon	Potential long-term maintenance savings; not widely reflected in current valuations but could enhance asset reputation
Green Landscaping & Open Spaces	Use of native plants, rooftop gardens, communal green areas	Enhanced aesthetics, improved air quality, community well-being	Can positively influence rental and sales values; contributes to higher neighbourhood desirability
Indoor Environmental Quality	Improved ventilation, natural lighting, low-VOC paints, noise reduction	Healthier living conditions, improved productivity and comfort	Growing demand among health-conscious buyers; could translate into higher occupancy rates and lower vacancy risks
Smart & Sustainable Technologies	Smart meters, home automation for energy/water control	Real-time monitoring of energy/water use, convenience, efficiency	Higher attractiveness to tech-savvy buyers; potential to command a market premium in competitive urban areas

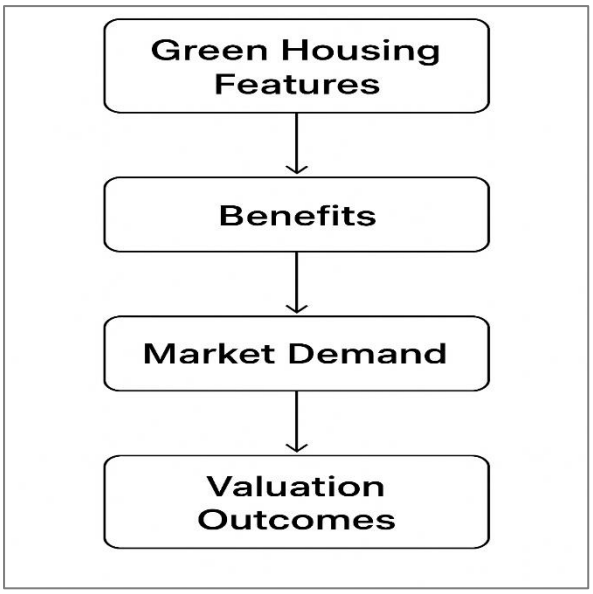

Figure 1: Conceptual relationship between green housing features, their associated benefits, market demand and valuation outcomes

Figure 1 presents the conceptual framework linking green housing features to valuation outcomes within the context of sustainable urban renewal. The model posits that the incorporation of sustainability-oriented design and construction attributes generates multidimensional benefits, such as, environmental efficiency, social well-being and economic savings, which subsequently shape consumer preferences and market demand. These market dynamics, in turn, exert measurable influence on property valuation outcomes, underscoring the need for valuers to integrate sustainability variables into professional appraisal methodologies.

3. Methodology

This study adopts a mixed-methods research design, combining quantitative and qualitative approaches to examine how green housing innovations influence valuation practice within sustainable urban renewal. The quantitative component utilized a structured questionnaire administered to estate surveyors and valuers, alongside selected real estate developers, urban planners and housing policymakers. The qualitative component comprised semi-structured interviews with key informants and documentary analysis of valuation reports, urban renewal records and policy documents. The integration of these methods allows for triangulation and strengthens the robustness of the findings (Creswell & Plano Clark, 2017).

The study population included registered Estate Surveyors and Valuers, developers, planners and policymakers active in Benin City. The initial target sample was 120 respondents; however, **97** valid responses were collected, distributed as follows: 75 estate surveyors and valuers, 10 developers, 7 urban planners, and 5 housing policymakers. Stratified random sampling ensured proportional representation across professional categories.

Data were collected using a structured questionnaire comprising four sections: demographic and professional background; awareness and adoption of green housing features; market perception and willingness-to-pay and implications for valuation practice. Likert-scale items (1–5) measured levels of agreement, frequency and perceived impact, while open-ended questions captured professional insights. Semi-structured interviews with 15 key informants provided qualitative depth, exploring institutional and policy perspectives. Secondary sources included housing policy documents, urban renewal master plans, building regulations and sample valuation reports.

To ensure validity, the questionnaire was reviewed by academic experts and practicing valuers, and pilot-tested with 10 estate surveyors. Ethical considerations included informed consent, confidentiality, voluntary participation and the right to withdraw.

Table 1: Questionnaire Distribution and Retrieval

Professional Category	Questionnaire Distributed	Questionnaire Retrieved
Estate Surveyors & Valuers	80	75
Developers	20	10
Urban Planners	10	7
Housing Policymakers	10	5
Total	**120**	**97**

Table 1 shows the number of questionnaires distributed to and collected from professions involved in the study

While focusing on Benin City provides in-depth context, generalizability to other Nigerian cities may be limited. Reliance on self-reported perceptions could introduce response bias; however, the triangulation of survey, interview and documentary data mitigates these limitations and supports a comprehensive analysis of sustainable urban renewal and valuation practices.

3.2 Study Area

The study is situated in Benin City, the capital of Edo State in the South-South geopolitical zone of Nigeria (NPC, 2006; Akinbamijo, 2012). Benin City is a medium-sized urban centre experiencing rapid population growth, rising housing pressures, and sporadic renewal interventions (Oboh, 2016; Alabi, 2018). Its housing market combines traditional stock, emerging middle-income estates, and government-led schemes. However, adoption of green housing innovations remains limited, with few developers and valuers explicitly integrating sustainability into practice (Otegbulu & Adewunmi, 2009; Ihuah & Eaton, 2013). This makes the city a representative case for exploring challenges and opportunities in aligning urban renewal with sustainable valuation practices.

Benin City is primarily within Oredo Local Government Area (LGA), home to the central business district, major markets such as Oba Market and New Benin Market, and the historic Oba of Benin's Palace (Ebohon, 1992; Eweka, 2019). Its metropolitan area extends into Egor LGA to the north, a growing residential and commercial zone contributing to urban sprawl (Ibhawaegbele & Ebohon, 2017); Ikpoba-Okha LGA to the east, characterized by rural communities engaged in agriculture and trade (Odemerho, 2008); and Ovia North-East LGA to the south, which combines urban and rural settlements with significant agricultural activity (Udo, 2010).

Together, these LGAs form the Benin Metropolitan Area, with an estimated 1.5 million people (NPC, 2006; United Nations, 2018). The city has a tropical savanna climate, with wet and dry seasons and average temperatures of 25–32°C (NiMet, 2017). These dynamics, combined with housing pressures and limited green adoption, underscore the need for sustainable renewal and valuation practices.

4. Data Analysis

Data analysis is conducted in two stages, quantitative and qualitative. This is to align with the mixed-methods design of the study.

4.1 Quantitative Analysis

Responses from the structured questionnaires are coded and entered into SPSS version 28 for statistical analysis. Descriptive statistics, including means, frequencies, percentages and standard deviations, are first generated to summarize respondent demographics, levels of awareness and adoption of green housing features.

Inferential techniques are then employed to test the study objectives:

(i) Pearson correlation analysis is used to examine the strength and direction of associations between awareness of green housing features and perceived valuation impacts.

(ii) Multiple regression analysis is employed to assess the predictive influence of specific green housing features, such as energy efficiency, solar installations, water management systems and sustainable materials, on property valuation outcomes.

(iii) Analysis of Variance (ANOVA) is conducted to test for statistically significant differences in perceptions among the professional groups (valuers, developers, planners and policy-makers).

These techniques enable the study to identify not only the existence of relationships but also the relative contribution of each green feature to valuation outcomes.

4.2 Qualitative Analysis

Data from the semi-structured interviews are transcribed verbatim and analysed thematically using an inductive approach. Coding is guided by the major research objectives, with particular attention paid to themes such as professional readiness, institutional barriers, valuation methodology gaps and policy frameworks. NVivo 12 software is employed to facilitate systematic organization and retrieval of codes and themes. The results are compared with the quantitative findings for triangulation, thereby enhancing the validity of the study.

4.3 Integration of Findings:

The final stage of analysis involves integration of quantitative and qualitative findings. While the quantitative analysis provides measurable patterns and relationships, the qualitative insights contextualize these patterns within the realities of professional practice and policy implementation in Benin City. This approach ensures that the study captures both statistical evidence and experiential perspectives on how green housing innovations influence valuation outcomes in sustainable urban renewal.

5. Data Presentation

5.1 Quantitative Analysis

5.1.1 Demographic and Professional Profile of Respondents

Table 2 presents the demographic and professional profile of the 97 respondents, showing a majority of estate surveyors and valuers (77.3%), with a balanced gender distribution and diverse professional experience, forming the basis for interpreting perspectives on green housing.

Table 2: Profile of Respondents

Category	Sub-category	Count	%
Profession	Estate surveyors & valuers	75	77.3
	Developers	10	10.3
	Urban planners	7	7.2
	Policymakers/ officials	5	5.2
Total		**97**	**100.0**
Gender	Male	63	64.9
	Female	34	35.1
Total		**97**	**100.0**
Years of professional experience	0–5 years	14	14.4
	6–10 years	25	25.8
	11–20 years	34	35.1
	>20 years	24	24.7
Total		**97**	**100.0**
Years of professional experience	0–5 years	14	14.4
	6–10 years	25	25.8
	11–20 years	34	35.1
	>20 years	24	24.7
Total		**97**	**100.0**
Highest qualification	B.Sc./HND	22	22.7
	M.Sc. / M.Phil.	55	56.7
	PhD / Professional fellowship	20	20.6
Total		**97**	**100.0**

5.1.2 Descriptive Analysis of Respondents

Table 3 shows the level of awareness and adoption of green features among respondents. The table reports moderate awareness and adoption of green features. With a mean score above 3 indicating moderate awareness/adoption, energy efficiency, green landscaping / open spaces, indoor environmental quality and solar power systems scoring highest, indicating which innovations are most commonly integrated.

Table 3: Awareness and Adoption of green features (Likert 1–5)

Green feature	Mean (1–5)	SD
Energy efficiency (insulation, LEDs)	3.42	0.91
Solar power systems	3.05	1.08
Water management (rainwater, greywater)	2.88	1.04
Sustainable waste management	2.61	1.02
Eco-friendly construction materials	2.75	0.99
Green landscaping / open spaces	3.10	0.95
Indoor environmental quality (IEQ)	3.18	0.92
Smart & sustainable tech	2.54	1.06

Table 4 indicates that nearly 60% of professionals believe the market would pay a premium for green housing features. On average, respondents estimated an 8.5% premium, with a median of 8%, suggesting a relatively consistent perception of added value. However, the wide range (2%–20%) reveals variability in market expectations, reflecting differences in professional perspectives and market segments.

Table 4: Willingness-to-pay (WTP) for green features

Item	Value	Notes
Respondents indicating willingness-to-pay (WTP) for a green premium	58 (59.8%)	Proportion of respondents who believe buyers/tenants would pay extra for green-equipped properties
Average perceived market premium (%) for green-equipped property	Mean = 8.5% SD = 4.1%	Respondents estimated additional value attached to green features
Median perceived premium (%)	8.0%	Midpoint of all responses, showing balanced distribution
Range of perceived premium (%)	2% – 20%	Lowest and highest premium estimates reported

Note. WTP = Willingness-to-pay. Percentages are based on total respondents (97)

5.3 Inferential Statistics

Table 5 reveals positive and statistically significant relationships among all the selected variables ($p < 0.01$). Awareness of green housing is moderately to strongly correlated with willingness to pay a perceived premium ($r = 0.58$) and perceived valuation impact ($r = 0.64$), as well as with reported adoption of green features in projects ($r = 0.51$). Willingness to pay also shows a strong positive association with perceived valuation impact ($r = 0.72$) and a moderate association with adoption ($r = 0.47$). Additionally, perceived valuation impact is positively related to adoption of green features ($r = 0.55$). Overall, these findings suggest that higher awareness and recognition of valuation benefits are associated with both greater willingness to pay and actual adoption of green housing innovations among respondents.

Table 5: Pearson Correlation Matrix of Awareness, Willingness-to-Pay, Perceived Valuation Impact, and Adoption of Green Features

S/N	Variable	1	2	3	4
1.	Awareness index	1.00			
2.	WTP (% perceived premium)	0.58**	1.00		
3.	Perceived valuation impact index	0.64**	0.72**	1.00	
4.	Adoption index (reported presence in projects)	0.51**	0.47**	0.55**	1.00

(n = 97), p < 0.01

Note: *Correlation coefficients marked with * are significant at the 0.05 level (p < 0.05); those marked with ** are significant at the 0.01 level (p < 0.01).*

Table 6 presents the results of multiple regression analysis predicting perceived valuation premiums for green housing features. Energy efficiency (B = 0.95, p < 0.001) and solar power systems (B = 1.05, p < 0.001) emerge as the strongest and most significant predictors, while water management (B = 0.44, p = 0.030) and indoor environmental quality (B = 0.62, p = 0.004) also have significant positive effects. Green landscaping shows a positive but non-significant contribution, highlighting which features are most valued in Benin City properties.

Table 6: Multiple Regression Analysis Predicting Perceived Valuation Premium (%) from Green Housing Features

S/N	Dependent variable: Perceived valuation premium (%)	B (coef)	SE (B)	t	p
1	Constant	1.20	0.85	1.41	0.161
2	Energy efficiency (score 1–5)	0.95	0.23	4.13	<0.001
3	Solar power systems (score 1–5)	1.05	0.28	3.75	<0.001
4	Water management (score 1–5)	0.44	0.20	2.20	0.030
5	Indoor environmental quality (IEQ)	0.62	0.21	2.95	0.004
6	Green landscaping	0.31	0.18	1.72	0.088

(n = 97)

Table 7 show that the regression model predicting perceived valuation premiums based on green housing features is statistically significant, F (5, 91) = 15.92, p < 0.001. This indicates that, collectively, the five green housing features explain a significant proportion of the variance in perceived valuation premiums among respondents. Therefore, the relational equation derived from the regression coefficients is statistically valid and appropriate for interpreting the influence of green features on valuation outcomes.

Table 7: ANOVA for Multiple Regression Predicting Perceived Valuation Premium (%)

Source	Sum of Squares (SS)	df	Mean Square (MS)	F	Sig.
Regression	628.41	5	125.68	**15.92**	**<0.001**
Residual	717.59	91	7.89		
Total	1,346.00	96			

Regression Equation

Based on the coefficients presented in Table 6, the predictive equation for perceived valuation premium (%) is:

$$\begin{aligned}&\text{Perceived Valuation Premium}\\&= 1.20 + 0.95(\text{Energy Efficiency})\\&+ 1.05(\text{Solar Power Systems})\\&+ 0.44(\text{Water Management})\\&+ 0.62(\text{Indoor Environmental Quality})\\&+ 0.31(\text{Green Landscaping})\end{aligned}$$

This equation indicates that improvements in energy efficiency and solar power systems yield the highest increases in perceived valuation premiums, followed by indoor environmental quality and water management. Although green landscaping has a positive coefficient, its effect is not statistically significant at the 5% level.

Table 8: ANOVA of Mean Perceived Valuation Premium (%) Across Professional Groups

Profession	n	Mean perceived premium (%)	SD
Estate surveyors and valuers	75	8.2	3.9
Developers	10	9.5	4.2
Urban planners	7	7.6	3.1
Policymakers	5	7.0	3.8

(n = 97), ANOVA: F = 3.20, p = 0.024

Table 8 presents the mean perceived valuation premiums for green housing features across different professional groups. The ANOVA results (F = 3.20, p = 0.024) indicate significant differences among professions, with developers expecting higher

premiums (9.5%) compared to estate surveyors and valuers (8.2%), urban planners (7.6%), and policymakers (7.0%). This suggests that professional role influences perceptions of the market value of green housing features.

5.4 Qualitative Analysis

Table 9 summarizes key themes, definitions, illustrative codes, and paraphrased quotes from qualitative interviews with 15 respondents. The themes highlight professional readiness, institutional barriers, market perception and valuation methodology, providing context to understand challenges and opportunities in valuing green housing features in Benin City."

5.5 Integration of Quantitative and Qualitative Findings

The quantitative results (Tables 2–7) indicate moderate awareness and adoption of green housing features, a willingness-to-pay for green premiums and measurable valuation impacts. Complementing this, the qualitative findings (Table 8) provide contextual explanations for these patterns, highlighting barriers such as cost and regulatory constraints, as well as methodological considerations like lifecycle costing. Triangulation of the two data sources confirms that energy efficiency and solar power systems are consistently recognized as the most value-enhancing features. Additionally, differences observed across professions, such as developers prioritizing marketability and valuers focusing on methodological rigor, are clarified through qualitative insights. Overall, combining statistical trends with narrative evidence offers a robust understanding of the factors shaping green housing adoption and valuation practices in Benin City.

Table 9: Thematic Codebook from Qualitative Interviews on Green Housing Valuation

Theme	Definition	Example codes	Illustrative quote (paraphrased)
Professional readiness	Valuers' capacity and tools to value green features	training gaps, guideline absence, data shortage	"We rarely include solar in reports because there are no benchmarks."
Institutional barriers	Policy, regulatory, and financial constraints	cost, incentives, building code gaps	"Developers cite high upfront cost and no tax breaks."
Market perception	How clients perceive green housing value	awareness, demand, WTP	"Middle-income buyers ask about solar, but low-income don't."
Valuation methodology	Methods used and needed adjustments	lifecycle costing, discounted cash flows, comparables	"Lifecycle cost analysis would better capture energy savings."

(n = 15)

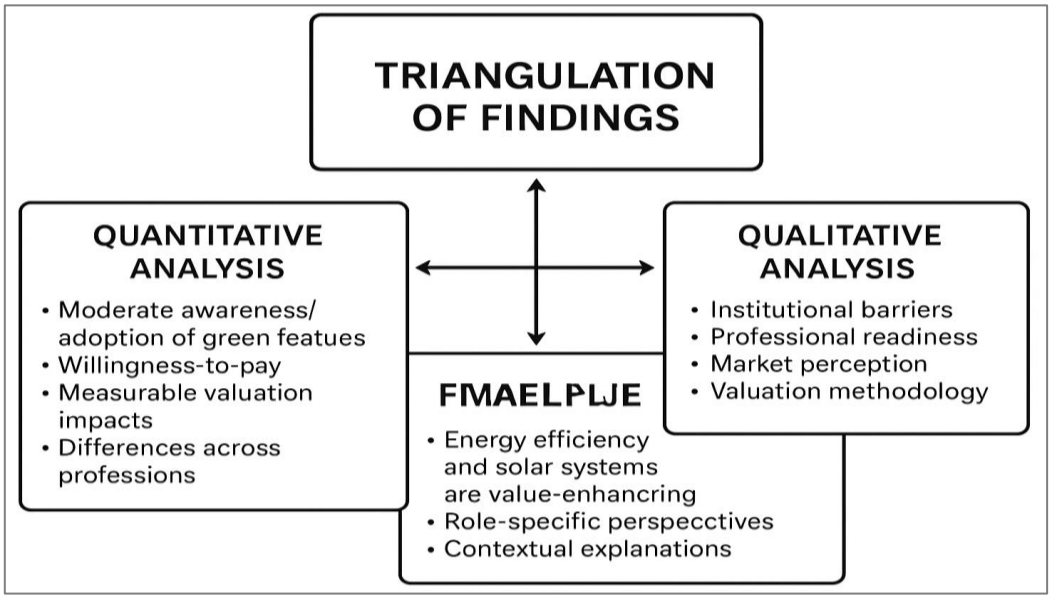

Figure 2: Triangulation of Quantitative and Qualitative Findings on Green Housing Adoption in Benin City

Figure 2 illustrates the triangulation process used to integrate quantitative and qualitative data in the study. On the left, Quantitative Analysis highlights measurable aspects such as moderate awareness and adoption of green features, willingness-to-pay, valuation impacts and differences across professional groups. On the right, Qualitative Analysis captures contextual insights, including institutional barriers, professional readiness, market perceptions and valuation methodologies. At the centre, the Triangulated Findings (FMAELPWE) combine both approaches, showing that energy efficiency and solar systems enhance property value, perspectives vary by professional role and findings are shaped by contextual factors. This visual representation emphasizes how combining numerical and narrative data strengthens the reliability and depth of the study's conclusions.

6. Findings and Discussion

The findings reveal how professionals in Benin City perceive, adopt, and value green housing features, exposing both opportunities and constraints in the housing market. Estate surveyors and valuers accounted for over three-quarters of respondents, significant given their central role in translating sustainability into measurable market value. The sample was diverse in gender, experience, and qualifications, with most respondents holding postgraduate degrees and more than half having over a decade of practice. These insights are therefore grounded in professional realities, echoing Oladokun (2019), who argued that valuation in Nigeria is shaped by expertise and institutional experience.

Awareness and adoption remain moderate. Energy efficiency measures such as LED lighting and insulation were most widely recognized, followed by solar systems, indoor environmental quality, and green landscaping. This pattern reflects Kok and Jennen's (2012) findings in Europe, where energy efficiency and renewable were early adoptees. The prominence of solar power reflects local realities of unreliable electricity and high energy costs, consistent with Deng et al. (2012), who showed that energy-related features attract stronger premiums in energy-insecure markets. By contrast, sustainable waste management and smart technologies were less integrated, aligning with Sayce et al. (2007), who noted that high costs and weak institutions constrain adoption.

The willingness-to-pay analysis highlights cautious optimism. Nearly 60% of respondents believed buyers or tenants would pay a premium for green-equipped properties, with the average premium estimated at 8.5%. This aligns with global studies that report premiums between 5–12% (Fuerst & McAllister, 2011; Chegut et al., 2014). Yet responses ranged from 2%–20%, suggesting fragmented perceptions shaped by income differences. Qualitative evidence confirms this: middle-income buyers show interest in solar and energy-efficient technologies, while low-income groups remain indifferent. This finding supports Yau (2012), who stressed that socio-economic stratification shapes green housing demand, with affordability acting as a major barrier.

Inferential analysis revealed strong positive correlations among awareness, willingness-to-pay, valuation impact, and adoption. Professionals who are more knowledgeable about green features are more likely to recognize their financial value and integrate them into projects. This resonates with Sayce et al. (2010), who emphasized knowledge as a driver of market acceptance. Willingness-to-pay showed the strongest link with valuation impact, consistent with Kok et al. (2012), who demonstrated that sustainability increasingly shapes economic performance. Adoption, though positively correlated, was less robust, reflecting a knowledge–practice gap consistent with Roberts and Sykes (2000), who noted that awareness often precedes integration where institutions are weak.

Regression analysis confirmed that energy efficiency and solar systems are the strongest predictors of value, supporting Chegut et al. (2014), who found similar results globally. Water management and indoor environmental quality also contributed, echoing Deng and Wu (2014), who stressed health and resource efficiency in valuation. Green landscaping, however, showed little impact, reflecting prioritization of functional, cost-saving features over symbolic sustainability. This mirrors Oladokun (2019), who observed that Nigerian markets privilege economic utility over environmental aesthetics.

Differences across professional groups further explain valuation patterns. Developers perceived the highest premiums, reflecting their focus on marketability and consumer demand. Estate surveyors and valuers acknowledged premiums but were conservative, consistent with Sayce et al.

(2007), who noted valuers' reluctance due to methodological uncertainty. Policymakers were most cautious, reflecting institutional inertia highlighted by Yau (2012) in Asian markets, were regulation lags behind market innovation. These differences show that professional orientation influences how green value is perceived: developers emphasize demand, valuers stress methodological rigor, and policymakers prioritize feasibility.

Qualitative insights reveal four themes explaining why adoption lags behind awareness: professional readiness, institutional barriers, market perception, and valuation methodology. Many valuers admitted that lack of benchmarks and standardized guidelines discouraged inclusion of green features in valuation reports. This corroborates Sayce et al. (2010), who stressed capacity building and methodological reforms as critical. Developers highlighted high costs and weak incentives, consistent with Kok and Jennen (2012), who showed policy support as decisive in adoption. Market perceptions were stratified by income, with middle-income buyers more receptive to solar than lower-income groups, again aligning with Yau (2012). Respondents also criticized reliance on traditional comparables, suggesting lifecycle costing and discounted cash flow instead. This supports Sayce et al. (2007) and Oladokun (2019), who argued for methodological innovation to capture long-term sustainability.

Taken together, the triangulation of quantitative and qualitative evidence shows a consistent narrative. Awareness is increasing, and professionals recognize that green features, especially energy efficiency and solar power, enhance property value. Yet adoption remains hindered by costs, weak policies, and methodological gaps. These findings reinforce Roberts and Sykes (2000), who argued that sustainability transitions are shaped by institutional, economic, and professional dynamics. Developers emphasize consumer demand and premiums, valuers remain conservative, and policymakers are slowed by regulatory inertia. Advancing green housing in Benin City will therefore require multi-pronged strategies: strengthening professional training and valuation methods (Sayce et al., 2010), introducing incentives and policies (Kok & Jennen, 2012), and broadening consumer awareness across income segments (Yau, 2012).

Overall, the findings suggest that Benin City is at an early yet promising stage in its green housing transition. Recognition of economic value is already evident through willingness-to-pay and valuation premiums, consistent with global evidence (Fuerst & McAllister, 2011; Chegut et al., 2014). However, without institutional reforms and methodological innovation, this recognition risks remaining aspirational. Bridging the gap between awareness and adoption is therefore critical to mainstreaming green housing as a pathway toward sustainable urban development in Nigeria.

7. Conclusion and Policy Recommendations

7.1 Conclusion

This study explored estate surveyors', developers', planners' and policymakers' perspectives on the valuation of green housing features within the context of urban renewal in Benin City. Drawing on both quantitative and qualitative data, the study provides some of the earliest empirical evidence on how sustainability considerations are entering property markets in a medium-sized Nigerian city.

Several conclusions stand out. First, awareness of green housing is moderate to high, with energy efficiency and solar technologies being the most recognized and valued. This reflects the prominence of energy insecurity in Nigeria and the tangible role that renewables play in reducing costs and improving resilience. In contrast, features such as water recycling, sustainable waste systems and eco-materials remain less visible in both practice and valuation, largely due to infrastructural limitations and weak institutional frameworks.

Second, there is cautious optimism about willingness to pay (WTP). A majority of respondents believed buyers and tenants would pay a premium (averaging 8–9%) for green housing, though scepticism persists. This shows that a "green value" signal is emerging, but not yet at a scale sufficient to transform valuation practice.

Third, features tied to cost savings and liveability, especially energy and water were perceived to have the most direct influence on property premiums. This pragmatic hierarchy reflects both household priorities and market realities, suggesting that developers emphasizing these features may gain competitive advantage.

Fourth, professional perspectives diverge. Developers reported stronger premiums than

policymakers and planners, reflecting commercial incentives versus regulatory caution. Such differences highlight the need for harmonized valuation frameworks to avoid fragmentation in practice.

Finally, significant barriers remain. These include a lack of localized valuation guidelines, scarcity of market evidence, high upfront costs and inadequate fiscal or regulatory incentives. Unless these systemic issues are addressed, green housing will remain marginal in urban renewal efforts.

In all, the findings suggest that while green housing holds measurable potential to support sustainable urban renewal and enhance property values in Benin City, achieving mainstream adoption requires reforms in valuation practice, consumer education and enabling policy frameworks.

7.2 Policy Recommendations

(i) Standardize valuation guidelines: NIESV, academia, and partners should develop methods integrating market, income, and lifecycle cost approaches.
(ii) Provide fiscal/regulatory incentives: Governments should introduce tax breaks, soft loans, and updated codes mandating minimum efficiency standards.
(iii) Strengthen consumer awareness: Campaigns and demonstration projects should highlight cost savings and health benefits of green housing.
(iv) Enhance professional capacity: Embed sustainability valuation in university curricula and professional development programs.
(v) Promote demonstration projects: Pilot schemes in renewal initiatives should showcase solar, rainwater harvesting, and eco-materials.
(vi) Improve data transparency: Establish a green property registry and encourage systematic reporting of green transactions.
(vii) Integrate sustainability in policy: Embed green housing within urban renewal strategies linking housing to waste, transport, and infrastructure.

7.3 Implications for Urban Renewal in Benin City

The study's findings demonstrate that urban renewal strategies in Benin City can gain traction by prioritizing green housing. Specifically:

(i) Market actors recognize tangible value in energy and water-related green features.
(ii) Urban renewal projects can leverage these priorities to align market incentives with sustainability goals.
(iii) Professional alignment is essential, that is, valuation practice must be consistent across developers, valuers and policymakers to avoid fragmented progress.

Embedding sustainability into renewal initiatives will not only enhance property values but also strengthen resilience, reduce urban vulnerability and advance Nigeria's commitments to the Sustainable Development Goals (SDGs).

7.4 Future Research Directions

(i) Expand scope: Compare Benin City with Lagos, Abuja, and Port Harcourt to capture differing market maturity.
(ii) Adopt longitudinal approaches: Track awareness, willingness-to-pay, and valuation practices as policies and preferences evolve.
(iii) Integrate household perspectives: Use buyer and tenant surveys to capture consumer-side valuation of green features.
(iv) Test behavioural interventions: Apply experiments on information provision and subsidies to assess impacts on valuation.
(v) Explore retrofitting economics: Examine upgrading existing housing with green features in renewal frameworks.

Addressing these gaps will align valuation practices with sustainability imperatives.

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Appendices

Appendix A: Structured Questionnaire

Introduction

This questionnaire is designed to collect information for a research study on the valuation of green housing features within the context of urban renewal in Benin City, Nigeria. The aim is to examine professionals' awareness, adoption, willingness-to-pay and valuation practices relating to green housing features. All responses will be treated confidentially and used strictly for academic purposes.

Please indicate your responses by ticking (✓) the appropriate option or rating on the scale provided.

Section A: Demographic and Professional Profile

1. Profession
    - Estate Surveyor & Valuer
    - Developer
    - Urban Planner
    - Policymaker/Official
2. Gender
    - Male
    - Female
3. Years of professional experience
    - 0–5 years
    - 6–10 years
    - 11–20 years
    - Above 20 years
4. Highest academic/professional qualification
    - B.Sc./HND
    - M.Sc./M.Phil.
    - PhD/Professional Fellowship

Section B: Awareness and Adoption of Green Features

On a scale of 1 (Very Low) to 5 (Very High), how would you rate your awareness and adoption of the following green features?

Green Feature	1	2	3	4	5
Energy efficiency (insulation, LEDs)	☐	☐	☐	☐	☐
Solar power systems	☐	☐	☐	☐	☐
Water management (rainwater, greywater)	☐	☐	☐	☐	☐
Sustainable waste management	☐	☐	☐	☐	☐
Eco-friendly construction materials	☐	☐	☐	☐	☐
Green landscaping/open spaces	☐	☐	☐	☐	☐
Indoor environmental quality (IEQ)	☐	☐	☐	☐	☐
Smart and sustainable technologies	☐	☐	☐	☐	☐

Section C: Willingness-to-Pay (WTP)

5. In your opinion, do you think buyers/tenants in Benin City would be willing to pay a premium for green housing features?
    - Yes
    - No
6. If yes, what percentage premium do you estimate they would be willing to pay?
    - 1–5%

- 6–10%
- 11–15%
- 16–20%
- Above 20%

Section D: Perceptions of Valuation Impact

On a scale of 1 (Strongly Disagree) to 5 (Strongly Agree), please rate your level of agreement with the following statements:

Statement	1	2	3	4	5
Green housing features increase property value.	☐	☐	☐	☐	☐
Energy-efficient buildings have higher marketability.	☐	☐	☐	☐	☐
Clients increasingly demand properties with sustainable features.	☐	☐	☐	☐	☐
Lack of standardized valuation guidelines limits proper assessment of green features.	☐	☐	☐	☐	☐
High upfront cost is the greatest barrier to green housing adoption.	☐	☐	☐	☐	☐

Appendix B: Interview Guide

Introduction

This guide is used to facilitate semi-structured interviews with professionals involved in real estate, housing development, planning and policymaking in Benin City. The aim is to explore in depth their perspectives on awareness, adoption, institutional barriers, market perceptions and valuation methodologies related to green housing. Participation is voluntary and responses will be kept confidential.

Section A: Professional Readiness

1. How prepared are estate surveyors and valuers and other practitioners to value properties with green features in Benin City?
2. What kinds of training or professional tools are available to support valuing such features?
3. How frequently do you encounter properties with green features in your professional practice?

Section B: Institutional Barriers

4. What are the main challenges limiting green housing adoption (e.g., cost, lack of incentives and regulatory gaps)?
5. Do you think current housing/building policies adequately promote green housing?
6. What incentives (e.g., tax relief, subsidies) would encourage developers and buyers to adopt green features?

Section C: Market Perceptions

7. How do clients (buyers, tenants and developers) perceive the value of green housing?
8. Do you believe buyers are willing to pay more for green housing features? Why or why not?
9. Are awareness levels different across income groups?

Section D: Valuation Methodology

10. How do valuers currently reflect green features in property valuation reports?
11. Are existing valuation methods (e.g., comparables, cost, income and lifecycle costing) adequate for green housing?
12. What data or guidelines are missing for proper valuation of green features?

Section E: Recommendations

13. What role should professional bodies (NIESV, RICS) play in mainstreaming green valuation practices?
14. What policy reforms or professional trainings are most urgently needed?
15. Where do you see the future of green housing in Benin City's property market over the next decade?