

# Resident's willingness-to-pay for green affordable housing in Fagge Local Government Kano State, Nigeria

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## Paper History

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## Abstract:

*The turn of the century as witnessed in increasing concern for sustainability in real estate industry with major stakeholders: investors, developer and users trying to embrace sustainability agenda. However, investment in green building has been encouraged through government legislation in developed economies, so far, in Nigeria sustainability in property investment particularly the preference to pay for green building features has not get focused on. This research work focuses on investigating the resident's willingness to pay for green features with implementation of green affordable housing concept, the major objective of this research work is to establish residents willingness to pay for green affordable housing, it aim at promoting sustainability culture in built environment. Questionnaire was administered to 383 residents selected through quantitative technique in the study area where 255 questionnaires were retrieved from the respondents. The data collected were analyzed and measured with the use of descriptive analysis. The findings show that the homeowners (resident's) willing to pay for green features attributes because of reduction in energy saver of green buildings. Basically, there is still need for more awareness on green building features. The result also indicated that television racked highest as medium of awareness. Clearly, it shows residents are willing to pay for green building but there is still need to gain more insight into preparedness of homeowners to embrace and promote sustainability culture in Nigeria built environment.*

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## 1. Introduction

Over the past decade there has been a virtual explosion of activity in the green building field. While the goals of green building are easy to embrace in concept, resources efficiency, habitat conservation, improved occupant health, better pedestrian environments and a commitment to high quality buildings, they are more difficult to achieve in practice, especially in affordable housing [1]. Many researchers in the affordable housing world are sensitive to the environmental and community impacts of development, but feel that their work is already too difficult to afford the luxury of addressing green building concerns [1]. A precious few see housing affordability, sprawl, indoor environmental quality and loss of habitat, loss of community character, and resource and material waste as a set of interconnected problems calling out for more comprehensive solutions. Many of those researchers have managed to conceive of green projects and sometimes even build them, but this has presented a new set of problem [2].

The excessive energy consumption and greenhouse gas emissions in the building sector leads to many environmental impacts in the life cycle of every building. Promoting green buildings is seen to be an ideal solution to mitigate these environmental impacts [3]. Developing countries like China, UK, USA has prioritized addressing such environment and energy problems, recognizing that energy consumption and environmental impacts resulting from construction, operation and demolition of buildings is particularly severe [4]. While the promotion of green housing depends on the supply-side, even

though the main driving force is from the demand-side—whether and how much urban households are willing to pay for green housing. If this willingness-to-pay (WTP) exceeds the incremental costs of building such green housing, developers will be incentivized to supply this green product in the market [5].

According to the United States Department of Housing and Urban Development (HUD) affordable housing is housing whose cost (in rent or mortgage payments) does not exceed 30% of the gross monthly income of a low-income household. Low-income households are defined through a HUD-promulgated formula that accounts for variation in area median income and family size. Whether a particular home is affordable for a given household is a function of price, area income, the family's income, and family size. The study aims to explore resident's willingness to pay for green housing attribute under investigation include the use of green materials and construction methods (e.g. timber from sustainable sources), energy efficient technologies (e.g. LED lighting) and water saving devices (e.g. grey water recycling system).

### 1.1 Nigerian housing issues

Housing is a fundamental product for every human being irrespective of financial standing. In fact, world acclaimed American psychologist, Abraham Maslow ranked shelter as second only to food in his hierarchy of human needs [6] (Maslow, 1943). Housing is one of the three basic needs of man and ranked the most important for the physical survival of man after the provision of food and clothing [7, 8, 9]. In 2002 housing deficit

in Nigeria was put at about 8 million units [10]. Latest statistics indicate that Nigeria requires a whopping 700,000 housing units annually for the next 15 years to accommodate her teeming homeless citizens. Rents in major cities of Nigeria are about 60% of an average worker's disposable income, which is much higher than the 20-30% recommended by United Nations [11]. The gross housing delivery is therefore a major factor in the nation's gross domestic product (GDP) [12]. Furthermore, in many economies the production of housing stimulates employment and growth as building or renovating homes requires the services of a diverse group of persons and the products of many different industries.

## 1.2 Green building concept

The term green building has been described as energy-efficient building, environmental building, eco-building, sustainable building and high-performance building [13]. The US Green Building Council 2003 defined Green building as the practice of increasing the efficiency of new buildings, and reducing their impact on human health and the environment through better site location, design, construction, operation, maintenance, and removal. According to the same source, Green buildings are designed, constructed, and operated to boost environmental, economic, health and productivity performance over that of conventional building. Chatterjee [14] defined green housing practice as a process to create buildings and infrastructure in such a way that minimize the use of resources, reduce harmful effects on the ecology, and create better environments for occupants. Kamana and Escultura [15] defined green building as an outcome of a design which focuses on increasing the efficiency of resource use while reducing impacts on human health and the environment during the building's lifecycle, through better location, design, construction, operation, maintenance, and removal.

## 1.3 The concept of affordable housing

Internationally, housing affordability is defined in multiple ways. One of the most commonly accepted definitions of affordability refers to housing affordability which is taken as a measure of expenditure on housing to income of the household [16]. The term housing affordability has been used to summarize the difficulties individual households face in accessing descent or adequate housing [17]. The idea of affordable housing recognizes the needs of households whose incomes are not sufficient to allow them to access appropriate housing in the market without assistance [18]. Affordable housing is ideologically framed as special pleading for individual welfare rights for unpopular populations and/or as a government redistribution program [19]. Thus, the term 'affordable housing' describes housing that assists lower income households in obtaining and paying for appropriate housing without experiencing undue financial hardship [18]. Affordable housing is housing that is appropriate for the needs of a range of low to moderate income households and priced so that low and moderate incomes are able to meet their other essential basic living costs. A range of publicly or privately initiated forms of housing may meet this specification [20].

## 1.4 Green Affordable Housing

The concerns regarding the negative impact of climate change and the importance of having a sustainability agenda has stimulated greater interest for green construction. It is noted by Hes [21], that design is one of the highest impact areas on 'green' performance of the built environment. Syed, *et al.* [22] define affordable and sustainable housing as the combination of housing that can be owned at minimal price, considers safety, allows for healthy living, and covers with sustainable aspects. The houses should be built and equipped with all of the elements of healthy living, learning, and working. In other words, the construction of

houses and building that enables low- and middle-income people to gain affordable homes requires the adoption of cost-effective, innovative and environmentally friendly housing technologies [23]. Green affordable housing is better designed and built, more durable, not significantly more expensive, cheaper to operate, healthier, more environmentally sound, and less risky [24]. It is clear that green specification achievement and design achievement are two key elements to achieve a sustainable future in the building industry [1]. They noted that it is widely acknowledged that green buildings are beneficial to the environment and society, however the key to moving forward to green has been rather challenging for all key stakeholders, including the government, private sector, designers and contractors.

## 1.5 Willingness-to-pay for Green

Based on the study conducted by Wu, *et al.* [25] on whether housing assets can affect the residence willingness to pay for green housing, using factors such as personal characteristics, housing price, and the number of real estate ownership on willingness that affects consumers' purchase of green houses in China, the study reveal that, housing assets significantly affect the willingness of house owner to pay for green houses. The more houses they own, the higher their willingness to pay for a green housing will be. On the other hand, if the housing prices are higher, house owners are more willing to buy a green house. Similarly, if the house owner is more educated [25, 26], unmarried, the willingness to buy a green housing will be stronger, and owning housing assets may affect the individual happiness due to the housing wealth effect brought by rising housing prices. Huang [26] also reiterate that the significance of the health benefits of green building housing products should be promoted and marketing of green housing product be increased.

Njo, *et al.* [27] conducted a study in Surabaya, Indonesia to determine the willingness-to-pay for green apartments, showed that green attributes, such as indoor air quality, land attributes, and environmental awareness significantly influences willingness-to-pay for green apartment in Surabaya. 79% of the respondents were willing to pay to own a green apartment for 15% more of the total purchase price, or \$670–\$6,700. The study further reveal that, governments institutions, educational institutions, and stakeholders in the real estate sector need to work together to develop net zero buildings as well as increase green building literacy in the general public. In a tropical and developing country, the development of green apartments should be adjusted to provide positive benefits to the environment and other sustainable developments.

Another study conducted by Golbazi, *et al.* [28] indicate that, students residing in a green building report higher satisfaction on thermal, lighting, and overall comfort levels, and report higher positive impact of their living environment on the quality of their studying. However, such students were also found to report decreased tendencies to consider green buildings in the future. Findings on willingness to pay with regards students' potential to reside in a green building upon graduation revealed that 35–40% respondents indicating lack of willingness to pay extra. On the contrary, only students with high self-acquired knowledge on environmental issues were found to indicate significant willingness to pay to reside in green buildings.

In Nigeria, the study of Takuh, *et al.* [29] revealed that in Makurdi homeowners are satisfied with conventional housing, even though they are willing to pay a 3.3% premium price to purchase green buildings. Furthermore, satisfaction with current traditional housing negatively affects their willingness to pay for green buildings. In Ghana, Kumah, *et al.* [30], identified the factors influencing the willingness to purchase green buildings by the built-environment professionals. The findings shows that, the perceived benefits of green buildings, perceived value of green

buildings, perceived risks associated with green buildings, environmental concerns, and social trust were all significant as key factor influencing their willingness to pay for green buildings.

## 2. Methodology

This paper presents the findings from a research conducted on the Resident's Willingness-To-Pay for Green Affordable Housing in Fagge Local Government, Kano State, Nigeria. The scope of the research covers the housing residents in Fagge Local Government Kano State, Nigeria. A research question was asked in order to guide the investigation: Are the market forces willing to pay for green affordable housing in Fagge Local Government? However, this section deals with the research methodology adopted in conducting this research, that is, the target population, sample and sampling techniques, instrumentation, data collection, the instruments used for data collection, the methods of data collection and analysis. The methodology employed in this study is quantitative method as discussed below. The target population is the Housing residents in Fagge Local Government Kano State, Nigeria. In this paper, the research design which is a systematic method of data collection basically on case study research design, which is aimed at investigating the in-depth of a phenomenon, finding out the resident willingness-to-pay for Green Housing in Fagge Local Government, Kano State. The total population of the resident in Fagge according to national population commission was 257,119. Having 26,728 in Fagge A which is the total number of the study area. These people were been selected because they are the major people that can give their own view on green building.

Table 1: Total population of wards in the study area (National Population Commission, [31])

Wards	Population
Fagge A	26,728
Fagge B	24,252
Fagge C	13,403
Fagge D	13,009
Fagge E	29,150
Kwachiri	45,640
Rijiyar Lemo	22,462
Sabongari East	34,204
Sabongari West	33,598
Yammata	14,673
<b>Total</b>	<b>257,119</b>

According to Saunders *et al.* [32], when the population of the study ranged from 10,000 and below 100,000 which is equivalent to 5% of margin error and 9% of confidence level then the sample size should be Three Hundred and eighty-three (383). However, since the population of this study is 26,728 which fall within 10,000 and below 100,000 the sample size therefore, will be 383 and it is justified under the Table 2.

Table 2: Population size [31, 32]

Ward	Population area	Population size	Sample size
<b>A</b>	Fagge	26,728	383

Saunders, Lewis & Thornhill [32] illustrates snowball sampling is commonly used when it is difficult to identify respondents of at the desired population. Likert scale according to Vonglao [33] the scale was introduced by Likert in 1932 and consists of a series of questions which are indicators of the latent traits. Each question has a five-scale response: least, less, moderate, more, and most with the scores for the scale being 1, 2, 3, 4, and 5, respectively. A total of numbers of 383 questionnaires were distributed and 255 of them were correctly

filled and returned. This represents 66.58% of the distributed number. The returned questionnaires formed the basis for the analysis.

Table 3: Questionnaire Administered

Questionnaires Administered	Frequency	Percentage
Total Number of Valid Returned	255	66.58
Total Number of not Returned	128	33.42
<b>Total Number Administered</b>	<b>383</b>	<b>100</b>

## 3. Results and discussion

The resident's willingness to pay for green affordable housing in Fagge Local Government Kano State, Nigeria, according to the findings as showed in Table 4 below; it shows that, I am not willing to pay for green features such as energy efficiency, green roof. 15.3% of the respondents strongly disagree, 10.2% of the respondents disagree, 14.1% of the respondents somewhat agree, 40% of the respondents agree while 20% of the respondents strongly agree. Therefore, the majority of the respondents agree that, they are not willing to pay for green features such as energy efficiency, green roof.

My utility bills should be reduced for developments of green building certification. 5.1% of the respondents strongly disagree, 10.2% of the respondents disagree, 15.3% of the respondents somewhat agree, 49.8% of the respondents agree while 19.6% of the respondents strongly agree. Therefore, the majority of the respondents agree that, there utility bills should be reduced for developments of green building certification.

I consider green features as part of my decision in purchasing a new house. 15.3% of the respondents strongly disagree, 15.3% of the respondents disagree, 15.3% of the respondents somewhat agree, 35.3% of the respondents agree while 18.8% of the respondents strongly agree. Therefore, the majority of the respondents agree that, they consider green features as part of my decision in purchasing a new house.

Water-conservation: I am willing to pay for green building features that can conserve water. 15.3% of the respondents strongly disagree, 10.2% of the respondents disagree, 15.3% of the respondents somewhat agree, 44.7% of the respondents agree while 14.5% of the respondents strongly agree. Therefore, the majority of the respondents agree that, they are willing to pay for green building features that can conserve water.

Energy efficiency lightening: I am willing to pay for energy efficiency lighting fixtures. 10.2% of the respondents strongly disagree, 15.3% of the respondents disagree, 20.4% of the respondents somewhat agree, 40% of the respondents agree while 14.1% of the respondents strongly agree. Therefore, the majority of the respondents agree that, they are willing to pay for energy efficiency lighting fixtures.

Public transportation nearby: I am willing to pay for convenience accessibility to transport. 18.8% of the respondents strongly disagree, 9.8% of the respondents disagree, 15.3% of the respondents somewhat agree, 25.5% of the respondents agree while 30.6% of the respondents strongly agree. Therefore, the majority of the respondents strongly agree that, they are willing to pay for convenience accessibility to transport.

Indoor air quality: I am willing to pay for improved natural ventilation in a conducive environment. 15.3% of the respondents strongly disagree, 20.4% of the respondents disagree, 15.3% of the respondents somewhat agree, 39.6% of the respondents agree while 9.4% of the respondents strongly agree. Therefore, the majority of the respondents agree that, they are willing to pay for improved natural ventilation in a conducive environment.

Access to natural light: I am willing to pay for high quality. 20.4% of the respondents strongly disagree, 15.3% of the respondents disagree, 15.3% of the respondents somewhat agree, 33.7% of the respondents agree while 15.3% of the respondents strongly agree. Therefore, the majority of the

respondents agree that, they have access to natural light: they are willing to pay for high quality.

Leadership in Energy and Environmental Design (LEED). I am willing to pay for the current sustainability building attributes. 14.1% of the respondents strongly disagree, 14.9% of the respondents disagree, 20.4% of the respondents somewhat agree, 30.2% of the respondents agree while 20.4% of the respondents strongly agree. Therefore, the majority of the respondents agree that, there is Leadership in energy and environmental design (LEED) and they are willing to pay for the current sustainability building attributes.

Recycling: I am willing to pay for conservation and reduction of the amount of wastes sent to incinerators of green attributes. 14.1% of the respondents strongly disagree, 14.9% of the respondents disagree, 20.4% of the respondents somewhat

agree, 30.2% of the respondents agree while 20.4% of the respondents strongly agree. Therefore, the majority of the respondents agree that, there is recycling: they are willing to pay for conservation and reduction of the amount of wastes sent to incinerators of green attributes.

Green cleaning: I am willing to pay for product with environmental friendly that are design to preserve human health and environmental quality. 20.4% of the respondents strongly disagree, 15.3% of the respondents disagree, 15.3% of the respondents somewhat agree, 33.7% of the respondents agree while 15.3% of the respondents strongly agree. Therefore, the majority of the respondents agree that, there is green cleaning: they are willing to pay for product with environmental friendly that are design to preserve human health and environmental quality.

Table 4: Mean and standard deviation of Fagge Local Government resident's preference to pay for green affordable housing

S/N	Green Building Attributes	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree	Mean	SD
1	I am not willing-to-pay for green features such as (a) energy efficiency (b) green roof	39 (15.3%)	26 (10.2%)	36 (14.1%)	102 (40.0%)	52 (20.4%)	3.40	1.333
2	My utility bills should be reduced for developments of green building certification	13 (5.1%)	26 (10.2%)	39 (15.3%)	127 (49.8%)	50 (19.6%)	3.69	1.059
3	I consider green-features as part of my decision in purchasing a new house	39 (15.3%)	39 (15.3%)	39 (15.3%)	90 (35.3%)	48 (18.8%)	3.27	1.343
4	Water-conservation: I am willing-to-pay for green building features that can conserve water	39 (15.3%)	26 (10.2%)	36 (14.1%)	102 (40.0%)	52 (20.4%)	3.33	1.280
5	Energy efficiency lighting: I am willing-to-pay for energy efficient lighting to transport	26 (10.2%)	39 (15.3%)	52 (20.4%)	102 (40.0%)	36 (14.1%)	3.33	1.194
6	Public transport nearby: I am willing-to-pay for convenience accessibility to transport	48 (15.3%)	25 (10.2%)	39 (14.1%)	65 (40.0%)	78 (20.4%)	3.39	1.478
7	Indoor air quality: I am willing-to-pay for improved natural ventilation in a conducive environment	39 (15.3%)	52 (20.4%)	39 (15.3%)	101 (39.6%)	24 (9.4%)	3.07	1.261
8	Access to natural light: I am willing-to-pay for high quality	52 (20.4%)	39 (15.3%)	39 (15.3%)	86 (33.7%)	39 (15.3%)	3.08	1.385
9	Leadership in energy and environment design (LEED): I am willing-to-pay for the current sustainability building attributes	36 (14.1%)	38 (14.9%)	52 (20.4%)	77 (30.2%)	52 (20.4%)	3.28	1.327
10	Recycling: I am willing-to-pay for conservation and reduction of the amount of wastes sent to incinerators of green attributes	36 (14.1%)	38 (14.9%)	52 (20.4%)	77 (30.2%)	52 (20.4%)	3.28	1.327
11	Green cleaning: I am willing-to-pay for product that are environmentally designed to preserve human health and environmental quality	52 (20.4%)	39 (15.3%)	39 (15.3%)	86 (33.7%)	39 (15.3%)	3.08	1.385



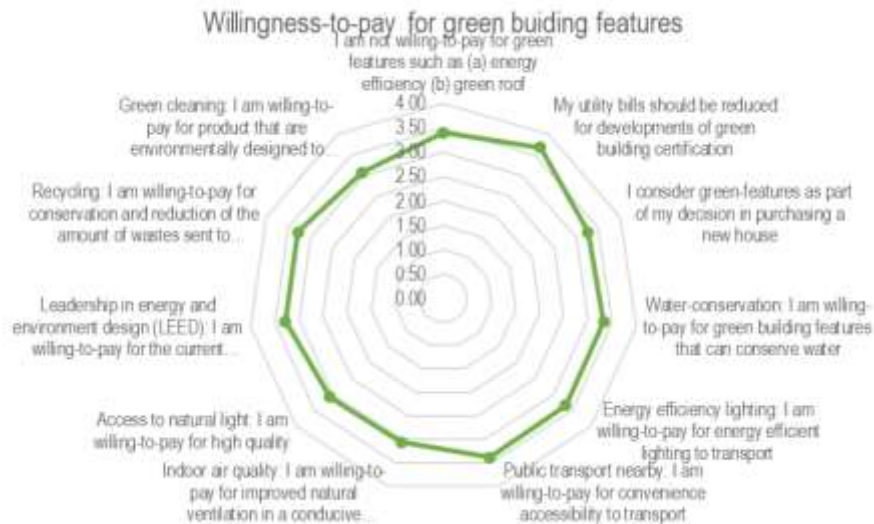


Figure 1: Mean average of Fagge Local Government Resident's willingness-to-pay for Green Affordable Housing

#### 4. Conclusions

The study has provided information on the willingness of homeowners to pay for various categories of green features. The aim is to evaluate the desire and readiness of residents (homeowners) to invest in green buildings. The degree of willingness of tenants to pay for various categories of green features was assessed through descriptive analysis. Moreover, the objective was to gain insight into the preparedness of homeowners to embrace green buildings in Kano State. The study also established that the willingness of resident's to pay for most of the groups of green features were high. Most of the features such as 'Water conservation (3.39),' LEED (3.28), Waste and Recycling' (3.28), 'Indoor Air Climate' (3.07). There is therefore the need to educate the users on the importance of such features to achieving full sustainability of built environment.

The following are recommendations for future research: To establish the readiness and indicators for the delivery of green affordable housing. The client's commitments and ability to finance for green affordable housing. Investigate the competencies of the housing sector to design developed and maintain green affordable housing. Finally, to identify the availability of the materials and equipment of green affordable housing in the market.

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