

CONSTRAINING FACTORS TO AFFORDABLE SMART HOUSING DEVELOPMENT IN AWKA, NIGERIA

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Abstract. The concept of smart housing in the design of residential homes is one that has developed extensively in terms of modern-day city planning, even when it comes to developing cities like Awka. Smart homes are built on advanced technological development, sustainable design principles, and user-centric facilities aimed at creating more efficient, comfortable, and eco-friendly living spaces. The aim of this study is to assess constraining factors to affordable smart housing development in Awka, Anambra State, Nigeria. This study employs a mixed-methods research design, combining both quantitative and qualitative approaches to investigate the constraining factors to affordable smart housing development in Awka. This study employed a quantitative research design. The population for the research comprises construction professionals and other relevant stakeholders in Awka, Anambra State. Specifically, the study population includes 97 construction professionals, 135 estate surveyors and valuers, and 400 Awka residents. The data were presented using tables and examined through mean score calculations and percentage analyses. The research revealed that the existing smart housing projects were perceived as unaffordable. The study identified key factors hindering the development of affordable smart housing in Awka. Lack of infrastructure emerged as a major constraint. The high cost of smart technologies was also identified as a crucial obstacle. The study recommends that government should prioritize the development of basic infrastructure to support smart housing technologies. This includes improving power supply, internet connectivity, and other necessary utilities. A comprehensive infrastructure development plan should be created and implemented in phases, focusing first on areas designated for smart housing projects.

Keywords: *Affordable, Awka, constraining, factors, housing, Smart.*

INTRODUCTION

One of the most basic human rights is housing. It plays a very important role in the quality of life and overall welfare of people in terms of the socioeconomic factors. Provision of affordable housing remains a challenge in developing countries like Nigeria. It is true that due to its overpopulation being estimated at over 200 million, Nigeria has a critical housing shortage (Oluwole & Aderonmu, 2023; Dania, 2023). The Federal Mortgage Bank of Nigeria reports that this deficit

stands at about 22 million housing units while a majority of such people are low-income earners (Dania, 2023).

The Nigerian government has acknowledged the significance of addressing the housing deficit and has set up different programmes aimed at providing affordable housing. These efforts have, however, been constrained by a number of obstacles such as a lack of infrastructure, financial issues as well as regulatory bottlenecks. To address the financial barriers, innovative financial instruments such as Real Estate Investment Trusts (REITs) and Mortgage-Backed Securities (MBS) have been proposed. REITs can provide a platform for collective investment in real estate, allowing small investors to participate in the housing market, while MBS can mobilise funds for housing finance by converting mortgage loans into tradable securities.

Alternative types of building materials have also been used to construct cheap houses. Interlocking Stabilized Soil Block (ISSB) is an innovation that could bring down the cost of construction considerably. ISSBs are made from locally available materials and do not require expensive imports, making them a cheaper choice for affordable housing projects. However, due to a limited number of people trained in this technology and resistance to change from conventional building practices, the use of such materials is still low (Oluwole & Aderonmu, 2023; Ugochukwu, 2024).

Awka, the State Capital of Anambra State, is a good case study for assessing the barriers towards the development of affordable smart homes. Awka's population stands at slightly over 300 000 people that represents a rapid rise in urbanisation rates within recent years leading to a higher demand for residential places. Awka's uniqueness in socio-economic and cultural aspects pose particular issues and chances for affordable smart homes. The rate at which the city is growing is causing a strain to the existing infrastructures that are reinforced with "gold prices of land". Moreover, reluctance towards accepting smart housing technologies due to traditional methods of construction and a lack of awareness hampers the adoption of new improvements. It is against this background that the study is set to assess the constraining factors to affordable smart housing development in Awka, the capital city of Anambra State.

1. LITERATURE REVIEW

1.1. Smart Housing Concept

The concept of smart housing in the design of residential homes is one that has developed extensively in terms of modern-day city planning, even when it comes to developing countries like Nigeria. Smart homes are built on advanced technological development, sustainable design principles, and user-centric facilities aimed at creating more efficient, comfortable, and eco-friendly living spaces.

For example, according to Bibri and Krogstie (2017), smart homes are houses that have been fitted with Internet of Things (IoT) devices, automated systems, and energy-efficient appliances that work together to give an easier and more convenient life. Such technologies also enable optimisation, thus facilitating various household operations ranging from the use of power to security issues, among other activities. Smart housing offers features such as automatic lighting

system that operates on its own based on the occupancy levels. Also, there are interconnected home appliances that can be operated remotely using mobile phones or any other gadget, hence giving people who live in such houses a chance to manage their homes better.

1.2. Affordable Smart Housing Development in Nigeria

The idea of affordable smart housing holds tremendous promise as one possible solution to Nigeria's housing challenge by offering improved quality of life that also takes into account affordability and sustainability concerns. According to Bibri and Krogstie (2017), smart homes are residential dwellings with modern technologies designed to increase energy efficiency, enhance security and make it more comfortable for occupants. Therefore, smart houses are considered a crucial factor in addressing both quality and quantity-related housing shortages from a Nigerian perspective.

Housing in present-day Nigeria is severely limited, especially within urban areas. The current housing deficit must be tackled every year to keep up with rapid urbanisation coupled with population growth. Besides, most existing buildings are substandard and do not meet contemporary requirements for comfort, safety, or environmental friendliness. Furthermore, there is a wide gap in housing needs across urban areas nationwide, thereby making the problem even worse. The use of local building materials in smart housing development presents an opportunity to reduce costs and promote sustainability. Oluwole and Aderonmu (2023) discuss how interlocking stabilised soil blocks can be used as a material for Nigerian housing projects. Therefore, blending these indigenous materials with modern technological systems may result in inexpensive dwelling units that are culturally valid, which benefits from both approaches: traditionalism or antiquity.

Smart housing technologies pose a major challenge as regards user acceptance and adoption. Moreover, cultural preferences, privacy concerns, and data security risks, coupled with unfamiliarity with the concept of smart homes by some people, may prevent them from embracing it. Therefore, public awareness campaigns highlighting the advantages of smart housing for Nigerians can be used to address these fears, thereby making such houses more acceptable.

The potential impact of smart housing on urban planning and development in Nigeria is significant. Yigitcanlar and Kamruzzaman (2018) argue that one of the things that makes urban cities sustainable is smart housing, which guarantees that people enjoy their stay in cities. Nigerian cities stand at a crossroad; they have achieved neither optimal resource use nor energy efficiency, nor better living standards – all of which are delivered by smart house implementations. However, despite these promising prospects, there are several obstacles ahead. Overcoming infrastructural gaps within the country's regulatory frameworks will be a key factor in determining whether modern technology residences spread widely in Nigeria.

Nevertheless, it is possible for the Nigerian governmental authorities along with other stakeholders such as NGOs and private investors to work together collectively towards realisation of accessible smart buildings that would resolve existing mass housing challenges while ensuring sustainable urban development. By using technology-based solutions to create low-cost but high-quality dwellings for its

citizens based on locally available materials under innovative financing platforms, Nigeria could deliver an effective approach toward solving its affordable shelter problems as well as improving the residents' quality of life.

1.3. Factors Constraining the Development of Affordable Smart Housing

Financial, technological, policy, and socio-cultural constraints have all hindered the development of affordable smart housing in Nigeria. These obstacles must be understood and addressed before smart housing can be implemented successfully.

One of the challenges faced by developers involves provision of financing options that are cost effective for producing affordable smart houses in the country. High initial costs associated with smart technologies may make them expensive for both developers and prospective house owners. The volatility in construction costs, driven by economic factors such as inflation and currency fluctuations, adds another layer of financial uncertainty.

Moreover, construction costs fluctuate mainly due to inflation and currency changes, exacerbated by Nigeria's macroeconomic challenges, adding to these investment issues. Consequently, it becomes difficult to engage in long-term planning towards such projects as they are affected greatly by such volatility. These problems will only be solved through more elaborate risk mitigation measures coupled with specific financial instruments for use by stakeholders in need of capital opportunities regarding the adoption of green bonds due to social impact programmes targeting cheaper residential facilities.

Nigeria is challenged by another problem in terms of technological barriers limiting the adoption of smart housing. Lack of adequate infrastructure, including power and internet services as highlighted by Dania (2023), may hinder the full use of smart technologies in housing. These drawbacks infringe on the capabilities as well as advantages of smart home systems, hence limiting developers and those intending to live there from being attracted to this technology. The use of imported smart devices and systems does not only add to the cost but also creates problems with customer support and continuity. To overcome these barriers, there is a need for creating a local ecosystem for smart home technologies. This involves encouraging research and development, establishing indigenous manufacturing capacities and training skilled technicians who can install and maintain smart homes.

Socio-cultural aspects significantly influence demand for and acceptance of intelligent houses in Nigeria. Apart from the perception of the difficulty of use or compatibility, privacy matters could lead many people to reject their application. Similarly, Nigerians regard ownership of own residence as one of life's major accomplishments, which makes it less likely that they will consider any technological devices that can easily be replaced or fade away.

Therefore, socio-cultural barriers require culturally based educational campaigns that demonstrate benefits of utilising these types of houses in terms of enhancing quality lives while lowering long-term costs. Building trust can involve engaging opinion leaders from the community about smart homes. Lastly, smart

housing projects could incorporate some local architectural features and traditional design elements, which would make them more attractive to future occupants.

Market-related constraints pose significant challenges to the development of affordable smart housing in Nigeria. Limited demand due to affordability issues is a primary concern. The high costs associated with smart home technologies, coupled with the generally low purchasing power of the average Nigerian, create a narrow market for these innovative housing solutions. The lack of demonstration projects to showcase the benefits of smart housing further dampens market interest. Without tangible examples of successful implementations, potential buyers and investors remain sceptical about the practical advantages and return on investment of smart homes.

2. DATA ANALYSIS

This study employed a quantitative research design to investigate the constraining factors to affordable smart housing development in Awka. The population for this research comprises construction professionals and other relevant stakeholders in Awka, Anambra State. Specifically, the study population includes 97 construction professionals, 135 estate surveyors and valuers, and 400 Awka residents. The response of the respondents was analysed using Mean Score Analysis. The decision rule was that any item with a mean score of 3.0 and above shall be accepted.

2.1. Data Presentation and Analysis

For this study, questionnaires were distributed to 632 respondents, comprising 97 construction professionals, 135 estate surveyors and valuers, and 400 Awka residents. Out of the 632 questionnaires distributed, 549 were retrieved and found usable, representing an 86.9 % response rate.

Table 1. Affordability of the Current Smart Housing Projects in Awka (created by the authors)

Response	Frequency	Percentage
Strongly Agree	12	2.2 %
Agree	34	6.2 %
Neutral	98	17.9 %
Disagree	267	48.6 %
Strongly Disagree	138	25.1 %
Mean	2.11	

Table 1 shows that the mean score of the response with respect to the affordability of smart houses in Awka is 2.11, which is less than 3.0. This indicates a significant affordability issue with existing smart housing initiatives, which means that smart houses in Awka are not affordable.

Table 2. Lack of Infrastructure as a Factor Hindering the Development of Affordable Smart Housing in Awka (created by the authors)

Response	Frequency	Percentage
Strongly Agree	201	36.6 %
Agree	243	44.3 %
Neutral	67	12.2 %
Disagree	29	5.3 %
Strongly Disagree	9	1.6 %
Mean	4.08	

Lack of infrastructure is accepted to be one of the key factors hindering the development of affordable smart housing in Awka, as shown in Table 2, with a mean score of 4.08.

Table 3. High Cost of Smart Technologies a Factor Hindering the Development of Affordable Smart Housing in Awka (created by the authors)

Response	Frequency	Percentage
Strongly Agree	187	34.1 %
Agree	256	46.6 %
Neutral	78	14.2 %
Disagree	23	4.2 %
Strongly Disagree	5	0.9 %
Mean	4.08	

High cost of smart technologies is accepted as one of the key factors hindering the development of affordable smart housing in Awka, as shown in Table 3, with a mean score of 4.08.

Table 4. Government Incentives as an Effective Strategy (created by the authors)

Response	Frequency	Percentage
Strongly Agree	234	42.6 %
Agree	256	46.6 %
Neutral	43	7.8 %
Disagree	12	2.2 %
Strongly Disagree	4	0.7 %
Mean	4.3	

Government incentives as an efficient strategy is accepted to be one of the practical strategies that would promote the development of affordable smart housing in Nigeria, as shown in Table 4, with a mean score of 4.3.

Table 5. Public-Private Partnerships (created by the authors)

Response	Frequency	Percentage
Strongly Agree	198	36.1 %
Agree	276	50.3 %
Neutral	58	10.6 %
Disagree	13	2.4 %
Strongly Disagree	4	0.7 %
Mean	4.2	

Public-private partnership is accepted to be one of the practical strategies that would promote the development of affordable smart housing in Nigeria, as shown in Table 5, with a mean score of 4.2.

CONCLUSIONS

The study on constraining factors to affordable smart housing development in Awka, Anambra State, has yielded several significant findings. The research revealed that the existing smart housing projects were perceived as unaffordable. The study identified key factors hindering the development of affordable smart housing in Awka. Lack of infrastructure emerged as a major constraint, with the highest mean of 4.3. The high cost of smart technologies was also identified as a crucial obstacle. The study also explored practical strategies to promote the

development of affordable smart housing, including government incentives and public-private partnerships.

The study concludes that while smart housing initiatives are currently limited and largely unaffordable in Awka, the primary constraints identified – a lack of infrastructure and high costs of smart technologies – highlight the need for significant investment and innovative approaches to make smart housing more accessible and affordable. These challenges are not insurmountable but require strategic interventions and collaborations between various stakeholders.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed to promote the development of affordable smart housing in Awka and, by extension, in Nigeria:

1. *Infrastructure Development*: The government should prioritize the development and upgrade of basic infrastructure to support smart housing technologies. This includes improving power supply, internet connectivity, and other necessary utilities. A comprehensive infrastructure development plan should be created and implemented in phases, with initial focus on areas designated for smart housing projects.
2. *Financial Incentives*: A range of financial incentives shall be implemented to make smart housing more affordable. This could include tax breaks for developers who incorporate smart technologies in affordable housing projects, subsidies for low and middle-income buyers of smart homes, and low-interest loans for smart home upgrades. The government could also consider creating a special fund to support research and development in locally adapted smart housing technologies.
3. *Public-Private Partnerships*: Partnerships among the government, private developers, and technology companies shall be encouraged and facilitated. These partnerships could focus on developing affordable smart housing projects, with each partner contributing their expertise and resources. The government could provide land and regulatory support, private developers could manage construction, and technology companies could offer smart solutions at reduced costs.

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