





# Construction stakeholders' perception on sustainable housing development in Anambra State, Nigeria

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**Citation:** Ezeokoli, F. O., Ehimioboh, C. O., Okoye, P. U., & Ekekezie, C. U. (2023). Construction stakeholders' perception on sustainable housing development in Anambra State, Nigeria. *European Journal of Sustainable Development Research*, 7(1), em0202. <https://doi.org/10.29333/ejosdr/12537>

## ARTICLE INFO

Received: 06 Jun. 2022

Accepted: 23 Aug. 2022

## ABSTRACT

The concept of sustainable development (SD) has been widely discussed and has gained theoretical importance over the years. Housing is an integral part of human development and as an important part of the built environment; it is therefore an important aspect of SD. However, it appears that the concept of SD in housing is misunderstood and neglected in practice, especially in developing countries, of which Nigeria is not exempt. Therefore, the study examined the perceptions of stakeholders in the construction industry on sustainable housing development (SHD) in Anambra State, Nigeria. The study was based on a survey using a questionnaire. A total of 372 questionnaires were distributed to the respondents out of which 283 were returned and found suitable for the study. The data collected was analyzed using the simple percentage and relative importance index. Hypothesis testing was done using the Kruskal-Wallis test. The study revealed that more than 90% of the respondents were aware of the concept of SD and SHD. However, the result of the hypothesis test shows that there is a significant difference between the responses of the project participants in terms of awareness and perception of the concept of SHD. This is because the concept is perceived as subjective, normative, and ambiguous and therefore neglected. It is therefore recommended that more education (in the form of sensitization, training, retraining and information) about SHD should be done by all stakeholders. This would help to improve existing knowledge about SHD in the implementation of housing projects.

**Keywords:** sustainable development, sustainable housing development, construction stakeholder, construction, building

## INTRODUCTION

The complexity of modern technology has led to more and more sophisticated homes being designed with very complex yet unique designs that have changed traditional building methods. This has expanded the range of housing types, uses and applications. According to Habitat for Humanity (2015) and Okwu et al. (2017), construction is one of the most important requirements for human existence and plays an important role in the economic development of any nation. It is used to measure the standard of living of individuals and communities (Jiboye, 2009). Therefore, everything about construction affects individuals and society in general. Thus, it becomes a starting point for building and rebuilding after incidents/disasters (Smith et al., 2014).

According to Habitat for Humanity (2015), housing includes all the procedures and/or processes used to create a safe, functional, and affordable home with all the necessary

features and the right environment, which is also easy to maintain. It also involves a degree of energy efficiency and resource control while improving the quality of life (Habitat for Humanity, 2015). Housing is therefore much more than just providing shelter but serves to assess the socio-economic development and/or growth of a nation (Igbino, 2011). Good housing must therefore meet the basic needs of shelter, sanitation, and protection from outside influences (Fadimoro et al., 2004). Otherwise, it affects the health, social well-being, etc. of the occupants (Ezennia & Hoskara, 2019).

On the other hand, the term of sustainable development (SD) has been discussed and debated among researchers in the built environment (BE) over the years. And the theory of SD is becoming quite popular now but not so useful to some persons (Elkington & Rowlands, 1999; Mensah & Casadevall, 2019). This should not be so, however, Allen et al. (2018) postulated that SD is a one of the major items of agenda in dealings of the international community and national strategies should be

designed and developed to address environmental, economic, and social aspect of SD of any nation.

In line with the importance of SD to growth and development of the nation, Nigeria Government in year 1991 formulated the national housing policy (NHP); with sole objective of providing quantitative sustainable housing and legal framework for achieving it (Festus & Amos, 2015). The NHP was formulated to provide solution to the housing problem in Nigeria. Years after its enactment, the provision of sustainable housing and incorporation of SD principles in the Nigeria housing sector have been a national embarrassment (Aribigbola, 2006; Festus & Amos, 2015, Igbino, 2011). This is because of lack of knowledge of basic building technology, unchecked or unplanned urbanization or development, and poor awareness of concept of SD, inadequate maintenance of existing structure (Aribigbola, 2006; Festus & Amos, 2015; Igbino, 2011). These issues have prevented the integration of SD principles into the housing sector in Nigeria, despite the increasing awareness of the concept among construction professionals (Okoye et al., 2021). The subsistence of low level of implementation SD principles in the housing sector was therefore, attributed to the low level of awareness among the non-professional stakeholders such as clients and contractors (Okoye et al., 2021). In view of this, this study will examine the construction stakeholders' perception on sustainable housing development (SHD) in Anambra State, Nigeria.

### Hypothesis

**H0:** There is no major variation in view of housing project practitioners' (professionals, regulatory agencies, contractors, and clients) perception on the concept of SHD principle in the Anambra State, Nigeria.

## LITERATURE REVIEW

### World

Over the years, various efforts have been made to improve the quality of life and housing stock without compromising the needs of the future generation. Some of these efforts around the world are:

The Geneva UN Charter for Sustainable Housing, organized by the United Nations Economic Commission for Europe in 2015, aimed to improve the sustainability of housing through effective policies and actions at all levels, based on domestic conviction. This was due to the severe impact of natural disasters such as earthquakes, floods, and landslides, as well as man-made disasters on housing in the European region. UNECE (2015) argues that the Geneva Charter UN on sustainable housing, national policies and planning are often insufficient to prevent or reduce the impact of natural and man-made hazards. This is due to the fact that climate change has become a recurrent phenomenon, with increases in world temperature, population, floods, storms, and landslides. This has serious implications for the lives and property of communities.

Conversely, Miller and Doh (2014) argue that by integrating the principles of SD into building design, the industry will make a huge contribution to reducing

environmental impacts by reducing energy consumption and anthropogenic greenhouse gas emissions by over 15% globally. Therefore, it is the duty of the architect and the client to achieve this milestone in the building industry.

Similarly, Ogunbiyi et al. (2013) examines the application and use of the lean concept and sustainable construction in the UK. Lean construction is a new production philosophy that has the potential to bring about innovative change in the construction industry. It focuses on minimizing material and process waste, which in turn contributes to sustainable construction in terms of energy consumption and improved health and safety. Furthermore, Ogunbiyi et al. (2013) postulate that better knowledge of the lean concept and its proper implementation will promote the achievement of sustainable construction in housing. In addition, Bidarianzadeh and Fortune (2002) have developed a strategy that combines the principles of sustainable construction with those of lean thinking into a comprehensive approach to manage waste in the construction process. In general, the lean philosophy focuses on minimising waste in construction without compromising the perfection of the end result (Bidarianzadeh & Fortune, 2002). Bidarianzadeh and Fortune (2002) outline the two basic contents of the lean philosophy as follows: A control system for sustainable projects based on advanced performance that reduces environmental impact; and a product policy that integrates economic variability and efficiency and incorporates reuse/recycling of construction materials.

Singh and Pandey (2012) have projected that India is likely to be the most populous country in the world with a projected population of 1.69 billion by 2030. This means that more than 70 million new urban building units will be needed to accommodate the population growth. This poses a serious threat to environmental, economic, and social sustainability. Singh and Pandey (2012) therefore suggest that a balance needs to be struck between urban growth and the environment. This should be all-encompassing, encompassing sustainable communities, sustainable cities, livable cities, green cities, prosperous cities, eco-cities, healthy cities, and resilient cities. When these measures are incorporated into the design and construction of buildings, environmental, economic, and social sustainability is achieved (Singh & Pandey, 2012). Shafii et al. (2006) also noted that countries in Southeast Asia face serious challenges to SD due to rapid population growth and industrialisation. According to Shafii et al. (2006), the critical threats to SD in Southeast Asia are lack of awareness, lack of education and training, and inefficient procurement systems. Consequently, the status of sustainable construction in Southeast Asia is still in its infancy. Therefore, Shafii et al. (2006) recommend those capacities, technologies, and tools, as well as a comprehensive and passionate commitment from all those responsible in the construction sector are needed to address the problems described above

### Africa and Nigeria

In Africa, as in other continents of the world, many studies have been conducted on SD. Some of the findings from these studies are, as follows.

Ebohon and Rwelamila (2001) found that the construction sector in the rest of sub-Saharan Africa, apart from South

Africa, is very fragmented and underdeveloped, lacking cohesion, technical and management problems, and a shortage of skilled labour. This limits the potential of the sector to develop into a functioning industry. This also affects the development of the construction workforce, making it difficult to implement regulatory measures and improvement programmes. All these problems stem from the fact that most construction firms are owned by individuals who have little or no knowledge of the construction industry and are mostly unregistered (Ebohon & Rwelamila, 2001). On this basis, Rwelamila (1991) stated that the construction sector in Africa is considered inadequate and incapable of coping with the dynamics of the construction industry and its external environment in the 21st century.

Accordingly, Adebayo (2002) argued that sustainable construction has not received adequate attention in Africa. This is because the construction industry in African countries has long been modelled on the experiences of the developed world, while ideology, technology, standards and working methods in Africa are not identical to those of the Western world. On this basis, Adebayo (2002) postulated that sustainable construction can only be achieved through a proper understanding of the political, economic, and social and development environment and must become an integral part of SD. Therefore, Irurah (2001) noted that the challenges of sustainable construction remain despite the tremendous efforts in addressing the problems outlined; thus, there is no sign yet that the demand is being met.

In Nigeria, Okoye et al. (2021) noted that the awareness of SD is slightly different between professionals and non-professionals based on their level of education and experience. Therefore, the benefits of optimising awareness of sustainable construction practices are not adequately optimized and incorporated into construction in Nigeria. For Makinde (2020), the key principles of SHD include environmentally friendly and energy efficient benefits, affordability, accessibility to facilities and the general public, and manageability. Okoye et al. (2020) noted that naturally occurring building materials, use of recycled building materials, elimination of hazardous materials, bio-climatic technologies and use of renewable resources are the most important environmental aspects of sustainable construction that need to be incorporated and integrated into building practices. In addition, Okoye et al. (2020) suggested a move away from conventional building practices and towards hybrid building practices that incorporate all elements of sustainability.

In Enugu, Nigeria, Chukwu and Anaele (2019) found that awareness, involvement, and use of green buildings is low. There is thus a need to build capacity on the concept and management of green buildings. Akadiri et al. (2012) also developed a framework based on the sustainable triad of resource conservation, cost efficiency and design for human adaptation to be implemented during the life cycle of building projects.

In this vein, Anigbogu (2011) suggested that for successful sustainable building practices in Nigeria, the following two factors/issues need to be addressed:

1. Endogenous determinants—which include traditional green buildings and technologies, indigenous research

**Table 1.** The breakdown of questionnaires distribution

Respondents	ND	NRV	R&V (%)
Clients	265	197	76
Professional	78	62	79
Contractors	25	21	84
Statutory bodies	4	3	75
Total	372	283	76

Note. ND: No distributed; NRV: No returned & validated; R&V (%): % returned & validated; & Source: Field survey (2021)

into alternative materials, deconstruction, and use of secondary materials and

2. Exogenous determinants—global sustainability efforts such as education, awareness raising and environmental policies) would enable Nigeria to achieve sustainability in construction.

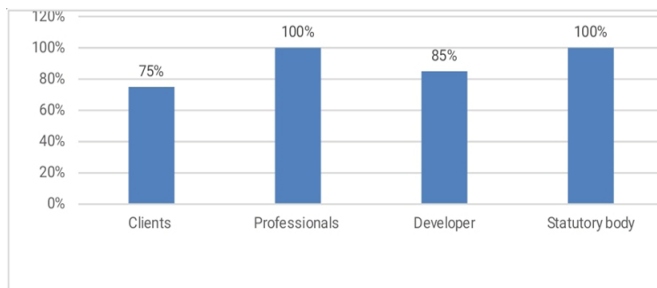
Nwokoro and Onukwube (2011) suggest that the principles of sustainable construction—social, economic, biophysical, and technical—need to be integrated into construction practice to improve understanding of sustainable construction.

## METHODOLOGY

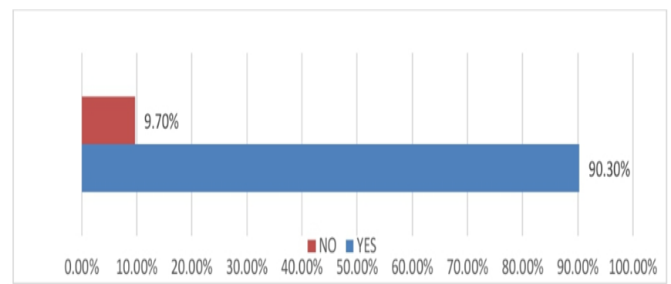
This study was conducted to investigate how construction stakeholders view SHD in Anambra State, Nigeria. The study used a survey research design where structured questionnaires were designed to obtain data from the respondents in this area of study. The population of this study includes key professionals in the construction industry who are project managers, contractors, and statutory bodies: architects (23), contractors (18), civil engineers and engineers (25), and surveyors (12).

The population figures for each profession were obtained from the respective state secretariats representing 78 fully registered professionals in the study area. The number of contractors, builders, and authorities sourced from Awka Capital Territory Development Authority records (2021) are 25, 789, and four, respectively. The study used Taro Yamane method to determine the sample size for builders while the other samples were retained and used for the study due to small size. Therefore, the samples for the study are 78, 25, 265, and four for building professionals, developers, builders, and statutory bodies, respectively.

The questionnaire is divided into two parts: The first part deals with the awareness of the concept of SHD among the project stakeholders, while the second part explores the perception of the concept of SHD by different stakeholders in the housing sector. The questionnaires were distributed to professionals, contractors, authorities, and clients (**Table 1**). 372 questionnaires were distributed through Google documents sent by email and other online tools such as social media. Of the questionnaires distributed, 283 were returned and duly completed, representing a 76% response rate. The respondents' views on the research questions were used to form an opinion on their perception of SHD. The presentation and analysis of the data obtained was done using mean, relative importance index (RII), percentages, graphs and tables, Kruskal-Wallis test.



**Figure 1.** Awareness of the concept of SHD among project stakeholders



**Figure 2.** Cumulative of awareness of the concept of SHD among project stakeholders

**Table 2.** Perception on SHD among professionals and statutory body' in the study area

Perceptions	Frequency					RII
	5	4	3	2	1	
SD is the development that meets the need of the present without conceding the ability of future generations to meet their own needs.	65	0	0	0	0	1.0
There is need for consciousness of this phenomenon (i.e., SD) in housing sector.	65	0	0	0	0	1.0
Sustainable development principles include (environmental, social, and economic), but other fields can also be added as cultural, political, and institutional.	65	0	0	0	0	1.0
The concept SD tends to be neglected and underplayed in the housing sector in Anambra state, Nigeria.	65	0	0	0	0	1.0
It is common for people to treat sustainability & SD as analogues & synonyms, but two concepts are distinguishable.	65	0	0	0	0	1.0
Sustainability is a contested concept because it is inherently complex, normative, subjective, & ambiguous.	65	0	0	0	0	1.0
It is this deeply fixed concept of integration that distinguishes sustainability from other forms of policy.	65	0	0	0	0	1.0
The most cost-effective way to develop and maintain a high-quality housing stock in the long term is to incorporate principles of sustainability into all parts of the housing development process	65	0	0	0	0	1.0
Given the multi-faceted nature of housing, the environmental, economic, social, and cultural dimensions, housing can enhance global and local sustainability and environmental protection.	65	0	0	0	0	1.0
Sustainability is the goal or end point of a process called sustainable development.	65	0	0	0	0	1.0
Sustainability in housing seeks to address the sustainability of environmental, economic, social, and cultural concern on housing project delivery.	65	0	0	0	0	1.0

Note. Source: Field survey (2021)

## DISCUSSION OF THE RESULTS

### Awareness of the Concept of SHD

This section presents the result of the awareness of SHD among the project stakeholders. **Figure 1** shows the result of the awareness level of the concept of SHD among the different stakeholders in the construction sector, while **Figure 2** shows the cumulative value.

The result in **Figure 1** shows that the level of awareness among construction professionals and supervisors is 100%, while the level of awareness among contractors and clients is 85%, and 75%, respectively. This means that all construction professionals living and working in the study area are aware of the SHD concept, as are the supervisors. However, 15% of the contractors and 25% of the builders are not aware of the concept of SHD.

In **Figure 2**, 90.3% of the respondents said they were aware of the concept of SD (YES) while 9.7% said they were (NO). This shows that more than 90% of the practitioners in Anambra State are aware of the concept of SHD.

### Perception on SHD and Sustainable Housing Principles

This section examined how the principles of sustainable housing were perceived by the respondents in the study area. We show the results of the perception of SHD among the four selected building stakeholders in the study area.

From the information presented in **Table 2**, you can see the responses of the respondents on the perception of sustainable housing. Since SD is development that meets the needs of the present without limiting the ability of future generations to meet their own needs, this resulted in an RII of 100%, indicating that professionals agree with the definition of SD, as defined by WCED (1987). This is in line with Abubakar (2017), Mensah and Casadevall (2019), and WCED (1987). This highlights the need for awareness of this phenomenon (SD) and an RII of 1.0 means that 100% of the respondents agree that there is need to raise awareness of the phenomenon SD, which is in line with the findings of Hak et al. (2016) and Kates et al. (2001). The principles of SD include (environmental, social, and economic) but also other areas such as cultural, political, and institutional and the concept of SD principles by various stakeholders in the study area had an RII of 1.0, indicating that about 100% of the respondents agreed with the perception of the need for more SD for housing projects, which also corroborates the assertion of Mensah and Casadevall (2019), Odebiyi (2010), and WCED (1987).

The concept SD tends to be neglected and undervalued in the development of the concept in Anambra State, Nigeria. The RII value was 1.0, indicating that 100% of the respondents agreed that the concept of SD is somewhat undervalued and neglected in the study area. This is in line with Adebayo (2002), Diesendorf (2000), Makinde (2020), and Turcotte and Ken (2010) that the term "sustainability" is controversial because it is multi-faceted, normative, distorted, and vague. The RII of



**Table 3.** Perception on SHD among contractors in the study area

Perceptions	Frequency					RII
	5	4	3	2	1	
SD is the development that meets the need of the present without conceding the ability of future generations to meet their own needs.	21	0	0	0	0	1.0
There is need for consciousness of this phenomenon (i.e., SD) in housing sector.	21	0	0	0	0	1.0
Sustainable development principles include (environmental, social, and economic), but other fields can also be added as cultural, political, and institutional.	21	0	0	0	0	1.0
The concept SD tends to be neglected and underplayed in the housing sector in Anambra state, Nigeria.	5	7	9	0	0	0.76
It is common for people to treat sustainability & SD as analogues & synonyms, but two concepts are distinguishable.	5	7	9	0	0	0.76
Sustainability is a contested concept because it is inherently complex, normative, subjective, & ambiguous.	18	3	0	0	0	0.97
It is this deeply fixed concept of integration that distinguishes sustainability from other forms of policy.	16	5	0	0	0	0.92
The most cost-effective way to develop and maintain a high-quality housing stock in the long term is to incorporate principles of sustainability into all parts of the housing development process	16	5	0	0	0	0.92
Given the multi-faceted nature of housing, the environmental, economic, social, and cultural dimensions, housing can enhance global and local sustainability and environmental protection.	9	11	0	0	0	0.85
Sustainability is the goal or end point of a process called sustainable development.	6	15	0	0	0	0.86
Sustainability in housing seeks to address the sustainability of environmental, economic, social, and cultural concern on housing project delivery.	18	3	0	0	0	0.97

Note. Source: Field survey (2021)

1.0 clearly shows that 100% of the respondents agreed that the concept of SD is ambiguous, subjective, and complex. The most profitable way to develop and maintain a world-class building stock in the future is to incorporate sustainability principles into all parts of the housing construction process had an RII of 1.0, meaning that 100% of respondents agreed that SD should be more integrated and included in housing projects in the study area. Sustainability is the goal or end point of a process called SD had an RII of 1.0, which means that 100% of the respondents strongly agreed that incorporating the principles of SD in housing projects is aimed at achieving sustainability in the delivery of housing projects. This means that 100% of professionals and supervisors agreed with the questions on SD and SHD. This shows that professionals and authorities regulating construction in the study area have a clear understanding of the concept of SD and SHD. This is a plus point on the road to achieving SD in the housing sector in the study area and is in line with Aldous (1992), Anink et al. (1996), Brandli et al. (2006), Chiu (2006), Gray (2010), Makinde (2020), Rotman (2006), and Stevenson and Williams (2005) on the importance of sustainable housing. The 100% response to the questions on SD and SHD clearly shows that the key building professionals in the study area understand the concept well.

From the information presented in **Table 3**, it appears that the parties to the contract were in 100% agreement on the following points:

1. SD is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
2. Awareness of this phenomenon (i.e., SD) needs to be promoted in the housing sector.
3. Belong to the principles of SD (environmental, social, and economic), but other areas such as culture, politics and institutions can also be added.

The information in **Table 3** also shows that contractors did not always agree on other issues concerning SD and SHD. The response rate was above 80%, but those with a rate below 80% were: The concept SD is neglected and undervalued in the

housing sector in Anambra State, Nigeria; and sustainability and SD are often treated as analogues and synonyms, but the two concepts can be distinguished. The findings are consistent with those of Aldous (1992), Anink et al. (1996), Brandli et al. (2006), Chiu (2006), Gray (2010), Makinde (2020), Rotman (2006), and Stevenson and Williams (2005).

The information presented in **Table 4** shows how clients perceived the principles of SHD SD. SD is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The RII score was 0.95%, indicating that the majority of clients agreed with the definition of SD according to WCED (1987). This is in line with Abubakar (2017), Mensah and Casadevall (2019), and WCED (1987). The need for awareness of this phenomenon (SD) had a value of 0.97, indicating that 97% of the respondents agree that there is need to increase awareness of the phenomenon SD, which is in line with the findings of Hak et al. (2016) and Kate (2001). The principles of SD include (environmental, social, and economic) but also other areas such as cultural, political, institutional and the concept of SD principles by various stakeholders in the study area had an RII of 0.97 which means that about 97% of the respondents agreed that more SD is needed for housing projects. This is in line with Adebayo (2002), Diesendorf (2000), Makinde (2020), and Turcotte and Ken (2010). The concept SD tends to be neglected and undervalued in the development of the concept in Anambra State, Nigeria. The RII value was 0.70, which means that 70% of the respondents agreed that the concept SD is slightly undervalued and neglected in the study area. Sustainability is a controversial concept because it is inherently complex, normative, subjective, and ambiguous. The RII value of 0.66 clearly shows that 66% of the customers agreed that the concept of SD is quite ambiguous, subjective, and complex. The most cost-effective way to develop and maintain a high-quality housing stock in the long term is to incorporate sustainability principles into all parts of the housing construction process. The RII was 0.97, which means that 90% of clients believe that SD should be more integrated and included in housing projects in the study area. Sustainability is the goal or end point of a process called SD

**Table 4.** Perception on SHD among clients in the study area

Perceptions	Frequency					RII
	5	4	3	2	1	
SD is the development that meets the need of the present without conceding the ability of future generations to meet their own needs.	150	47	0	0	0	0.95
There is need for consciousness of this phenomenon (i.e., SD) in housing sector.	168	29	0	0	0	0.97
Sustainable development principles include (environmental, social, and economic), but other fields can also be added as cultural, political, and institutional.	168	29	0	0	0	0.97
The concept SD tends to be neglected and underplayed in the housing sector in Anambra state, Nigeria.	50	50	43	54	0	0.70
It is common for people to treat sustainability & SD as analogues & synonyms, but two concepts are distinguishable.	60	50	30	57	0	0.66
Sustainability is a contested concept because it is inherently complex, normative, subjective, & ambiguous.	70	50	30	47	0	0.75
It is this deeply fixed concept of integration that distinguishes sustainability from other forms of policy.	168	29	0	0	0	0.97
The most cost-effective way to develop and maintain a high-quality housing stock in the long term is to incorporate principles of sustainability into all parts of the housing development process	168	29	0	0	0	0.97
Given the multi-faceted nature of housing, the environmental, economic, social, and cultural dimensions, housing can enhance global and local sustainability and environmental protection.	140	57	0	0	0	0.94
Sustainability is the goal or end point of a process called sustainable development.	122	75	0	0	0	0.92
Sustainability in housing seeks to address the sustainability of environmental, economic, social, and cultural concern on housing project delivery.	168	29	0	0	0	0.97

Note. Source: Field survey (2021)

**Table 5.** Comparative analysis on the perception of SHD among project stakeholders

Perceptions	RII		
	P& A	Cont.	C
SD is development that meets need of present without conceding ability of future generations to meet their own needs.	1.0	1.0	0.95
There is need for consciousness of this phenomenon (i.e., SD) in housing sector.	1.0	1.0	0.97
Sustainable development principles include (environmental, social, and economic), but other fields can also be added as cultural, political, and institutional.	1.0	1.0	0.97
The concept SD tends to be neglected and underplayed in the housing sector in Anambra state, Nigeria.	1.0	0.76	0.70
It is common for people to treat sustainability & SD as analogues & synonyms, but two concepts are distinguishable.	1.0	0.76	0.66
Sustainability is a contested concept because it is inherently complex, normative, subjective, and ambiguous.	1.0	0.97	0.75
It is this deeply fixed concept of integration that distinguishes sustainability from other forms of policy.	1.0	0.92	0.97
The most cost-effective way to develop and maintain a high-quality housing stock in the long term is to incorporate principles of sustainability into all parts of the housing development process	1.0	0.92	0.97
Given the multi-faceted nature of housing, the environmental, economic, social, and cultural dimensions, housing can enhance global and local sustainability and environmental protection.	1.0	0.85	0.94
Sustainability is the goal or end point of a process called sustainable development.	1.0	0.92	0.92
Sustainability in housing seeks to address the sustainability of environmental, economic, social, and cultural concern on housing project delivery.	1.0	0.97	0.97
Mean statistics	1.0	0.91	0.88

had an RII of 0.92, which means that 92% of the clients strongly agreed that incorporating the principles of SD into housing projects is aimed at achieving sustainability in the delivery of housing projects. This shows that clients perceive the principles of SD in housing construction at SD. In contrast to the contractors and professionals in **Table 3** and **Table 2**, respectively, the responses in **Table 4** differ accordingly. The disagreement in responses is lowest for the following topics, with a response rate below 80%:

1. The concept SD tends to be neglected and undervalued in housing in Anambra State, Nigeria.
2. It is common to treat sustainability and SD as analogues and synonyms, but the two concepts are distinguishable.
3. Sustainability is a controversial concept because it is inherently complex, normative, subjective, and ambiguous.

This is consistent with the findings in **Table 3**, which are also consistent with Aldous (1992), Anink et al. (1996), Brandli et al. (2006), Chiu (2006), Gray (2010), Makinde (2020), Rotman

(2006), and Stevenson and Williams (2005) on the importance of SHD. However, the responses to the themes have a response rate of more than 80%.

The information presented in **Table 5** shows the comparative analysis of stakeholders of housing projects on the principles of SHD. SD is development that meets the needs of the present without compromising the ability of future generations to meet their own needs had an RII of 1.0 for both professionals and regulators and developers and an RII of 0.95 for clients. This means that 100% of professionals, regulators, and developers and 95% of clients agreed with the WCED (1987) definition of SD, which represents a significant difference in stakeholder perception. The need for awareness of this phenomenon (SD) had an RII of 1.0 for professionals and regulators and builders and an RII of 0.97 for clients. This means that 100% of professionals, regulators, and contractors and 97% of clients think that awareness of the phenomenon SD needs to be raised, which does not imply a significant difference in stakeholder perceptions. SD principles include (environmental, social, and economic), but also other areas

**Table 6.** Non-parametric test result (independent samples Kruskal-Wallis test)

Null hypothesis	Mean rank	Test-stat.	Sig.	Decision
Distribution of perception of stakeholders (Prof. & Reg. Agencies, contractors, & clients) on SD & SHD are same across categories.	Prof. & Reg.=26.50 Contractors=13.82 Clients=10.68	18.082	.000	Null hypothesis is rejected.

Note. The significance level is .05

such as cultural, political, and institutional. The concept of SD principles by the different stakeholders in the study area had an RII of 1.0 for professionals and regulators and contractors and an RII of 0.97 for clients. This means that 100% of professionals, regulators, and contractors and 97% of respondents agreed that more SD is needed for housing projects, which is a significant difference in the perception of the respondents. The concept SD tends to be neglected and undervalued in Anambra State, Nigeria. The RII score for professionals and supervisors was 1.0, for contractors 0.76 and for clients 0.70. This means that 100% of professionals and supervisors, 76% of contractors and 70% of clients agree that the concept of SD is somewhat undervalued and neglected in the study area. However, there is a difference of 24% and 30% among contractors and clients, respectively, who do not fully agree with this view. Sustainability is a controversial concept as it is inherently complex, normative, subjective, and ambiguous. The RII score for professionals and regulators was 1.0, for contractors 0.76 and for clients 0.66. This means that 100% of professionals and regulators, 76% of contractors and 66% of clients agreed that the concept of SD is quite ambiguous, subjective, and complex. However, 24% of contractors and 30% of clients did not fully agree with this view. The most cost-effective way to develop and maintain a high-quality housing stock in the long term is to incorporate sustainability principles into all parts of the housing construction process. This resulted in an RII of 1.0 for professionals and regulators, 0.92 for contractors and an RII of 0.97 for clients. This means that 100% of professionals and supervisors, 92% of contractors and 97% of clients believe that SD should be more integrated and included in housing projects in the study area, which is a significant difference in their responses. Sustainability is the goal or end point of a process called SD had an RII of 1.0 for professionals and supervisors, 0.92 for contractors and an RII of 0.92 for clients. This means that 100% of professionals and supervisors, 92% of builders and 92% of clients believe that incorporating the principles of SD into housing projects aims to achieve sustainability in the delivery of housing projects, which shows that there are differences in their perceptions. The information generally shows that 100%, 91.55% and 88.2% of professionals and agencies, contractors and clients agree with SD and SHD respectively. This is because the respondents' understanding of this issue has increased.

### Test of Hypothesis

The hypothesis test checked whether "the distribution of stakeholder (Prof. & Reg. Agencies, Contractors, and Clients) SHD perceptions is equal across categories". The test was conducted using the Kruskal-Wallis test. The results are presented in **Table 6**.

The result of Kruskal-Wallis test for independent samples as shown in **Table 6** for the differences in the perceptions of

those involved in construction in SHD in the study area shows that the mean values for professionals, contractors and clients are 26.50, 13.82 and 10.68, respectively. The p-value is 0.000, which is below the significance level of 0.05. Therefore, the null hypothesis is rejected. This implies that there is a significant difference in the perception of stakeholders (Prof. & Reg. Agencies, contractors, and clients) towards SHD in Anambra State, Nigeria (Kruskal-Wallis  $H=18.082$ ,  $p=0.000<0.05$ ). This shows that the perception of the respondents in the different categories varies according to their level of knowledge.

## CONCLUSION AND RECOMMENDATIONS

The aim of the study is to examine the perception of construction stakeholders on SHD in Anambra State, Nigeria, to ascertain and compare the level of awareness and perception of construction stakeholders on SHD in the study area. The study revealed that majority of the respondents (over 90%) were aware of the concept of SD and sustainable housing in the study area. However, there is a significant difference among the project stakeholders in terms of awareness and perception of the concept of sustainable housing in the study area. The awareness and perception of the concept of SD among the key project stakeholders in the study area is 100%, 91.55% and 88.2% for professionals and agencies, contractors, and clients, respectively. This shows that the concept is controversial in the study area, which may lead to low consideration of this concept in the implementation of housing projects. The conclusion is that the concept of SHD is perceived as inherently complex, normative, subjective, and ambiguous by some of the stakeholders involved in a housing project, especially the developers and builders. For this reason, it is recommended that more education (in the form of awareness raising, training, retraining and information) about SHD should be provided to all stakeholders. This would help improve existing knowledge about SHD in the implementation of housing projects and also ensure that housing in the study region is no longer seen as just a roof over one's head. Although this study is limited to the perceptions of construction stakeholders on sustainable housing in Anambra State, further research using all the pillars/principles of SD needs to be conducted to ascertain the overall level of inclusion of sustainability of housing projects and SHD in Anambra State and other states in Nigeria.

**Author contributions:** All co-authors have involved in all stages of this study while preparing the final version. They all agree with the results and conclusions.

**Funding:** No external funding is received for this article.

**Acknowledgements:** The authors would like to thank to the construction stakeholders in Anambra State, Nigeria; particularly the staff of Anambra Physical Planning Authority.

**Declaration of interest:** The authors declare that they have no competing interests.

**Ethics approval and consent to participate:** Not applicable.

**Availability of data and materials:** All data generated or analyzed during this study are available for sharing when appropriate request is directed to corresponding author.

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