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Evaluation of sustainability concepts in public housing projects in ogun state, nigeria.

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Abstract

The issues associated with housing are colossal and multifaceted, displaying clear and concise differences in various parts of the world. As is the case of most urban environments, the problem of housing can no longer be limited to the quantity of houses available, it should also include the quality and the location of these housing units. As a result, this study intends to assess the different sustainability concepts adopted in the planning, design and construction of public Housing in Ogun State. The objectives of the study were to, evaluate the physical characteristics and conditions of the housing units, examine the socio-economic characteristics of the residents, and determine factors which affect the level of satisfaction of the residents. 274 housing units were assessed, from four public housing estates in the state, between the months of December, 2018 and February, 2019. Data was gathered by administration of questionnaires as well as interviews to household heads. The data was analyzed using descriptive and inferential techniques. The result of study highlighted that the housing estates were assessed to be sustainable as regards the housing density of the units and the affordability levels, however the estates were deemed unsustainable based on type of building materials used, proximity to basic amenities, and non-existence of communal facilities. The study concluded that relevant agencies as regards housing in the state, should focus on the provision and maintenance of public facilities so as to improve resident's satisfaction and also make use of adaptable spaces when designing houses, so as to cater for unexpected growth in the family and improve quality of life of the occupants.

Keywords: public housing, satisfaction, sustainability.

1. Introduction

The requirement that most public housing schemes should be able to meet certain basic sustainability criteria has consistently been a cause of worry to property developers, designers and agencies involved in the creation of housing policy, all over the world. Since 1987, when the World Commission of Environment and Development Report highlighted the problems of sustainable development, authorities, specialists and professionals of the built industry involved in the design and implementation of these housing schemes have been looking at different ways, through which they can achieve sustainability.



Since inception of the word “sustainability”, the concept has been a widely debated topic, but there seems to be a unanimous agreement in general, that sustainability largely denotes the capacity of any civilization, environment, culture, or programme to continually operate at maximum level for the entire duration of its lifetime, without deteriorating as a result of depleted resources [1]. [2] Further stressed that the idea of sustainability as regards housing should be considered as a norm and therefore should not be defined categorically or singularly.

As regards housing development and construction, pertinent literature [3] [4] [5], discloses the fact that sustainability has developed into a critical problem in the planning, design and construction of housing units. Even though a huge amount of time and efforts have gone into examining the different outcomes of public housing schemes from the perspectives of residents’ satisfaction [6][7], proximity and accessibility to public services [7], physical characteristics [8] and finally, affordability [9].

[10], nevertheless highlighted that the alarm raised over the lack of sustainability elements incorporated in the construction of housing units is still in its initial stages in this part of the world. This puts forward the fact that the research on the sustainability of public housing projects in Nigeria is highly inadequate. It is therefore due to this inadequacy that this study is designed to evaluate the sustainability concepts employed in public housing projects that were constructed between 2009 and 2019 in Ogun State, Nigeria. The objectives were to evaluate the physical characteristics and conditions of the housing units at post occupation and identify the socio-economic characteristics of the residents in the selected public housing estates. In order to accomplish these objectives the study sought to seek responses for the following questions:

- i). what are the current physical characteristics of housing schemes in the study area
- ii). How have these characteristics been affected by sustainable development

Ogun state was chosen as the study area, due to the high numbers of housing construction taking place in the state in the last ten years, and also due to the rapid urbanization occurring in the state. The study seeks to improve knowledge on the different sustainable features employed in public housing schemes and similarly raise awareness about the benefits of incorporating elements of sustainability in the design and construction of housing schemes.

2. Concept of sustainable development

After extensive review of current and pertinent literature [11] [12], as regards sustainable development, it is safe to say that the idea of housing can be viewed from different viewpoints specifically: housing as a structure (physical object) and an entity with both social and economic values; Housing as regards the neighborhood and its immediate environment; and finally as a locational access through which Infrastructural services are provided, this therefore means that, to correctly define sustainable development, one must find a way to marry housing as a product, service and process [13].

Although several notions and definitions of sustainable development exist, there is still a need to explore and understand the vital features of sustainability and sustainable housing. Sustainability can be described as: “*a global way of life that endeavors to build a lasting future that contemplates regularly on the social and environmental as well as the economic factors*” [14]. Sustainable development meanwhile, is described by the WCED as “*development which meets the needs of the present without compromising the ability of future generations to meet their own needs*” [15]. Although this definition has been constantly disapproved of for accommodating conservative ideas of sustained economic progress as the way to improve human well-being, placing together two conflicting philosophies; environment stability and that of economic increase, therefore producing two explanations centered on “*ecocentric*” which prioritizes the ecosystem first and then “*anthropocentric*” which prioritizes the wellbeing of man first, it has been widely established and given birth to consequent definitions of the term. The modifications in the different definitions of the

term sustainable development hinges principally on the way each of the three objectives; **economy, environment, and society** are highlighted. However, the changes in the definition of the word are not to divide the meaning but instead to try to find answers that effectively connect human welfare and ecological robustness.

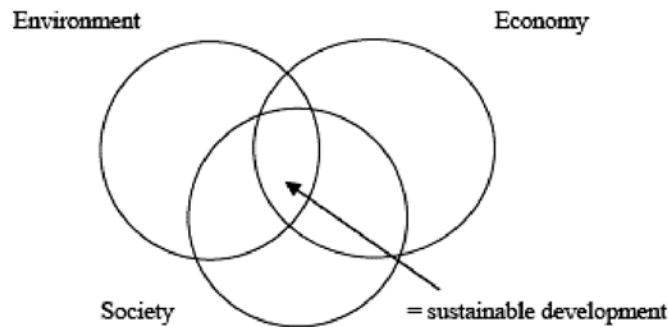
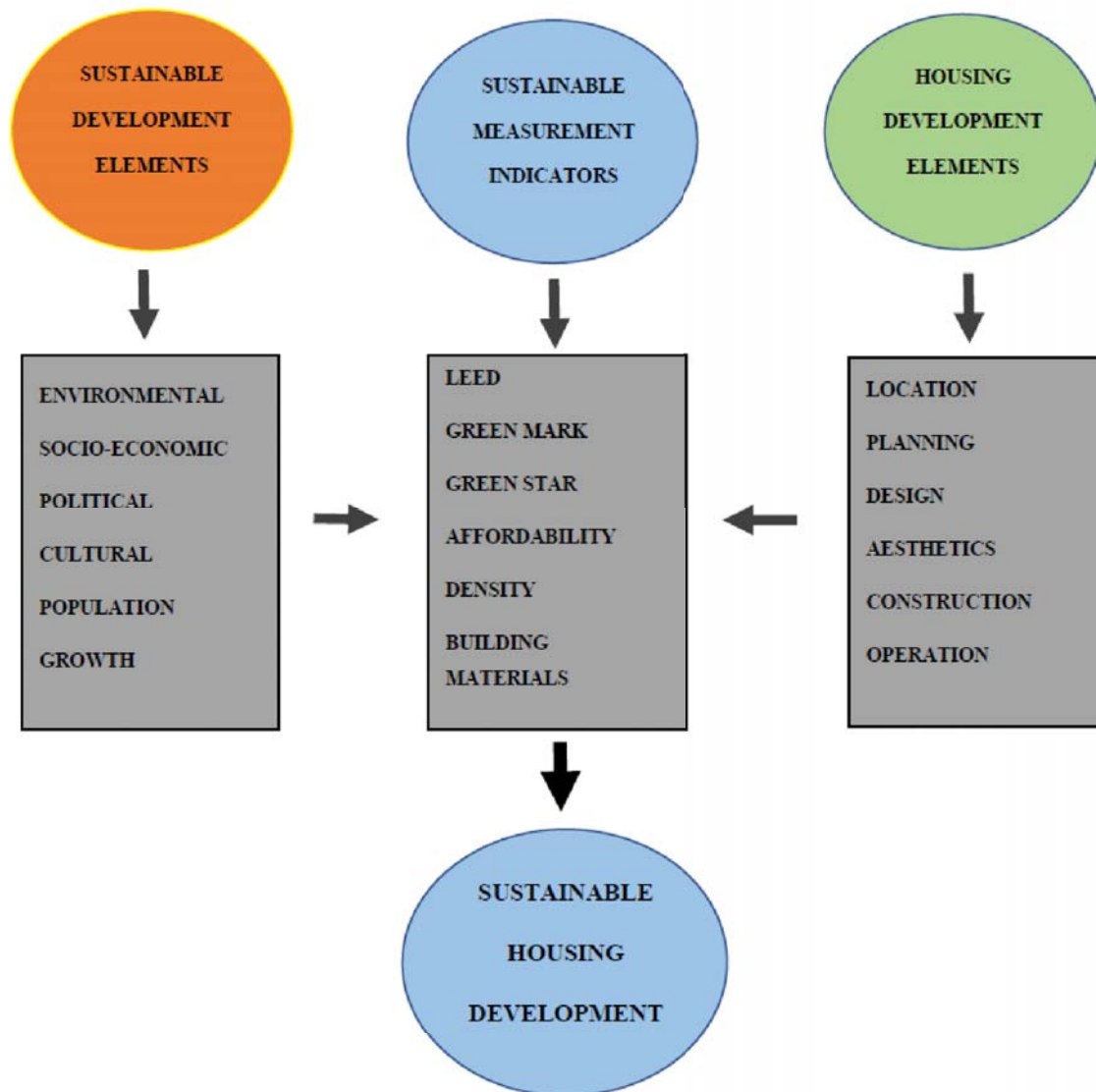


Figure 1: The Venn diagram

from the above mentioned, it can be deduced that there are principally three aspects of sustainable development that are critical in the description of housing as a process, service and products, and they are environmental, social and financial. In this study, emphasis has been placed on the housing unit as a structure and its immediate environment, this implies that housing as a process is out of the scope of this study.

The interaction of Sustainable Development elements such as Environmental, Socio-economic factors, political and cultural resources, population growth, etc. and the inter-mingling of Housing Development elements like strategic location, good planning and design which fosters aesthetics, adherence to construction and operation guidelines, plus the application of the Sustainability Measurement Indicators and tools as the Green mark, Green star, the GBI, CASBEE, LEED, BREAM, etc. results to a viable Sustainable Housing Development as can be seen below.



*Figure 2: Theoretical framework for sustainable development
Source: Authors design (2019).*

3. Methodology

The aim of this study is to assess the sustainability of public housing schemes that were constructed within the timeframe of the year 2009, all through to the year 2019 in Ogun State, Nigeria, using selected sustainability indicators as shown in Figure 2. In order to accomplish this, the design used for this study was the Survey approach, which then resulted in the use of two major survey techniques namely: administration of questionnaires and the use of case studies. The survey strategy has been adopted because of its inherent potential to allow for inferences to be drawn about the characteristics of a population, which is a prime aim of this research. It is preferred for a number of reasons. First, survey-generated data can be

quantitatively analyzed. Second, the survey method can produce a large amount of information on short notice and at a relatively low cost. Last, the survey method produces indiscriminate information.

The study population comprises of all the residents in federal or state owned public housing schemes developed within the timeline of 2009-2019 under the four selected key housing agencies in the state specifically: the Ogun State Property and Investment Company (OPIC), the State Ministry of Housing (MOH), Ogun State Housing Corporation (OSHC), and the Gateway City Development Company Limited (GCDCL). The public housing schemes include: OGSHC industrial estate Ota, Orange valley estate, and A.A.K Degun Mitros Estate and OPIC housing estates. In summary, the study population consisted of 1850 completed and occupied housing units. Structured questionnaires were administered to occupants of the housing estates assessed in this study. The questionnaire consisted of different sections. The first Section was used to obtain data on the socio-economic characteristics of the respondents (e.g. sex, age, education and income level). The second section obtained information about the respective housing units currently occupied by the residents, it consisted of questions such as number of rooms, size of rooms and types of fixtures and fittings. The final section of the questionnaire gathered data from residents on their satisfaction level with the size and number, as well as the amount of natural lighting and ventilation in the major spaces of the house such as the bedroom, dining and the living room; level of privacy, thermal comfort; and access to basic amenities, their replies were assessed on a 5-Likert type scale with "1" for "satisfied" to 5 for Very dissatisfied.

An observation chart was also employed to gather data, the scope of the assessment was limited to the exterior environments of the housing units. Ten performance criteria were developed and used in assessing the physical quality and condition of residential environments of the estates, namely: 1. External visual quality of buildings (ViQ): 2. Maintenance quality of buildings (MtQ): 3. Structural quality of buildings (StQ): 4. Detailing quality of buildings (DeQ): 5. Quality of building services (QBs): 6. Quality of estate roads (QRd): 7. Quality of landscaping (QLs): 8. Quality of semi-public open spaces (QOs): 9. Quality of environmental layout (QEn): 10 Quality of the location (QLc): Total Physical Quality (TPQ).

The surveys were carried out between December 2018 and February 2019 and out of a study population of 1,850 housing units, a confidence level of 95% was used, examining four different statistical formulae similar results of 399 housing units were gotten in three cases, it was therefore adopted as the sample size as it was the most occurring result from the four statistical formulae used and suitable to enable for a more representative behavior of the larger population. Questionnaires were administered to an adult member of all housing units sampled. However, 274 questionnaires making up 70% of the administered questionnaires were regained.

The data obtained from the respondents were analyzed using descriptive statistics (frequencies and percentages).

4. Results and discussions

4.1 socio-economic characteristics of respondents

Table 1 displays the socio-economic characteristics of the respondents in the sampled housing estates. It illustrates the fact that approximately 70% of the respondents were males, while 30% were females, 53% were amongst the age bracket of 40 to 54 years old and 71% of the respondents were highly educated. The table also depicts that majority (49%) of the respondents can be classified as low-income earners, with a large number of them working as civil servants. This result points out that a large number of the residents in the sampled estates are largely middle aged, well-educated males of the low income class.

Table 1. Socio-economic characteristics of respondents

	N = 274	Percentage %
Sex of respondents		
Male	192	70.1
Female	82	29.9
Age bracket of respondents		
Below 25	3	1.7
25-39	111	40.6
40-54	145	52.7
55-69	14	4.9
70 and above	1	0.1
Educational background		
Primary	2	0.7
Secondary	63	22.9
Tertiary	187	68.2
Postgraduate	21	7.6
Employment status		
Civil servants	151	55.1
Self-employed	47	17.1
Retired	41	14.9
Wage-earners	35	12.7
Income level		
Below 50,000	133	48.5
50,000-100,000	72	26.2
Above 100,000	69	25.1

Source: authors field work (2019).

4.2 physical characteristics of the estates

This table presents the summary of the assessment of the physical characteristics of the sampled housing estates. It can be deduced that, out of all the estates sampled, only the orange valley estate, Abeokuta was able to satisfy more than half of the performance criteria.



Figure 3: view of the road network, rows of housing units and sit outs in orange valley estate

Source: Authors' Field Work (2019)

The housing estates were assessed and scored using the performance criteria, if they were present and in good working conditions, then 3 points would be awarded to the estate, if they were present and in a fair state, then 2 points would be awarded, if they were present but in a poor state, then 1 point would be awarded to the estate, if not present at all, then 0 points would be added. The summary of the ten performance criteria gives the value of Total Physical Quality (TPQ) for each estate. Table 2 shows that orange valley Estate has the highest Total Physical Quality (TPQ) points of 22 out of 30 points maximum while OGSHC Industrial Estate has the least TPQ of 10pts.

Table 2. Physical characteristics of the housing units

Estate	ViQ	Mtq	Stq	Deq	Qbs	Qrd	Qls	Qos	Qen	Qlc	Tpq	Total	Ranking
OGSHC Industrial Estate, Ota.	2	2	1	1	0	1	0	0	1	2	10	30	4
Orange valley estate	3	1	2	2	2	3	2	2	3	2	22	30	1
A.A.K Degun Mitros Estate.	2	2	1	2	0	1	0	0	2	1	11	30	3
Valueville estate	1	2	2	1	2	2	0	0	1	1	12	30	2
Total	8	7	6	6	3	7	2	2	7	6	54	120	
Percentage	66.7	58.4	50	50	25	58.4	16.4	16.4	58.4	50	45		

Source: authors field work (2019).

Key:

1. External visual quality of buildings (ViQ): 2. Maintenance quality of buildings (MtQ): 3. Structural quality of buildings (StQ): 4. Detailing quality of buildings (DeQ): 5. Quality of building services (QBs): 6. Quality of estate roads (QRD): 7. Quality of landscaping (QLs): 8. Quality of semi-public open spaces (QOs): 9. Quality of environmental layout (QEn): 10 Quality of the location (QLc): Total Physical Quality (TPQ).

4.3 residents level of satisfaction

The study examined the different housing features and facilities that influence the resident's satisfaction level. It considered the variables that determine which facilities are more important to the occupants than the others.

The study considered four clusters of variables namely: the housing unit features, public facilities, neighborhood facilities and social environment. The satisfaction level of the residents was measured via a five-point Likert scale –1 for very satisfied, 2 for satisfied, 3 for neutral, 4 for dissatisfied and 5 for very dissatisfied.

The table shows the residential satisfaction variables as characterized into sheltered and non-sheltered components. The most satisfactory features are the dwelling units' features (9) with an approximate mean of 66 while the least satisfactory are the neighborhood facilities variable (8) with mean of 46. The inference drawn from this finding is that the residents are more pleased with their housing units' features and least contented with their neighborhood facilities.

Table 3: level of satisfaction of residents with housing unit features and facilities

Habitat Table	VS %	SA%	NU %	DIS %	V-DIS %	Habitability Index	Rank
Housing unit features (9)							
Size of living and dining spaces	4.9	85.7	8.7	0.1	0.6	78.84	1
Size of bedrooms	4.5	69.7	14.8	10.6	0.4	73.46	5
Number of bedrooms	3.5	52.5	33.8	10	0.2	69.82	6
Size of kitchen and storage spaces	0.7	79.5	11.5	7.8	0.5	74.42	4
Natural lighting in living rooms	2.3	81.4	10.8	5.2	0.3	76.04	3
Natural lighting in bedrooms	36.6	22.4	38.2	1.6	1.2	78.32	2
Natural lighting in kitchen	7.3	26.7	39.1	16.7	10.2	62.33	8
Unrestricted air flow in living rooms	2.1	11.8	38.7	37.1	15.5	43.78	26
Unrestricted air flow in bedrooms	1.9	10.6	39.1	35.4	16.2	44.67	25
Total						Mean 66	

Habitat Table	VS %	SA%	NU%	DIS%	V-DIS %	Habitability Index	Rank
Social environment (5)							
Noise pollution	28.2	22.9	11.7	20.1	17.1	65	7
Protection against insects and wild animals	0.1	5.1	19.8	30.1	44.9	37.08	23
Security measures in your home	0.3	14.6	37.3	26.3	21.5	49.18	16
Fire prevention measures	0	2.6	22.6	31.6	43.2	36.92	24
Level of privacy	5.7	15.7	38.9	17.4	22.3	53.02	13
Total						Mean 48	

Habitat Table	VS %	SA%	NU%	DIS%	V-DIS %	Habitability Index	Rank
Neighborhood facilities (8)							
Proximity to shopping facilities	1.1	12.2	36.3	25.9	24.5	47.9	18
Proximity to educational facilities	4.8	12.8	34.6	23.5	24.3	50.06	15
Proximity to sports facilities	0	7.1	18.9	36.4	37.6	39.8	21
Provision of recreational centers	7.3	9.2	35.5	27.9	20.1	51.14	14
Availability of parks/gardens.	0	0	12.5	44.3	43.2	33.86	27
Proximity to health care	3.8	0.4	16.1	40.2	39.5	37.76	22
Access to public transport	10.9	22.5	35.2	19.3	12.1	60.16	9
Access to places of worship	4.7	11.2	29.9	30.1	24.1	48.46	17
Total						Mean 46	

Habitat Table	VS %	SA%	NU%	DIS%	V-DIS %	Habitability Index	Rank
Public facilities (4)							
Electricity supply	10.1	14.8	49.6	13.2	12.3	59.44	10
Provision of parking spaces	7.1	29.3	21.7	21.4	20.5	56.22	12
External/security lighting	2.1	1.9	42.6	14.8	38.6	39.5	20
Portable water supply	12.2	25.3	28.6	11.6	22.3	58.7	11
Total						Mean 53	

Source: authors Field Work (2019)

5. Conclusion

The study assessed the sustainability concepts of selected Public Housing Estates in Ogun State by measuring them using a checklist of sustainability indicators. In general, most housing estates analyzed did not meet the minimum sustainability requirements, except newly established estates such as orange valley estate, Oke-mosan, Abeokuta which had a total TPQ point tally of 22 out of 30, the residents of Ogun State public low-cost housing are moderately satisfied with their residential environment. However, the proportion of residents moderately satisfied with dwelling unit features variables are higher than number of residents satisfied with neighborhood facilities followed by support services, and public facilities, and social environment, which have higher percentage of respondents with low level of satisfaction. This goes to show the importance of dwelling unit features in ensuring the satisfaction of the residents of public housing estates in Ogun state.

These Public housing estates were initially built with a sole aim, which was to provide members of the public with adequate, affordable houses in a safe environment. However, corrupt practices and the negative economic situation in the country may deter the government from actually combating the housing inadequacy in the state. Therefore, the partnership between the government and interested private partners should be further explored by the provision of an enabling environment through reduction in tax returns, creation of a well-constructed mortgage plan and the introduction of low interest rate for financing housing projects.

Also, the beneficiaries of the housing estates ought to be involved during the construction and the design phases of the project, as the occupants will be able to explain what works for them so it can be incorporated into the design.

Finally public housing agencies should conduct regular post-occupancy evaluations on housing estates so as to get regular feedback from the residents, and also know what and what not to implement in future designs.

6. Recommendations

The study revealed the need for government intervention in providing houses in the state, it was also learnt during the course of the research that majority of the families have very large families. The insinuation of this particular observation is that future designs should be adaptable and flexible enough to accommodate a growing family, without the family having to move out entirely. Also, a high amount of the respondents were dissatisfied with how far away the housing estates were from educational, religious and commercial facilities.

The lack of public facilities like car park spaces, street lightning, play areas, communal spaces and goad road networks are, according to the study proving to be one of the main causes for dissatisfaction amongst occupants of the housing estates. Therefore going forward, public housing agencies should not just design houses but also provide these amenities, to aid living in these housing estates.

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