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Challenges of Achieving Sustainable Green Space in Urban Built Environment in Nigeria

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Preserving green spaces in parks and gardens in the physical landscape of urban built environment is an action that has been identified as a contributing factor to the sustainability of urban areas. The benefits of green space in built environment are so enormous in the aspect of aesthetics, achieving good temperatures, provision of good health and so on. However, certain activities have hindered the actualization of these significant rewards negatively. Despite all these glaring challenges, application and provision of green spaces in the built environment have been practised at a slow pace in Nigeria's construction industry. This study assessed green space in urban built environment with a view to enhancing its sustainability. Questionnaires were administered to professionals in the built environment to ascertain the hindrances in achieving green spaces in the urban built environment. The study reveals the hindrances like "ignorance on the benefits of green spaces by the users" as the major factor with relative importance index of 0.806. Green space benefits like "improving the health and well-being of residents" as the major factor with relative importance index of 0.778. The study also reveals the possible technique in application and management of sustainable green space with the major factor "efficient policy implementation of green spaces in sustainable management and institutional governance" with relative importance index of 0.789. The study concludes that unsuccessful green space provision in urban built environment is a reflection of unhealthy environment which leads to serious environmental challenges. To enhance the sustainability of urban green spaces, the study recommends creation of awareness on the need of the green spaces to users and also there should be provision of basic laws in the city that will protect the existence and suitability of the green spaces in the urban built environment.

Keywords: Challenges, Green Space, Sustainability, Urban Built Environment

Introduction

Green space is one of the components of open landscape in an urban built environment covered with natural and artificially grown trees, shrubs, flowers and grass. Urban green spaces are also defined as public and private spaces in urban areas, covered by green vegetation that is either natural or artificial, which are directly or indirectly available to the residents of the city (Baycan *et al*., 2009). The importance of green spaces in built environment has been recognised by most built environment professionals and public agencies. This importance has been acknowledged by many authors and has been considered a long-term comprehensive tool for protection and maintenance of environmental sustainability by providing ecosystem services to users (Vargas-Hernandez *et al*., 2018). The concept of preservation of these green spaces in urban built environment is very vital for the users and occupants of the urban areas (Karade *et al*., 2017). Building and construction activities greatly impact urbanisation by establishing living and working spaces and also help to boost the national economy (Zuo & Zhao, 2014). However, building and other construction tasks also have depressing outcomes on the natural

environment inclusive of its resources (Oluwunmi *et al*., 2019).

Although numerous literature exist on the subject of sustainable green space, nevertheless achieving effective, sustainable green space remains a challenge as there continue to be problems resulting in uncomfortable urban climate due to inadequate green spaces in urban areas. According to United Nations (2013) report, the percentage of people living in urban areas will increase from 50% in 2010 to nearly 70% by 2050. This will result in the expansion or densification of urbanized areas which affect the existence of green spaces in urban centres. As migration to urban areas is ongoing globally, the need for sustainable urban development is becoming increasingly important (Haaland & Bosch, 2015). Planning and management of urban green space is a crucial issue in the context of the compact city concept, as these spaces provide essential benefits to urban dwellers (Haaland & Bosch, 2015).

A study done at Banjarbaru, Indonesia by Krisdianto *et al*. (2012) found that around 18.0% of those questioned were involved in the planting of trees and also aware of the importance of green spaces, while the remaining 82.0% never participating in the activity or even not aware of green spaces and its value to the built environment. This shows that the presented figures reflect the fact that the public were not involved in greening initiatives and activities. Thus, it has become increasingly clear that the problems remain peoples' ignorance of the value and importance of green spaces in the building environment.

In Nigeria, Oluwunmi *et al*. (2019) discussed the obstacles of achieving green spaces in urban built environment which are ignorance on greening and its principles, enormous price tag of green space technology and maintenance, ignorance on the importance attached to green space management etc. The issue of not integrating green spaces in built environment has become so pronounced such that Nigeria has continued to be one country in such situation due to neglect and ignorance (Ekong, 2017). The aim of the study is to assess the factors hindering sustainable green space in urban built environment. Hence the effects of green spaces in the urban built environment cannot be ignored and this will aid in an increase in the knowledge of the value of green spaces in the urban built environment. The objectives that guided this study are;

- To identify the barriers towards achieving sustainable green space.
- To highlight the effect of green spaces in urban built environment.
- To investigate the technique in the application of sustainable green space in the building environment.

Literature Review

Functions of green spaces in urban built environment

Green spaces in urban built environment provide many functions in urban context that benefits people's quality of life. There is therefore a wide consensus about the importance and value of urban green spaces in cities towards planning and constructing sustainable or eco-cities of the 21st century (Karade *et al*., 2017). The greening of urban built environment aids in controlling diseases by reducing environmental health risks associated with urban living, reducing chemical and physical hazards; developing high quality urban environments for all and ensuring progress towards sustainable environment (Ekong, 2017). Urban areas have most areas conserved by buildings, roads or paving materials (Scalenghe & Ajmone, 2009). This causes steadily growing traffic and urban heat, which is not only damaging the environment, but also invites social and economic costs. Green spaces gives ecological benefits which range from protecting and maintaining the biodiversity to helping in the mitigation of change cannot be overlooked in today's sustainable planning (Karade *et al*., 2017). Several studies have documented the hindrances to achieving sustainable green space in the urban built environment.

Jim (2013) study revealed low application of green spaces in the cities built

environment which provided a way forward based on three main stages in the planning and management of urban greening: (1) Applying urban ecological principles to urban greening design, green space geometry, urban biodiversity enrichment, and holistic assessment of urban greening benefits. (2) Protecting nature-in-city assets, involving spontaneous natural remnants, champion-calibre tree stock, tree preservation in construction sites, salvaging outstanding trees by transplanting, and timely tree care. (3) Augmenting greening opportunities, such as planting at narrow roadsides, ameliorating soil constraints, and introducing greenery into compact areas.

World Health Organisation WHO (2017), in Europe found challenges and suggested solutions toward achieving sustainable green spaces. The study stated that experience from urban green space intervention case studies showed that such challenges can be tackled through adequate planning, maintenance and effective communication with local users. The challenges revealed are: economic challenge due to uncertain or reduced budgets for maintenance of urban green spaces, community dissatisfaction with urban green space features/services, degradation of urban green spaces due to overuse etc. In Egypt, Mersal (2017) found socio-economic and demographic factor as a major challenge towards achieving green space in urban built environment. The study revealed that high urbanization and the high pace of social and economic development in cities, resulting from the increase of population in cities are major issues toward achieving sustainable green space development. In addition, Littke (2016) in a study carried out in Sweden assessed some of the challenges for green spaces existence in urban built environment. The study which adopted case study and interview methods identified the major challenges as follows: Lack of value and ignorance of green spaces among local government authorities and funding.

In Ghana, Mensah (2017) investigated physical barriers to green spaces in Kumasi and also stated the possible ways to overcome them. The study found three (3) factors responsible for physical barriers to green spaces in Kumasi which are: conflicting ownership rights on green spaces, encroachment, and poor maintenance. The study also stated three (3) possible ways or strategies to overcome the barriers which are: enhancing the availability of green spaces, enhancing the maintenance of green spaces, and controlling the encroachment on green spaces. In Sofia, Bulgaria they had a challenge of inadequate green spaces in the city built environment and it tended to become a concrete city in some residential quarters which made them to lack large green spaces and preventing them from being in touch with nature (Kovachev *et al*., 2012). The challenges were basically three; protection of green areas on municipal property, protection of designated green areas on private land and creation of new green areas.

In Nigeria, Bununu (2012) study in Zaria revealed a complete absence of urban green system. The study explained the constraints, limitations and challenges in the development of a viable and sustainable urban green system in Zaria. These were identified as land ownership, lack of comprehensive land use plans, and lack of green space development strategy. In a related development, Ibrahim (2010) stated the challenges of green space sustainability in Abuja. Due to the dual role given to Abuja Environmental Protection Board (AEPB), greening the city and waste management, the Board was overwhelmed. It was becoming more difficult to maintain the green spaces because of the demands of solid and liquid waste management. In addition, funding was also inadequate as such most of the green spaces started being ignored as a result of competing needs. The issue worsened when the seat of the Federal Government moved from Lagos to Abuja in 1991 and development increased tremendously. The demand for serviced plots in the city increased geometrically. Due to the absence of additional serviced plots, the green areas became easy targets

for abuse which led to the distortions of Abuja Master Plan.

Yoong *et al.* (2017) suggested ways of managing and maintaining green spaces in built environment to enhance its sustainability. The suggested ways are: (1) Citizens participation which involves designing, planning, managing and maintaining process, education and research projects with regard to urban green space. (2) Budget for urban green spaces as a percentage of the total urban budget by government authorities. Another study conducted by Vargas-Hernandez *et al*. (2018) advocated some strategic ways of management and application of urban green spaces. Local authorities should provide a more holistic approach for more efficient policy implementation and budget protection of urban green spaces in sustainable management and institutional governance. The study further stated that sustainable management and expansion of urban natural green spaces contributed to supporting the sustainable community development, ecological system integrity, liveability and general public health, psychological well-being, physical activities, gentrification, and environmental justice.

The green space hindrances in built environment

The hindrances to sustainable green space in built environment as identified from the reviewed literature can be seen in Table 1.

Research Methodology

Questionnaire survey design was adopted for the study however, extant literature were reviewed from where the constructs used in the questionnaire were derived from. Before distributing the questionnaires, a pilot study was carried out where 10 respondents were interviewed by using structured questionnaire to ensure that the questionnaire was devoid of ambiguity and clearly understood by the respondents. Out of the 190 questionnaires that were self-administered to built environment professionals, 136 were returned showing a response rate of 72.6%. The use of questionnaire was identified as the most suitable instrument through which the respondents could be easily reached and is the main instrument of data collection. These identified factors were posed to the respondents on a five point Likert scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD).). To accomplish the objectives of this study, the use of relative importance index for ranking was adopted to analyse the responses obtained.

Results and Discussion

Demographic characteristics of the respondents

The analysis on the demographic factors of the respondents. Table 2 shows the demographic factors of the professionals. It revealed that a greater percentage of the respondents are Architects, 18 male (18.6%) and 10 female (24.4%) followed by Building Engineers, 15 male (15.5%) and 3 female (7.3%) and project managers are the least number of the respondents, 7 male (7.2%) and 2 female (4.9%).

Table 1 Hindrances to green space developments

S/N	Hindrances to green space Developments	Sources
1	Inadequate funding/ economic hindrance	WHO, 2017; Littke, 2016, Ibrahim, 2010), (Jim, 2013)
2	Lack of green space development strategy	Bununu, 2012, WHO, 2017
3	Lack of value and ignorance on the benefits of green spaces by the users	Littke, 2016. (Kovachev, et al., 2012), (Jim, 2013, WHO, 2017, Oluwunmi, et al 2019, Krisdianto, et al 2012
4	Socio-economic and demographic factor	Mersal, 2017, Haaland & Bosch, 2015).
5	Lack of use of master plans	Bununu, 2012, WHO, 2017
6	Ignorance on its benefits by government	Littke, 2016. (Kovachev, et al., 2012. Oluwunmi, et al 2019, Krisdianto, et al 2012
7	Poor Maintenance and Planning	Mensah, (2017, (Kovachev, et al., 2012, Haaland & Bosch, 2015, Oluwunmi, et al 2019
8	Ignorance on expert knowledge & mastery on green spaces	Bununu, 2012, Oluwunmi, et al 2019, Krisdianto, et al 2012
9	Lack of policy or law guiding implementation	Mensah, 2017, (Jim, 2013). WHO, 2017, Haaland & Bosch, 2015).

Source: Author's review of literature

Table 2: Bio data of the respondents

Professional Disciplines	Gender		Total per Discipline	% Total per Discipline	% Male	% Female
	Male	Female				
Architects	18	10	28	20.3%	18.6%	24.4%
Civil Engineers	11	5	16	11.6%	11.3%	12.2%
Mechanical Engineers	10	4	14	10.2%	10.3%	9.8%
Quantity Surveyors	9	8	17	12.3%	9.3%	19.5%
Land Surveyors	12	1	13	9.4%	12.4%	2.4%
Town Planners	8	4	12	8.7%	8.3%	9.8%
Builders	15	3	18	13.0%	15.5%	7.3%
Estate Surveyors	7	4	11	8.0%	7.2%	9.8%
Project Managers	7	2	9	6.5%	7.2%	4.9%
TOTAL	97	41	138	100%	100%	100%

Knowledge of Benefits of Green spaces in Built Environment by the respondents

The professionals were requested to quantify their level of knowledge on the benefits of green spaces in built environment. Table 3 shows the respondents knowledge on the benefits of green spaces in urban built environment. The table reveals that the majority of the respondents have good or better knowledge of the benefits of green spaces in urban built environment. The result shows that 15.2% have excellent knowledge, 40.6% have very good knowledge, 30.4% have good knowledge, 11.6% have fair knowledge and 2.2% have poor knowledge. Based on the analysis 97.8% of the respondents have knowledge of green spaces and it's benefits in urban built environment.

Table 3: Responses on benefits of green spaces in built environment

Knowledge of benefits of green spaces	Frequency	Percentage
Excellent	21	15.2%
Very Good	56	40.6%
Good	42	30.4%
Fair	16	11.6%
Poor	3	2.17%
Total	138	100%

Professionals Perception on the hindrances to achieving sustainable green space in Urban built environment

The hindrances sourced from the literature were assessed by the respondents. This is to ascertain by ranking the factors that hinder the existence of green spaces in urban built environment using relative importance index. Table 4 shows respondents perception on the factors that hinder the existence of green spaces in urban built environment. The respondents strongly agreed that the listed factors contributed to non-existence of green spaces. Based on the analysis as shown on the table above, "The Perception of Lack of value and ignorance on the benefits of green spaces by the users" acts as a major hindrance to achieving sustainable green space; ranked 1st with RII as 0.806; Inadequate funding ranked 2nd with RII as 0.735; Ignorance on its benefits by government ranked 3rd with RII as 0.732; Lack of policy or law guiding implementation ranked 4th with RII as 0.725; Lack of use of master plans ranked 5th with RII as 0.713; Lack of green space development strategy ranked 6th with RII as 0.700; Poor Maintenance ranked 7th with RII as 0.662; Socio-economic and demographic factor ranked 8th with RII as 0.655; Ignorance on expert knowledge & mastery on green spaces ranked 9th with RII as 0.582.

Respondents' perception on the benefits of green spaces in urban built environment

This section analyses the benefits of green spaces as described by the respondents. Table 5 analyses the respondent's perception on the benefits of green spaces in built environment. The analysis shows that the respondents value the significance of the presence of green spaces in the built environment. The result shows that "the benefit of health and well-being of residents is improved; ranked 1st with RII as 0.778; "Residents have adequate opportunities for exposure to nature; ranked 2nd with RII as 0.771; "Environmental hazards such as air pollution or noise are reduced; ranked 3rd with RII as 0.764; "Improve indoor air and water quality; ranked 4th with RII as 0.762; "The impacts of extreme weather events (heat waves, extreme rainfall or flooding) are mitigated; ranked 5th with RII as 0.761; "Urban biodiversity is maintained and protected; ranked 6th with RII as 0.733; "The quality of urban living is enhanced; ranked 7th with RII as 0.761.

Table 4: Perception of the respondents on the hindrances to green space developments

Hindrances to achieving sustainable green space in urban built environment	SA	A	N	D	SD	RII	RANK
	5	4	3	2	1		
Inadequate funding/ economic hindrance	56	29	20	18	15	0.735	2nd
Lack of green space development strategy	35	51	17	18	17	0.700	6th
Lack of value and ignorance on the benefits of green spaces by the users	57	52	12	10	7	0.806	1st
Socio-economic and demographic factor	31	34	29	30	14	0.655	8th
Lack of use of master plans	41	48	16	14	19	0.713	5th
Ignorance on its benefits by government	43	33	23	17	22	0.732	3rd
Poor Maintenance and planning	33	41	22	20	22	0.662	7th
Ignorance on expert knowledge & mastery on green spaces	22	32	25	30	29	0.582	9th
Lack of policy or law guiding implementation	59	25	11	29	14	0.725	4th

Table 5: Benefits of green spaces in urban built environment

Benefits of green spaces in urban built environment	SA	A	N	D	SD	RII	RANK
	5	4	3	2	1		
The health and well-being of residents is improved	57	32	28	19	2	0.778	1st
Urban biodiversity is maintained and protected	42	39	32	19	6	0.733	6th
Environmental hazards such as air pollution or noise are reduced	41	48	32	17	0	0.764	3rd
The impacts of extreme weather events (heat waves, extreme rainfall or flooding) are mitigated	38	57	23	18	2	0.761	5th
The quality of urban living is enhanced	39	47	24	21	7	0.730	7th
Residents have adequate opportunities for exposure to nature	57	34	22	20	5	0.771	2nd
Improve indoor air and water quality	42	53	21	19	3	0.762	4th

Respondents' perception on the suggested ways and technique in application and management of sustainable green space

The respondents were subjected to some factors that can improve the application and management of green spaces. This section analyses the perception of respondents toward the listed factors. Table 6 shows the analysis of the factors which will promote the existence of green spaces to enhance its sustainability. It can be seen from the result in Table 7 that the respondents rated "Efficient policy implementation of green spaces in sustainable management and institutional governance" ranked 1st as most important factor they adopt for management and application of green space with RII as 0.789. This is followed by "Citizens participation which involves designing, planning, managing and maintaining process" ranked 2nd with RII as 0.786; "Education and research projects with regard to urban green space" ranked 3rd with RII as 0.739; "Creating awareness on the authorities and users on the benefits of green spaces" ranked 4th with RII as 0.738; "Allocate percentage area of the green space per residence" ranked 5th with RII as 0.716; "Budget for urban green spaces as a percentage of the total urban budget by government authorities" ranked 6th with RII as 0.710. This analysis shows that the respondents agree on the factors to enhance the sustainability of green space in built environment.

Table 6: Technique in application and management of sustainable green space

Suggested ways and technique in application of sustainable green space	SA	A	N	D	SD	RII	RANK
	5	4	3	2	1		
Citizens participation which involves designing, planning, managing and maintaining process	54	46	18	14	6	0.786	2nd
Education and research projects with regard to urban green space	40	52	20	16	10	0.739	3rd
Budget for urban green spaces as a percentage of the total urban budget by government authorities	36	49	22	17	14	0.710	6th
Allocate percentage area of the green space per residence	37	45	29	15	12	0.716	5th
Creating awareness on the authorities and users on the benefits of green spaces	51	33	25	18	11	0.738	4th
Efficient policy implementation of green spaces in sustainable management and institutional governance.	56	47	15	12	8	0.789	1st

Conclusion and Recommendations

This study investigated the hindrance in achieving an effective green space in built environment. Findings signified that the level of adoption in Nigeria is very low and the likely hindrance to its adoption is ignorance of the benefits of green spaces, inadequate funding, lack of policy or law guiding its implementation and lack of use of environmental master plans. The effects of green spaces in built environment were highlighted and found that there are numerous benefits such as good and stabilised temperature, pollution reduction, and improvement in the health of residents. The study also investigated the application and management of green spaces and found out that the respondents agreed on the listed factors like creating awareness, efficient policy and implementation, citizen participation in planning, managing and maintaining of green spaces as a way forward to ensure the existence of green spaces in built environment. In view of the findings from this study, promotion of awareness is advocated on the benefits of green spaces to the users, citizens should be encouraged to participate in managing the green spaces. To make green spaces in the built environment sustainable, government should provide laws that promote the application of green spaces and also encourage education and research with regards to urban green space.

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