

# The Awareness of Sustainability Principles in the Practice of Architecture in the Developing World: A Survey of South-South Nigeria

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## Abstract

Contemporary Nigerian architecture seems to lack the 'green' in architecture due mainly to inadequate knowledge of the principles of sustainability; a serious environmental and sustainability problem. The objective of this paper therefore is to examine the degree of the spread of the knowledge of sustainable (green) architecture in the *South-South Region* of Nigeria. The result shall be used to judge what obtains in Nigeria and by extension, in most developing world countries, especially in Africa, south of the Sahara. This study will also create greater awareness among the practitioners of the profession. The study was done through the questionnaire/interview (technique), which sought to find how much the architects in the south-south of Nigeria knew about sustainable architecture. The analysis involved the use of means and percentages. The results of the analysis show that all the respondents agreed that the application of the principles of green architecture is very important in the practice of architecture in Nigeria, but only 12.5 % have clients who are knowledgeable about sustainability in the practice of architecture. The outcome of the analysis paved way for the conclusion and recommendations that, 1) many architects from Nigeria are yet to practice green architecture; a step they have to take if they must catch up with their counterparts from the developed nations, 2) Nigerian architects should be encouraged to train and retrain in the concepts and application of green architecture, 3) codes for sustainable building and designs should be introduced into building codes for use by all, 4) Governments and private organizations should encourage serious projects and researches on green architecture by providing funds and other necessary logistics.

**Keywords:** climate change, environmental impact, green architecture, sustainability

## 1. Introduction

In the developed economies of the world, green architecture, also known as "sustainable architecture", describes environmentally-conscious design techniques in the field of architecture (Brown, 1981; Hui, 2002; Dick, 2010). Indeed, green architecture is framed by the larger discussion of sustainability and the pressing socio-economic and socio-political issues of the world. In the broad context, green architecture seeks to minimize the negative environmental impact of buildings by enhancing efficiency and modernization in the use of materials and energy, as well as land and environmental management (Goldenberg et al, 1998; Dincer & Rosen, 2007; Milosevic, 2004; Sirija, 2013; Khalfan et al, 2015). It involves a trans-disciplinary approach to building construction (Salama & Ashukaikhat, 2006).

In the said advanced countries, green architecture as an approach to building construction has become more popular since the last two or three decades (Brown, 1981). Also known as sustainable design, green architecture is a method of design that minimizes the impacts of buildings and building construction on the environment. Once thought of as unconventional and non-standard, both regulatory agencies and the public alike are quickly accepting green architectural approach as a socially responsible and logical means of construction. It is axiomatic that the beginnings of today's green revolution of the developed nations can be traced back to the environmental awareness of the 1960s, and to European designs. New construction techniques have led to the development of innovative materials and design concepts. Green buildings are designed, constructed and commissioned to ensure that they are healthy for their occupants.

In Nigeria, where the concept of green architectural design, green building, green building materials, integration

of energy efficient mechanical systems and conservation are either new or not heard of by many architects and the generality of the citizenry, the situation is different. Globalization and technology are bringing the world closer. Therefore, architects and allied professionals across the globe must learn quickly in order to keep pace with the emerging trends.

It appears that over the next 10 to 20 years, accelerated movements towards a more sustainable economy and infrastructure will be needed to head off environmental problems such as global climate change, enlargement of the “ozone hole”, possible food-chain disruption and depletion of ocean fisheries, top-soil depletion and erosion, desertification and ground water contamination (Owen et al, 2008; Iwaro and Mwashier, 2013). Today, sustainable approach is becoming an accepted process of an increasing number of building design. As natural resources dwindle, green design will take a critical role in our built environment.

These challenges are new to many Nigerian architects – this is the concern of this compendium. Nigeria generally has a low percentage of registered architects as compared to other professionals (Obot, 2008; ARCON, 2014). In 2014, there were about 3,000 registered Architects in Nigeria (ARCON, 2014). This translates to one architect per 60,000! Not more than 50% of them are in practice. The bulk of this number (about 30%) are found in Lagos, the commercial capital of Nigeria. The *South-South* region under study has less than 20% of the number; with Port Harcourt taking the largest share. Architectural practices in Nigeria are urban-based; hence, the choice of three principal cities of the region for the study namely, Port Harcourt, Calabar and Uyo.

The questionnaire approach adopted in this study would reveal how much the architects and their potential clients know about green design and are willing to adopt the principles. At present, most of these architects are at a cross road, where vernacular, modern and green architectural designs meet. The architects have to lead the end users to understand the concept of green architecture, and educate them on the need to use green building materials and green construction techniques.

## 2. Conceptual Background

### 2.1 *The Built Environment in the Developing World and the Awareness of Green Architecture*

Globally, the building industry is a primary driver of many an economy across the world, and a major source of employment for their citizenry. However, this industry is driven by energy derived from fossil fuel, accounting for 40% to 60% of the total national energy demands of the industrialized world (EC, 2016). The problem associated with this energy consumption is the accompanying emission of deleterious gaseous pollutants and greenhouse gases that promote climate change. Besides, this high energy consumption impacts the ecology of the environment in ways that natural recovery appears far from being possible.

As was noted earlier in this compendium, contemporary Developing World architecture often has little consideration for climate and ecology; serious concerns in the developed nations. In these (developed) nations, there exists increased awareness amongst architects of the need to integrate sustainability in the design and execution of projects (Trebilcock, 2006), a development that appears to be lacking in the developing nations. With the limited awareness in the developing countries on the risk associated with the rapid man-induced climate change, some of these countries seem to be in doubt that the G8 countries (Britain, Canada, France, Germany, Italy, Japan, Russia, United States) can devise effectively a means to evidently reduce greenhouse gas emission by half by the proposed 2050 deadline (McDonough, 2009). There is also the limited awareness on the parts of most architects in the Developing World, especially Africa, of the existence of the evolving methods of assessing building sustainability performance based on the sustainable building components designs. These assessment methods, such as the Building Research Establishment Environmental Assessment Method (BREEAM), play a major role in sustainable building designs (Iwaro & Mwashier, 2013; Roderick et al, 2009). The miracle of green architecture however, which is credited to energy efficiency, water and waste management and the ultimate need to create and enhance an eco-friendly environment, has created a platform on which climatic and ecological issues, as they affect the built environment could be effectually tackled.

The new trend, nonetheless, is to build “green”, that is using materials that are sourced locally and that are rapidly renewable and recyclable, such as straw, bamboo, recycled stone and metals etc., low *voc*-emitting materials, and the proper insulation of walls and ceilings to reduce energy consumption (Irene & Robert, 2007; NIBS, 2015). Though these buildings are challenging to design, they offer comfort and amenities, while reducing negative impact on the environment (WBGD, 2011). The perception in many parts of the world, especially Africa, is that sustainable or *green architecture* is a fringe activity concerned with mud bricks, wooden poles, straw bales, etcetera, and as such it is quickly disregarded, most especially by the rich who believe that massive structures symbolize wealth. The end result is the inundation of the cityscapes with energy-demanding structures, with great environmental consequences that are often borne by the poor in the society. The concept of green

architecture, needs to be very much a part of the main stream of activity in the built environment and in doing so, there is a need to embrace the latest technological developments. There is also the need to educate the populace to appreciate the importance of building *green*, and the overwhelming effect green architecture would have on the climate. Unfortunately, even the syllabuses of architecture schools, especially in the developing countries, are deficient in sustainability contents (Adegbile, 2012; Posluna & Urbaskova, 2014; Morsi, 2016)

### 3. Methodology

#### 3.1 Study Area

As stated earlier at the introduction, the study was conducted across three principal cities in South-South Region of Nigeria, Port Harcourt (Rivers State), Calabar (Cross River State) and Uyo (Akwa Ibom State). The South-South Region, one of the six political divisions of Nigeria, is located within latitudes 4.15°N and 6.01°N and longitudes 5.05°E and 7.35°E, extending into the Gulf of Guinea, with the Bight of Benin to the west and Bight of Biafra to the east (see figure 1). The region is composed of six administrative states, Edo, Delta, Bayelsa, Rivers, Akwa Ibom and Cross River States. Other major cities in the region include Warri, Benin City, Yenogoa and Asaba. Apart from being state headquarters, the cities where this study was conducted, are also centres of intense developmental activities involving building construction.



Figure 1. Map showing the six states of South-South Region and the cities of Port Harcourt, Calabar and Uyo highlighted

Source: Commons: [http://www.geographicmedia.com.ng/images/gallery/universities\\_in\\_the\\_SS\\_of\\_nigeria.png](http://www.geographicmedia.com.ng/images/gallery/universities_in_the_SS_of_nigeria.png)

It has to be noted that Nigerian economy is primarily dependent on hydrocarbon oil that is extracted mainly from this region (Ekpoh & Obia, 2010). The huge investment in the oil sub-sector has led to high influx of people and industries into the region, leading to massive housing development. As should be expected, this has attracted architects into cities in the region, especially Port Harcourt (often tagged the ‘Oil City of Nigeria’); perhaps more than any other region apart from Lagos (the commercial headquarters of Nigeria) and Abuja (the administrative headquarters). Thus, a study of the awareness of the principles of sustainability in building design and construction by Nigerian architects and their clients would best be done in the region.

### 3.2 Research Questions

Having now understood the concept of green architecture and its effects on the physical environment, it becomes pertinent to find answers to the following:

- Can the contemporary Developing World's architects meet up with the challenges posed to them by the concept of green architecture to build green?
- How important is the knowledge of green architecture to the potential beneficiary population?
- What role can contemporary (affected) architects play in fulfilling the challenges of sustainability in architecture?

### 3.3 Data Collection Method

The answers to the research questions raised need an objective approach and can only be tackled by going to the field (to conduct a survey) with questionnaires. Thus, the data for the research were collected through primary sources. The administration of questionnaires was sometimes followed by oral interviews in some selected cases of architects who were in active practice. This exercise was conducted over a period of three months across the three chosen principal cities in the South-South Region of Nigeria – Uyo, Calabar and Port. Data collation and analysis lasted for one month. The reference points were the cities Port Harcourt, Calabar and Uyo, while the subjects were the practicing architects.

### 3.4 Data Analysis

#### 3.4.1 Criterion Group Returns: Respondents Characteristics and Classification

A total of ninety-three (93) questionnaires were distributed to 93 practising architects in the cities under study. This represented about 50% of licensed architects in the zone the questionnaires were a mix grill of closed and open-ended questions, where the architects' personal views on sustainable practice were sought through interview. Out of the 93 questionnaires distributed, 60 were distributed to architects practicing within the Port Harcourt metropolis. Of the other thirty-three (33), fifteen (15) were distributed to architects practicing in Calabar and eighteen (18) to architects practicing in Uyo, Out of the ninety-three (93) questionnaires distributed, a total of eighty-eight (88) were returned. Fifty-seven (57) useable questionnaires came from the architects practicing in Port Harcourt metropolis, fifteen (15) from the architects practicing in Calabar, and sixteen (16) from the architects practicing in Uyo. This represented 94.6% response rate which is adequate to provide basis for empirical study and generalization.

#### 3.4.2 Presentation and Analysis of Data According to Research Questions

##### 1. Questionnaires

Table 1.

No. of questionnaires sent out	No. of questionnaires returned	Percentage
93	88	94.6%

Table 2. Respondents with positive reaction on the application of green architectural principles in Developing World's architecture

No. of respondents	Percentage	Positive reaction
88	100%	It is important to the survival of the architectural practice

Table 3. Respondents with high application rating of green architectural principles in their architectural practice

No. of respondents	Percentage	Reaction
68	77.3%	It is necessary to enhance and safe guard the life span of building projects.
20	22.7%	The application of the principles are expensive, thus application is based on client's budget.
67	76.1%	Most architects in the Developing World countries are yet to practice green architecture

Table 4. Clients request for green architectural principle to the applied to their building projects

Respondents with clients who request for the application of the principle of green architecture in their building project

No. of respondents	Percentage	Reaction
11	12.5%	Knowledgeable in the practice of sustainability in the practice of architecture

Respondents with clients who don't request for the application of the principle of green architecture in their building project

No. of respondents	Percentage	Reaction
77	87.5%	Little or no knowledge about green architecture and its benefit to their building project and the environment at large.

Table 5. Respondents who hold that green architectural practice and people's lifestyle are ways to build an eco-friendly built environment

No. of respondents	Percentage	Reaction
88	100%	

Table 6. Respondents view on the workability of the application of the principle of green architecture in Nigerian architecture

No. of respondents	Percentage	Reaction
88	100%	Positive
0	0%	Negative

### 3.4.3 Analysis of Research Questions

Research Question 1:

Can the contemporary Developing World architects meet up with the challenges posed to them by the concept of green architecture to build green?

Table 6 shows an analysis derived from questionnaire 6. A close look at the table shows that all the respondents agree that Nigerian architects can meet the challenges of green architecture.

Research Question 2:

How important is the knowledge of green architecture to the Nigerian populace, in combating greenhouse gas emission that results from the built environment?

A comparative analysis of table 2, 3, 4 and 5 derived from questionnaires 1, 3, 5 and 9, show that all the respondents agreed that the application of the principles of green architecture is very important in the practice of architecture in Nigeria, but only 12.5% have clients knowledgeable in the application of sustainability in the practice of architecture, leaving the remaining 87.5% with clients who have no idea of the importance and benefits of the practice of sustainability in architecture. This analysis shows that the knowledge of green architecture to the Nigerian populace is limited but very important, if there is the desire to have an eco-friendly built environment in Nigeria. It could be seen that, though architects are able to give professional advice to their clients, making them take a decision in in the application of green architecture becomes a difficult task. Often, they hardly do anything more or less than what their clients demand, because of cost implications, as seen by the reactions in table 4.

Thus, we rightly agreed that the knowledge of green architecture to the Nigerian populace determines to a great extent the building of an eco-friendly environment.

Research Question 3:

What role can contemporary Nigerian and Developing World's architects play in tackling the challenges posed by the need for sustainability in the field of architecture?

This question could not be answered with the use of a questionnaire, but the inputs from the oral interviews put to the respondents in the course of obtaining the information on the questionnaire gives an insight to the ideas that various architects hold in their roles in tackling the challenges posed by sustainable architecture. Some of the closely related responses are;

- a) Architects should encourage their clients, showing them the numerous benefits green architecture can give their building projects.
- b) The professional body of the architects should extensively use the media, seminars, and workshop to enlighten their members as well as the Nigerian citizens on green architecture; the dangerous implications its neglect will have on the Nigerian environment, and its benefits, not only to the building projects, but to the environment at large.
- c) Architects should get the government's involvement in the move to realise an eco-friendly built environment. Government could aid financially and encourage local production of elements needed for undertaking a green building project by creating an enabling environment as well as subsidizing the cost of the much needed raw materials.

#### **4 Summary, Conclusion and Recommendations**

##### *4.1 Summary*

Whilst one could be forgiven for considering that green architecture means building that will survive and function for a long time, the real concern is the search for and the encouragement of methods and materials to achieve safe and durable shelter and settlements that people can go on using skills and resources available to them, and using materials that would not be harmful to the environment. This is an elusive target. The global and local context in which we live is evolving more rapidly than ever. Local approaches to achieving shelter that have been sustainable over many centuries are now ceasing to cope with today's needs or relate adequately to today's available resources. In this environment, new solutions and approaches that seem genuinely sustainable are hard to come by. Where they exist, they need to be encouraged if we are to keep pace with rapidly growing needs.

Factors including demographic growth, rural-urban drift, natural and man-made resource depletion, and significant changes in expectations and lifestyles, all combine in their various ways to erode the viability of sustainable approaches to shelter provision.

The architecture in Nigeria should be based on the concept of "green architecture", which is architecture that is respectful of nature and its resources and which also creates a pleasant and comfortable environment for its occupants.

It should also be bioclimatic architecture, implying that building projects should be oriented so that they enjoy good views and take advantage of natural light while avoiding severe solar conditions. This should take advantage of favourable climatic conditions and integrate the construction in the land, as well as incorporating elements like recycling water and earth sheltering roofs with plants. The objective is to reduce energy consumption and to harmonize the building with its surroundings.

##### *4.2 Conclusion*

Nigeria, like most developing countries of the world, especially in Africa, south of the Sahara, view green architecture as a new trend and as such, are hesitant in making total commitment due to the risks that are involved in venturing into a completely new area, with the fear of a low level of success. As such, it is common to notice less resources, time and man-power emerging trends.

At present, it is difficult to know who is dedicated to staying "green" because it involves more effort than simply using traditional resources. Since most architects are unfamiliar with green materials, it is a slow and difficult process to research materials than go along and use them.

There is much debate in developing countries over the nature of the word "sustainability". Many would argue that sustainability is an idea, and as yet unknown objective. Others use the term with impunity, making easy claim to sustainability with regards to produces and processes. We argue that while we cannot claim to a sustainable built environment, building a sustainable built environment is within our grasp.

In this study Nigeria, was used as a test case. The picture seen in Nigeria is what obtains across very many developing countries, especially those found in Africa, south of the Sahara. Therefore, the recommendations apply across the board in the developing counties as well, hence the title.

#### 4.3 Recommendation

- 1) Government legislation should be made that will encourage the development of green architectural practice in Nigeria and other Developing World countries.
- 2) Codes for sustainable building should be evolved and introduced into the federal building code of Nigeria and other developing countries.
- 3) Awareness should be created so as to get the citizenry intimated about the structure of green architecture, its benefits, and the problems its neglects will have on the inhabitants of the built environment and the total environment at large.
- 4) Government and private organizations should promote projects and researchers into green architecture by providing funds and other necessary logistics.
- 5) Financial incentives and continued education of clients and end-users, as well as more challenging building regulations should be encouraged by both the government and private organizations to keep the people abreast of changes in the drive for establishing green architecture in Nigeria and other third world countries.

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