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Assessment of Sustainable Construction Practices In Nigerian Constructionindustry (Abuja)

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ABSTRACT : In the mad race of development, the Nigerian building industry have developed a myopic vision thereby endangering the coming generations. No doubt, industrialization and urbanizationare the main reason, but what is missing intoday's style of building construction development is the aspect of sustainability. One hundred questionnaires were administered to the construction professionals out of which eighty constituting 80% was valid for analysis using simple percentages and relative importance index(RII). The findings of the study reveal the level of awareness of sustainable building is low among the construction professionals. Furthermore, the research focuses on the barriers to sustainable construction and ways of eliminating these barriers.
Keywords: Sustainable Construction, Sustainability, awareness, Nigeria

I. INTRODUCTION

There is no general consensus as to the meaning of sustainable construction; various people have defined sustainable construction from different point of view over the years. According to Fissema et al (2007), sustainable construction is defined as the responsible supply, operation and maintenance of buildings that meet the needs of their owners and users over their life span with minimal unfavourable environmental impacts, whilst encouraging economic, social and cultural progress. From this definition sustainable construction is zero-impact buildings which mean that they have no negative environmental, social or economic impacts. Invariably, sustainable construction is the design and construction of building using methods and materials that are resource efficient and that will not compromise the health of the environment or the associated health and well-being of the building occupants, construction workers, the general public, or future generation (Landman, 2000).

According to Adebayo (2000) in Dahiru (2005), sustainable construction is the way the building industry responds to achieve sustainable development. It is a process, which starts well before construction in the planning, design stages, and continues after the construction team has left the site. It also includes managing the serviceability of building during its lifetime and extends to its eventual deconstruction and recycling of resources to reduce waste stream usually associated with demolition (Dahiru et. al, 2013).

Sustainable construction offered many advantages to the environment, occupants, and developers. The benefits to our shared environment include: air and water quality protection, ozone layer protection, natural resource conservation, soil protection and flood prevention (Landman, 1999). To the occupants, improved health, comfort, increase productivity/performance of occupants and construction workers; improvements in a buildings air quality and day lighting can make the occupants healthier and happier (Landman, 1999). The developers and construction firms have the opportunity to broaden their market niche by attracting new clients who wants to hire firms with demonstrated experience in sustainable construction. Other benefits of sustainable construction are lower construction costs, lower operating cost and increasing building value.

Delivering sustainable construction requires actions from all engaged in constructing and maintaining the structure or building including those providing design, consulting and construction services (Usman and Khamidi, 2012). It requires willingness to explore new territory in construction approach and prepares to adopt new products, ideas and practices (Ofari et. al, 2000). It has been argued that a major obstacle to sustainable construction is lack of public awareness (Usman&Khamidi, 2000). Awareness and education are often given credit for increased levels of support, although there is only incomplete evidence produced that awareness alone is responsible for increase support (Irwin and Rita, 1990).

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Despite the numerous advantages of sustainable construction outline above, it is therefore worrisome that sustainable construction has not received adequate attention in Nigeria even though it is an important aspect of sustainable development (Adebayo, 2000). There is need for construction professionals to incorporate sustainable construction into the present system of construction so that Nigerians can also derive the benefit there in. This issue raised call for assessment of sustainable construction practices in Nigerian construction industry.The research aim to Assess sustainable construction practice in Nigeria Building Industry with FCT Abuja Nigeria as a Case Study. The following objectives were formulated to achieve the stated aim:

i. To determine the level of public awareness on sustainable construction
ii. To determine a general set of barriers to sustainable construction
iii. To suggest ways of eliminating these barriers in order to move forward to achieving sustainable construction.

II. SUSTAINABLE CONSTRUCTION

The term sustainable construction is generally used to describe the application of sustainable development to the construction field. The conseil international du batiment(CIB) added to the definitions of sustainable development, by stating that sustainable construction iscreating, running and operating a healthy built environment based on resource efficient and ecological principles" (Kibert, 2005).Hill& Bowen, (1997) contributed by extending the definitions to the four pillars: social, economic, biophysical and technical. The CIB postulated seven principles of sustainable construction, which relates to decision makers; at various stages of construction without leaving out the design process and procedures enduring throughout the whole life cycle of the building which are; reducing resourceconsumption, recycling of resources and putting them to good use, securing and safe guarding nature, eliminating toxics, applying life cycle cost and emphasizing quality (Kibert, 2005).

World commission and environment and development WCED,(1987)came up with the Brundtland report; which looked as sustainabledevelopment which meets the need of the present without compromising the ability of future generations to achieve theirs. This definition was well taken by the whole world, but was seen to be ambiguous. So many disciplines came up with their own definitions to sustainability; economists cling on to 'sustainable economy, agriculturist, 'sustainable harvest', and sociologists 'sustainable societies' (Adebayo, 2000), this is so, because Hill,(1991) pointed that the definitionwas used interchangeably with 'sustainable growth'.However, the definition brought up by the WECD could have worked out if it was meant also, for developing countries, like Africa where economic development have been crippled by poverty, war, political transitions of various sort and exhausting debt burden which leaves posterity with heavy debt overhanging. This empowers the present to carter for their needs, let alone for the future generations to come (Adebayo, 2000).

Sustainable construction has plethora definitions, enough to match every chosen context. Sustainableconstruction can be defined as construction process which incorporates the basic themes of sustainable development (parkin, 2000). Any construction with the same purpose as the above stated will further bring environmental responsibility, social awareness, profitability, objectives to the fore in the built environment as well as create and provide facilities for the entire and wider community (Raynsford, 2000).

Africa like other continents of the world can enjoin and enjoy the values of sustainable construction processes by adopting all of its patterns and principles. Since sustainable construction has potentials to eradicate poverty, hunger as well as alleviate the health situation and the environment of surrounding areas by improvingand upgrading unplanned settlement (Tessema, Taipale&Bethge, 2009). In 2002, the United Nations (UN) called for a world summit which requested a change in the general production and consumptions of unsustainable patterns. The 10 year framework of programmes also known as "The Marrakech Process". The Marrakech process has identified sustainable construction as its number one priority, thus, it took giant steps in helping regions, territories and national initiatives to accelerate a shift towards achieving sustainable development.

The main aim of this process is to provide both local and international policies to support sustainable construction and the maintenance and refurbishment of the built environment. Africa has been active on this scheme, it was the first region that launched its 10YFP, it was approved by the African ministerial conference on environment (AMCEN) in 2005 (Tessema,Taipale&Bethge, 2009). During the world summit organized by the (UN), a task force was inaugurated to oversee the smoothrunning of the Marrakech process. In 2007, the Marrakech task force organized a workshop. During the period of this workshop, a lot of

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definition where formulated for sustainable construction; this includes: sustainable construction refers to responsible supply, operation and maintenance of buildings that meets the need of their owners and users over the lifespan with minimal or less environmental impacts, whilst economic, cultural and social benefits are encouraged.

The UK government devices for more sustainable construction (DETR; 2009) suggests some key factors to be taken into considerationby the construction industry by widening the basic themes. These encompasses the basic design for minimum waste, minimize energy use and energy in construction, lawn construction, do not pollute, enhance and preserve bio diversity, conserve water, respect people and their environment, set targets, monitorprogrammes and report appropriately and documented adequately in other to benchmark performances (Raynsford, 2000). Construction has a significant effect on quality of life, its outputs goes a long way to alter the appearances of towns, cities and improve the standard of living as well as improvethe general environment in which man, works and lives (Najah, 2010). Sustainable development is a long term planningprocess, the future of sustainable construction has its root in the past andpresent, and the future depends on our ethical awareness of the consequences of our actions and deeds. Sustainable development by this explanation has a lot to do with the general awareness of the consequences of not just our actions, but nor negligence Schmid,(2003)

The construction industry addresses the three dimensions of sustainability differently (Adetunji, 2003). The first of the three dimensions to be considered at all times, Environmental factors in sustainable construction encompasses the use of natural resources, efficient use of energy, waste minimization, appropriate use of water to avoid any effect on the environment. Social aspects refer to the interaction of each member of the construction team with each other to achieve required goal. Economic factors of sustainability further establish the contribution of the entire industry to the economic growth of the nation and employment (Kristy, John and Geraldine, 2006).

To obtain the best and mostfavourable solutions to construction and infrastructural challenges, it is of paramount importance to look into the three dimensions of sustainability; Environmental, social and economic aspects, their synergies and the incredible and yet inevitable balance between them (Al-yami& price, 2006).

According to the United States green building council, leadership in energy and environmental design (USGBC), building in the states constitute 36% of energy use, while electric energy consumption by such buildings maintains a whooping amount of 65%, 30% of green gas and waste production , while clean and portable water consumption (USGBC, 2003). The importance of implementing sustainable development principles in all stages of construction is associated with the three main aspects;

i. The environmental benefits are geared achieving the efficient use of natural resources, the efficient use of energy in and around the building, the reduction of waste production.
ii. The economic benefits are in the reduction of operating cost and maintenance and increased revenue generation.
iii. Social benefits can be replaced interchangeably with “health and community” this aspect is leveled towards provision of comfort, health and safety, minimizing absenteeism as well as turnover rates and liabilities.

Building sustainably, moreover, will produce buildings: with lower embodied energy and harmful emissions; using recyclable, renewable, reusable and reparable energy; using water and energy more efficiently, this will further increase the demand for professionals and practitioners (buildings, designers and consultants ...etc) increasing marketing and promotional opportunities related with sustainable construction (Ashe, 2003). The adaption of sustainable construction principles will yield long-term value of the built environment and its occupantsHayles,(2004)

Manoliadis and tsolas (2006), Enumerated fifteen drivers for change to implement sustainable construction; energy conservation, waste reduction, indoor environmentally standard, environmentally-friendly terminologies; resource conservation; incentive programmes; land use regulation and urban planning policies; education and training; re-engineering the design process; sustainable construction materials; new cost metrics; new partnership methods and project stakeholders; product innovation and recognition of commercial/residential buildings as productivity assets. The above stated drivers should stimulate the stakeholders to adopt sustainable design standards in the procurement and design of their buildings.

III. RESEARCH METHODOLOGY

The methods employed for this study embrace extensive searching of relevant literatures connecting to the study such as journals, textbook,

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magazines and of course the internet. The sample frame for this study comprised of Quantity surveyors, Architechs, Civil Engineers and Builders. 100 questionnaires were administered to the respondents, after selecting them by means of a simple random sampling techniques. On the whole, a total of 80 (81%) questionnaires were returned completed in a usable format. After primary analysis of data, the screened questionnaires for analysis. Data analysis were undertaken using descriptive statistics by the application of Microsoft Excel and statistical packages for social sciences (SPSS) where frequency mean and percentages and relative importance index (RII) were employed to interpret the results.

IV. RESULT AND DISCUSSION

TABLE 4.1 DISCIPLINES OF THE RESPONDENTS

Variable	Number of Respondents	Percentage (%)
Architects	28	35
Builders	35	43.8
Quantity Surveyor	15	18.7
Consultants	2	2.5
Total	**80**	**100%**

From table 4.1 among the respondents, 28 respondents representing 35% were architects, 35 respondents represent 43.8% were builders/contractors, 15 respondents representing 18.7 percent were quantity surveyors and 2 respondents representing 2.5 percent were consultants. The fact that architects and builders are represented in this survey gives an assurance that the perceptions of the designers are captured with a good level of accuracy.

TABLE 4.2 EDUCATIONAL ATTAINMENT DISTRIBUTION OF THE RESPONDENTS

Variable	Number of Respondents	Percentage (%)
BSC/HND	25	31.3
PGD	30	37.5
MSC	20	25
Ph.D	5	6.2
Total	**80**	**100%**

From table 4.2, the result shows that 31.3 percent of the survey participants representing 25 respondents have completed at least undergraduate degrees; 25 percent have additional postgraduate qualifications. This means that the outcomes obtained from the survey represents the opinion of construction professionals with a good educational background.

TABLE 4.3.YEARS OF EXPERIENCE DISTRIBUTION OF THE RESPONDENTS

Variable	Number of Respondents	Percentage (%)
6-10 years	20	25
11-20years	30	37.5
> 20 years	30	37.5
Total	**80**	**100%**

Table 4.3 indicates 37.5% have over 20 years experience working in the construction industry, 37.5% also have 11-20 years experience in the same industry, while 25% have at least 10 years or less, representing 30, 30 and 20 respondents respectively.

As the experience of the respondents is quite respectable, opinions and views obtained through the survey can be regarded as important and reliable. Majority of the respondents had reasonable experience in sustainable construction which further shows that the respondents are sufficiently experienced enough to provide data which are credible.

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TABLE 4.4. DISTRIBUTION OF CONSTRUCTION WORKS ENGAGED BYRESPONDENTS

Variable	Number of Respondents	Percentage (%)
Residential Building	50	62.5
Institutional Building	15	18.8
Commercial Building	10	12.5
Industrial Building	5	6.2
Total	**80**	**100%**

Within the combined valid response, residential building (62.6%) is the leading area of project specialism reported by 50 respondents, with institutional building (18.8%), commercial (12.5%) and industrial (6.2%). The larger numbers of residential respondents further reflect the intended focus of the research which is on residential buildings.

TABLE 4.5 LEVEL OF SUSTAINABLE CONSTRUCTION AWARENESS

Level of awareness scale	Respondents	**Percentage (%)**
Extremely aware	64	80
Somewhat aware	10	12.5
Slightly aware	6	7.5
Not at all aware	0	0
Total	**80**	**100%**

To successfully implement sustainable construction, the level of awareness of the construction professionals and clients must be adequate. From the survey 80% representing 64 respondents are extremely aware of what sustainable building is all about, 12.5% representing 10 respondents are somewhat aware, while 7.5% representing 6 respondents are slightly aware. This shows that most respondents are aware of sustainable building.

This 7.5% slightly aware indicate that few of the respondents don't have sufficient awareness of sustainable building. The result of this analysis is in line with Toronto green development standard, (2006) which states that public awareness about green construction has been an important component that led to high demand.

The sustainable future idea adopts on the understanding and involvement of individual as well as on the awareness of the implication of the people action. The rate of success towards sustainability in construction would depend mainly on enhancing awareness, knowledge and understanding of the influences of people action.

TABLE 4.6: BARRIERS TO SUSTAINABLE CONSTRUCTION INDUSTRY.

Item	Barriers to sustainable construction	R11	RANK
1.	Lack of building codes and regulation	0.74	9th
2.	Lack of Incentive	0.62	15th
3.	Higher investment cost	0.68	11th
4.	Risk of investment	0.76	8th
5.	Higher final cost	0.85	3rd
6.	Lack of public awareness	0.83	4th
7.	Lack of demand	0.98	1st
8.	Lack of strategy to promote sustainable const.	0.96	2nd
9.	Lack of design and construction	0.44	19th
10.	Lack of expertise	0.50	17th
11.	Lack of professional knowledge	0.60	16th
12.	Lack of data base information	0.48	18th
13.	Lack of technology	0.82	5th
14.	Lack of government support	0.79	7th
15.	Lack of measurement tool	0.72	10th
16.	Increased documentation	0.64	14th
17.	Extensive pre-contract planning	0.65	13th

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18.	Resistance to change	0.64	14th
19.	Lack of training	0.67	12th
20.	Lack of cooperation	0.80	6th

Major barriers identified by respondents have been shown and expressed in table 4.14 .

The responses by key players indicate that lack of demand with R11 of 0.98, and lack strategy to promote sustainable construction, R11 of 0.96 ranked 2nd, Higher final cost ranked 3rd with R11 of 0.85, Lack of public awareness ranked 4th with R11 of 0.83 and lack of technology ranked 5th with R11 of 0.80, lack of government support with R11 of 0.79, Risk of investment with R11 of 0.74, lack of building codes and regulations with R11 of 0.74 and lack of measurement tool also with R11 of 0.72 for 6th , 7th , 8th , 9th and 10th respectively. However, lack of expertise (0.50), lack of incentives (0.62), lack of design and construction (0.44), lack of database information (0.48) are the least in the ranking with respect to the barriers that affect the implementation of sustainable construction as shown in able 4.14

TABLE 4.7 OVERCOMING SUSTAINABLE CONSTRUCTION BARRIERS.

Item	OvercomingBarriers to Sustainable Construction	Relative important Index (R11)	Rank
1.	Value management	0.70	6th
2.	Public private partnership	0.85	3rd
3.	Education and training	0.75	5th
4.	Using sustainable technical manual	0.53	8th
5.	Reducing cost misperception	0.80	4th
6.	Public awareness	0.95	1st
7.	Sustainable building design	0.63	7th
8.	Seminars	0.40	10th
9.	Demonstration projects	0.50	9th
10.	Boosting client demand	0.90	2nd
11.	Sustainable building completion	0.53	8th

The measures of overcoming sustainable construction barriers identified by the respondents have been shown and expressed in table 4.15. The responses by the respondents indicates that public awareness with R11 of 0.95 ranked 1st , Boosting client demand, with R11 of 0.90 ranked 2nd , Public private partnership (PPP) with R11 of 0.85 ranked 3rd, Reducing cost misperception ranked 4th with R11 of 0.80, Education and training ranked 5th with R11 of 0.75, Valve management ranked 6th with R11 of 0.70. The others are: Sustainable building design with R11 of 0.63 ranked 7th , sustainable building completion and award programmes and using sustainable construction technical manual ranked 8th with R11 of 0.53, Demonstration projects ranked 9th with R11 of 0.50, while seminars ranked 10th with R11 of 0.40.

As the ranking suggest, public awareness is one of the best measure of overcoming sustainable construction barrier. Delivering sustainable construction requires action from all engaged in constructing and maintaining the structure or building including those providing the design, consulting and construction services for it has been argued that a major obstacle to sustainable construction is lack of public awareness.

V. CONCLUSIONS

Based on the literature review and the empirical findings, sustainable construction has not been successfully implemented by all the role players in Nigerian construction industry. The following conclusions could be made from the findings.

- The level of awareness of sustainable construction in Nigerian construction industry is high as indicated by respondents. The major problem is lack of successful implementation of sustainable construction in the Nigeria construction industry. The responses by respondents indicate that lack of demand and lack of strategy to promote sustainable construction higher final cost, lack of public awareness are ranked higher as the major barriers to the successful implementation of sustainable construction. However, lack of expertise, lack of incentives, lack of database information and lack of design and construction are the least in the ranking with

respect to the barriers that affect the implementation of sustainable construction.

- The measures of overcoming sustainable construction barriers identified indicate that public awareness, boosting client demand, public private partnership and reducing cost misperception has the highest ranking. However, sustainable technical manual, seminar and demonstration projects have the lowest ranking.

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