

EXPOSITORY STUDY ON SUSTAINABLE CONSTRUCTION PRACTICE IN PROJECT DELIVERY IN NIGERIA.

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ABSTRACT

The construction industry is a key driver of most developing economies like Nigeria, considering its huge contribution to the nation's gross domestic product. Unfortunately, a large proportion of construction industry's method of work delivery and resource inputs degrade the environment with attendant negative impacts on humans, plants and animals alike. This, succinctly imply an unsustainable construction practice. This paper therefore, examined the extent of awareness of the impact construction activities have on the Nigerian environment. It also evaluated the constraints militating against the development and implementation of appropriate environmental policy frameworks for sustainable construction practice in Nigeria, and finally identified ways of improving the adoption of sustainable construction practice in Nigeria. The methodology of study involved descriptive survey research in which structured questionnaire was purposively administered to a study population of construction industry professionals in selected states of the Nigeria's North Central geopolitical zone, namely-Niger, Kogi, Nassarawa, Plateau, and the Federal Capital Territory. Data obtained in the study were analysed using both descriptive and inferential statistical methods. The findings showed that lack of appropriate sustainable construction strategy awareness by stakeholders and public investors (WT-257, R-1); Divergent view of success factors and criteria (WT-246, R-2), and Poor government support for sustainable construction (WT-227, R3) ranked most among factors that militate against the development and implementation of environmental policy for sustainable construction in Nigeria. The study concludes that adoption of sustainable construction practice in Nigeria could be achieved by increasing public awareness on the imperatives of construction sustainability and improving general stakeholder commitment towards its implementation. The study recommends that the government, its agencies, academic institutions and professional associations in the built environment industry should evolve policies and strategies that seeks to increase the present low level of implementation of sustainable construction practice in Nigeria.

Keywords: *Construction; Environment; Practice; Sustainable; Nigeria.*

Introduction

The United Nations General Assembly (UNGA) in the year 2015, adopted the 2030 agenda on sustainable development and its 17 sustainable development goals (SDGs) to instigate actions

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Page 155 - 165

of critical importance to humanity, people, planet, prosperity, peace and partnership (Osman, Ladhani, Findlater and McKay, 2017). This came at a time when the world is constantly reminded that the solution to the challenges we face – conflict, migration, and climate related disasters can only be found in a truly global endeavour, by actively involving all countries - to fulfilling this vision (Nicolai, Chris, Tom and Thomas, 2015). Hence, this paper addresses one of the key goals of the sustainable development; which is aimed at making cities and human settlements inclusive, safe, resilient and sustainable.

The construction industry generally is a key driver of most developing economies like Nigeria, contributing immensely to GDP, infrastructural development, and employment. Construction activities amongst others have led to environmental deterioration being one of the most globally discussed issue over the past few decades. Due to its significance, the construction industry is regarded as a key sector for achieving sustainable development goals. Construction project activities impact on the environment throughout the life-cycle of development, from the initial work on-site to the final demolition of the structure at the end of its design life (Simon & Samuel, 2015). Vivek, Anjali, Akash and Manjul (2016) asserts that construction projects impact greatly on the environment with the majority being pollution, waste disposal, resource use, soil erosion and material wastage, habitat destruction, desertification, etc. Several views of sustainable construction have been given by scholars. Du Plessis (2002) defined sustainable construction as a holistic process aimed at restoring and maintaining the natural and the built environment and create settlements that improve human dignity and encourage economic equality. Hence, sustainable construction in simple terms involve meeting present needs without depriving future generation of meeting theirs. Sustainability initiative in the construction industry over the years has led to improved standard of living, conducive working environment for individuals and communities, generation of minimum energy over project life cycle and the use of renewable resource inputs where applicable. Sustainable construction was defined by Kibert (1994) as the creation of healthy environment by the application of sustainable, efficient and ecologically based principles.

The state of affairs of the construction industry in Nigeria is similar to other developing countries. Given the peculiarity in the challenges faced by these countries which include fast growing population, poor governance, enormous housing and infrastructural deficit, rapid urbanisation and ineffective institutions. Delivery of buildings and other infrastructures remains major pursuit in these countries (Oluwole, 2015; Du Plessis, 2007). According to recent data released by the Nigerian Bureau of Statistics for the second quarter of 2018, construction industry contributes about 7.9% of the GDP. Thus, looking beyond the social and economic gains of the construction industry, its environmental impact is grossly neglected. In view of this gap, this study therefore, seeks to achieve the following objectives: to examine the extent of awareness of the impact construction activities have on the Nigerian environment; to evaluate the constraints that militate against the development and implementation of environmental policy for sustainable construction practice in Nigeria and to identify ways of improving the adoption of sustainable construction practice in Nigeria. Nigeria and to identify ways of improving the adoption of sustainable construction practice in Nigeria.

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Page 155 - 165

In order to prosecute the above objectives, the following research questions were developed:-

Are construction industry stakeholders aware that construction activities have negative impacts on Nigeria's natural environment?

What are the factors that militate against the development and implementation of an environmental policy for sustainable construction practice in Nigeria?

What are the ways of improving the adoption of sustainable construction practice in Nigeria?

Sustainability in The Construction Industry

The concept of sustainability is not new as it can be traced as far back as the energy crisis began in 1970s when the major industrial countries of the world faced substantial petroleum shortages. These events led to major movement toward energy efficiency, conversion and alternative energy sources (Kibert, 1994). According to Gunatilake & Liyanage (2010), the phrase 'Sustainable Construction' – can be used interchangeably with 'green building', 'high performance building' or 'sustainable building'. Generally, it is the responsibility of the construction industry in accomplishing the sustainability development goals (SDGs). Ever since the adoption of Gro Brundtland report of 1987 which resulted to a new direction of thinking called 'Sustainable development', new ideas and strategies for the improvement of the environment has emerged. Amongst the new policies and strategies for environmental preservation is the idea of sustainable building. Sustainable construction refers to construction processes that are environmentally suitable and resource efficient throughout the life cycle of a structure from the initial work on site through the construction period, operation period and to the final demolition. Sustainability in construction is aimed at provision of structures having a relatively low negative impact on socio-economic life and the environment. According to Alabi (2012), sustainability in construction focuses on the adoption of suitable construction practices in terms of choice of material, construction methods and design concepts for efficient performance, reduced environmental burden, and minimized waste. Furthermore, McMahan, Marks, and Wallace (2015) opined that the construction of sustainable buildings reduces emissions, water and pollution, use of raw materials, and minimises the consumption of energy and water.

Unlike the developed economies, the evolution of industrialized system of construction in Nigeria and other developing economies has continued to pose huge constraints in the ardent pursuit of sustainable construction agenda. The awareness on this global issue is still relatively low. In a recent study, Olayeni, Mosaku, Oyeyipo and Afolabi (2018) posits that a significant number of construction stakeholders in the Nigerian construction industry have poor awareness of basic concepts of sustainable construction. The situation fundamentally explains the associated poor government and leadership support. Majority of building development in Nigeria are conceived, designed, approved, constructed, operated and managed without proper account of their consequences for sustainability (Alabi, 2012).

There is relatively dearth of available literature on construction sustainability in developing countries. Some related researches on construction sustainability are however highlighted below

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Page 155 - 165

to provide generalized insights of this very important but long neglected research area. The study on the acceleration of sustainable construction; the professionals' perspective (Oluwole, 2015); a conceptual framework aimed at implementing sustainability principles in the building industry (Akadiri, Chinyio, and Olomolaiye (2012); a comparison between Nigerian Environmental Sustainability in Construction with Malaysia (Alabi, 2012); assessment of stakeholders' perception of factors determining the adoptability of green building practices (Olabode , 2015). More recent studies include Douglas et al. (2018) assessment of the challenges of sustainable construction: and the assessment of sustainability strategies in the construction industry: - implication on green growth (Olayeni et al., 2018). It was widely noted that a majority of the construction industry practitioners have low awareness of sustainability issues in the industry.

The Impact of Construction Processes on the Environment

The word environment is derived from the French word “Environ” which means “surrounding”, it comprises of human beings, plants, animals, microbes, light, air, water, soil, etc. Environment is everything around us, which can be living or non-living things, physical, chemical and other natural forces. Furthermore, the environment exists either naturally, or built (man-made). Miedzinski , Rebecca , Erik , Harper , Asel , Stefan , Elina, Klaus, Mahieu, Markandya, Peter, Ploeg, Stasiakowska, and VanderVeen (2013) states that as a result of socio-economic activities, wastes and emissions are released back to nature, thereby causing environmental pressure. There have been emerging environmental concerns in relation to the activities of construction projects globally with major emphases on atmospheric emissions, energy issues, and depletion of natural resources. This environmental menace is due to the increase in the consumption of raw materials in the construction industry, which is partly dependent on increase in population and rapid urbanization (Muhwezi et al., 2012, Lomite & Kare, 2009, Garba et al., 2016, Dalibi, 2017). Lomite & Kare (2009) posits that due to the uncontrollable use of structural construction materials, the current trend of consumption will eminently lead to environmental hazard in the world. The proper identification of the major environmental impacts of construction process will in turn save the environment (Zolfagharian, 2012). Figure 1 broadly outlines the impact of construction process on the environment.

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Page 155 - 165

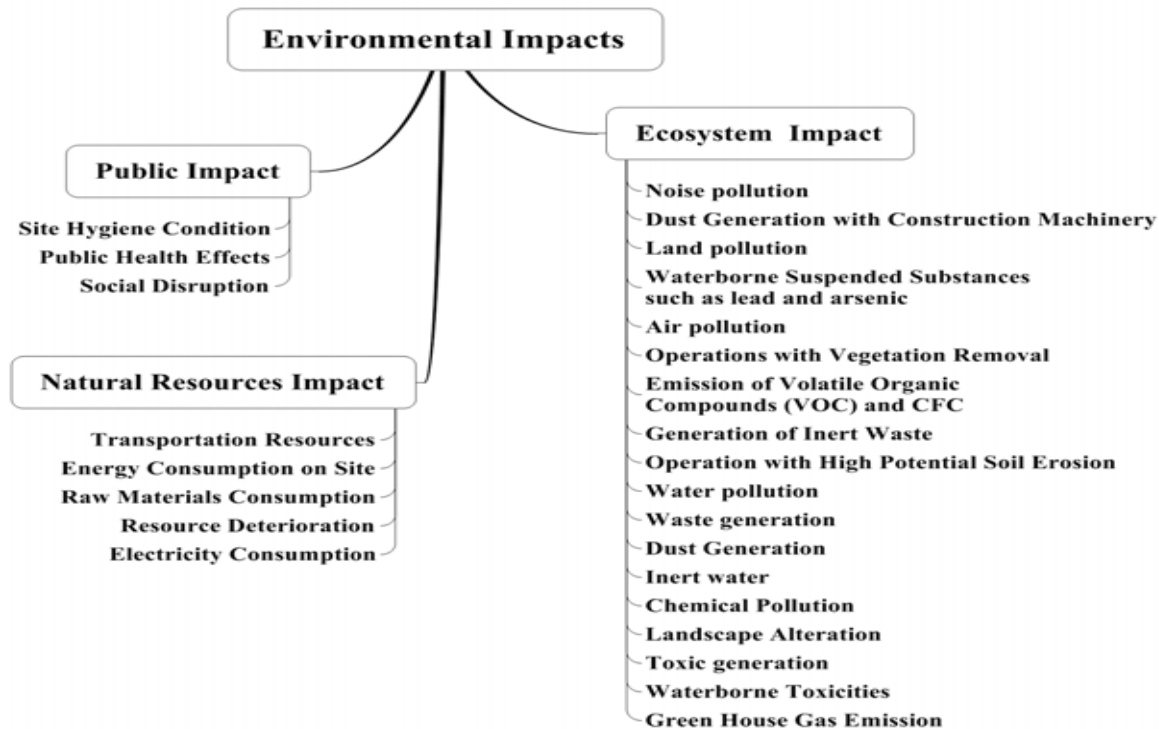


Figure 1: Environmental Impacts of Construction Processes (Source: Zolfagharian, 2012)

Methodology

The research design methodology used was descriptive survey method. The questionnaire solicited responses on the extent to which construction activities impact the environment, the factors hindering the development and implementation of environmental policy for sustainability in Nigeria, and ways of improving the adoption of sustainable construction practice in Nigeria. The study population comprise construction professionals working in construction companies, environmental agencies, professional construction consultancy firms, construction client organizations, building materials manufacturing firms, etc., with practices located in selected states of the Nigeria's North Central geopolitical zone, namely-Niger, Kogi, Nassarawa, Plateau, and the Federal Capital Territory. A total of 70 questionnaires were judgmentally distributed, out of which 56 returned, thus representing 80% success rate. This return rate was considered adequate for a zonal study of this magnitude. Therefore, a total of 56 valid responses formed basis for data presentation, analysis, conclusion and recommendation for this study. Data obtained from field survey were analysed by a combination of descriptive and inferential statistical methods considering the expository nature of the study.

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Page 155 - 165

Results and Discussion

Objective 1: To examine the extent of awareness of the impact construction activities have on the Nigerian environment.

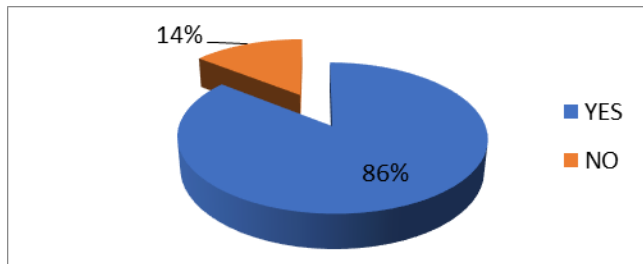


Figure 2: Awareness of impact of construction activities on the environment.

Source: Authors' Field Survey, 2019

48 out of 56 respondents representing 86% agree that construction activities impact negatively on the natural environment, while 8 disagree (14%). Thus, the high response rate to this enquiry indicates significant awareness of the impact construction activities have on the environment.

Objective 2: To evaluate the constraints that militate against the development and implementation of environmental policy for sustainable construction practice in Nigeria.

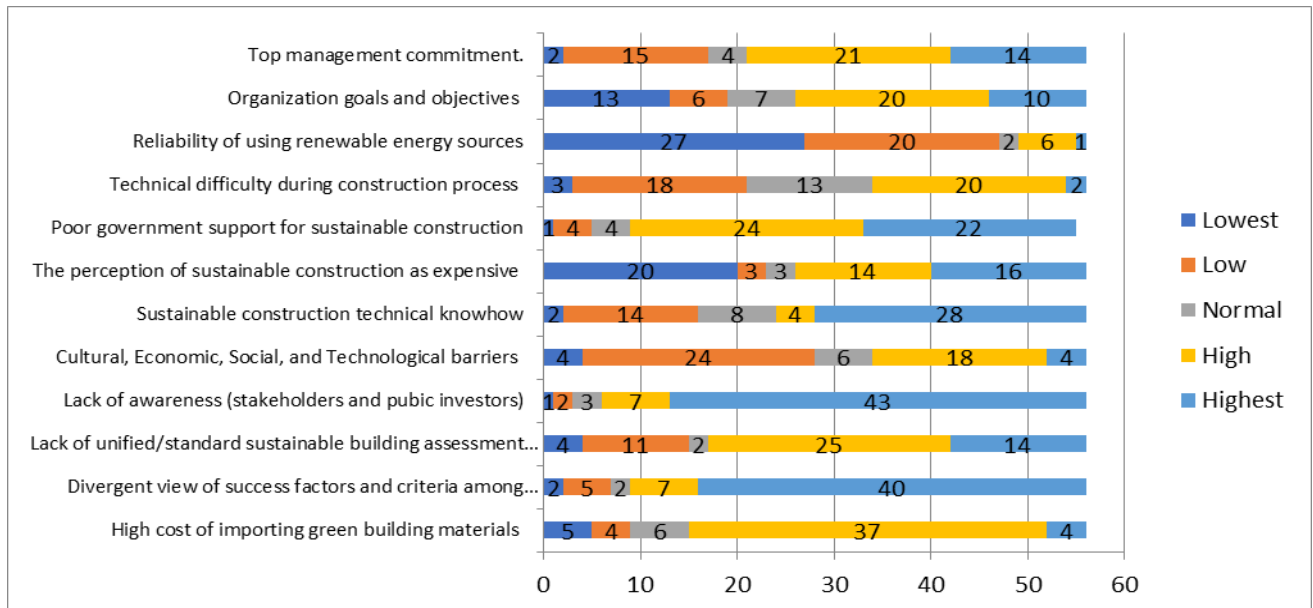


Figure 3: Respondents perception on extent to which identified factors hinder implementation of sustainable construction practice in Nigeria (Source: Authors' Field Survey, 2019)

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Page 155 - 165

Table 1: Weighted Total and Ranking of factors that hinder implementation of sustainable construction practice in Nigeria, based on respondent's perception.

Factor	Lowest (1)	Low (2)	Normal (3)	High (4)	Highest (5)	Weighted Point Total	Mean	Rank Position
Lack of appropriate sustainable strategy awareness by stakeholders and public investors	1(1)	2(4)	3(9)	7(28)	43(215)	257	4.59	1
Divergent view of success factors and criteria	2(2)	5(10)	2(6)	7(28)	40(200)	246	4.38	2
Poor government support for sustainable construction	1(2)	4(8)	4(12)	24(96)	22(110)	227	4.05	3
Sustainable construction technical know-how	2(2)	14(28)	8(24)	4(16)	28(140)	210	3.75	4
Lack of unified/standard sustainable building assessment	4(4)	11(22)	2(6)	25(100)	14(70)	202	3.61	5
High cost of importing green building materials	5(5)	4(8)	6(18)	37(148)	4(20)	199	3.55	6
Top Management Commitment	2(2)	15(30)	4(12)	21(84)	14(56)	198	3.53	7
Technical difficulty during construction process	3(3)	18(36)	13(39)	20(80)	4(20)	178	3.18	8
Organisational goals	13(13)	6(12)	7(21)	20(80)	10(50)	176	3.14	9

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Page 155 - 165

Perception of sustainable construction as expensive	20(20)	3(6)	3(9)	14(56)	16(80)	171	3.05	10
Cultural, Economic, Social and Technological barriers	4(4)	24(48)	6(18)	18(72)	4(20)	162	2.89	11
Reliability of using renewable energy resources	27(27)	20(40)	2(6)	6(24)	1(5)	102	1.82	12

The study identified the above stated 12 no factors as major constraints that hinder the implementation of environmental policy for construction sustainability in Nigeria. For each factor, five(5) metrics namely:- Lowest (1 point), Low(2 points), Normal (3 points), High (4 points), and Highest (5 points) were used to assess strength of respondents agreement on the extent to which the factor contributes to the enquiry sought. For factor 1- Top management commitment, 2 out of 56 respondents scored the factor lowest, 15 scored the factor low, 4 scored the factor normal, 21 scored the factor high, while 14 scored the factor highest, giving a weighted total of 198 and ranked 7th (WT-198, R-7). Factor 2 -Organisational goals and objectives had a weighted total of 176 and ranked 9th (WT-176, R-9). Other factors, their weighted totals and ranks are as follows :- Factor 3-Reliability of using renewable energy resources (WT- 102, R - 12); Factor 4-Technical difficulty during construction process (WT- 178, R -8); Factor 5-Poor government support for sustainable construction (WT-227, R3): Factor 6- Perception of sustainable construction as expensive (WT-171, R-10); Factor 7- Sustainable construction technical know-how (WT-210, R-4); Factor 8- Cultural, Economic, Social and Technological barriers (WT-162, R-11); Factor 9- Lack of appropriate sustainable construction strategy awareness by stakeholders and public investors (WT-257, R-1); Factor 10- Lack of unified/standard sustainable building assessment (WT-202, R-5); Factor 11- Divergent view of success factors and criteria (WT-246, R-2), and Factor 12- High cost of importing green building materials (WT-199, R-6).

Objective 3: To identify ways of improving the adoption of sustainable construction practice in Nigeria.

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Page 155 - 165

Table 2: Respondent’s views on ways of improving the adoption of sustainable construction practice in Nigeria

1	Construction stakeholders should be enlightened on the need for sustainability in construction procurement and delivery
2	Government and its agencies should develop and implement policies that will promote sustainability in the construction industry
3	The general public should be educated on sustainability as a new way of saving the environment and her natural resources
4	Proper awareness of the advantages of sustainable construction by all professionals in the built environment industry
5	Built environment industry should ensure policy directives that deliberately seeks to increase the present sustainable construction technical know-how competency.
6	Management of construction organisations should scale-up their top management participation on matters of sustainable construction.
7	Early education on construction sustainability and entrenchment of same on all built environment curriculum for academic and professional certification.

Source: Authors’ Field Survey, 2019

The respondents views on ways of improving the adoption of sustainable construction practice in Nigeria hinge mainly on the need for improved level of present awareness by government development units and agencies, academic institutions, building research institutes, professional associations in the built environment industry, construction industry practitioners, the civil society and the general public.

CONCLUSION:

A fundamental objective of the 17 sustainable development goals is the need to make human settlements safe, resilient and sustainable. The construction industry is a major contributor to a nations aggregate impact on sustainability, namely-environmental, natural resource, and ecological impact. The process of construction product delivery involves activities that massively degrade the natural environment, and often characterized by pollution, waste disposal, material use and wastages, desertification, etc. Consequently, the problem of construction sustainability has in recent times become a global topic and international discuss among industry stakeholders in an attempt to make construction processes efficient, ecologically friendly and sustainable. This paper therefore, examined the extent of public awareness of the impact construction activities have on the Nigerian environment. It also evaluated the constraints militating against the development and implementation of appropriate environmental policy frameworks for sustainable construction practice in Nigeria, and finally identified ways of improving the adoption of sustainable construction practice in Nigeria. The results of the findings showed that a majority of the respondents (86%) are aware that construction activities have negative impacts

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on the natural environment. The study also revealed that the following factors ranked most among the twelve (12) identified factors that militate against the development and implementation of environmental policy for sustainable construction in Nigeria, viz- Lack of appropriate sustainable construction strategy awareness by stakeholders and public investors (WT-257, R-1); Divergent view of success factors and criteria (WT-246, R-2); Poor government support for sustainable construction (WT-227, R3); Lack of sustainable construction technical know-how (WT-210, R-4), and a Lack of unified/standard sustainable construction assessment template (WT-202, R-5). Finally, the study revealed that the adoption of sustainable construction practice in Nigeria could be achieved by increasing public awareness on the imperatives of sustainability and general stakeholder commitment towards implementing those enduring strategies that promotes both the value and culture of sustainable construction practice in Nigeria.

Recommendations:

In view of the research findings, and conclusions drawn on this study, the following recommendations are made for purposes of policy:-

1. Construction stakeholder development of sustainable construction and information dissemination strategies for improved awareness.
2. The government, the civil society , and the general investing public should promote the use of sustainable construction methods including materials and components.
3. The enactment and implementation of workable environmental policies that ensures the protection of the natural environment in the procurement and delivery of all private and public sector projects in Nigeria.
4. Management of construction organisations should scale-up their top management participation on matters of sustainable construction practices.
5. Government, their agencies, academic institutions and professional organisations in the built environment industry should ensure policy directives that deliberately seeks to increase the present low level of technical know-how in sustainable construction practice.

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Page 155 - 165

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Page 155 - 165