



INNOVATION IN THE CONSTRUCTION INDUSTRY: GREEN BUILDING APPROACH

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ABSTRACT

Green buildings are the outcome of a design focus on increasing the efficient usage of resources ensuring the reduction of building impacts on human health. In Lagos state level of awareness of green building is low with minimal understanding of green materials and sustainable design. There is a need to raise the level of awareness to drive involvement towards green construction. The study instrument of data collection is a questionnaire. Primary data was collected through a questionnaire while secondary data were sourced from journals, official statistics, monographs, unpublished and published theses; and government policy frameworks on green architecture, green innovation and climate change. The study population are client organization, consultants and contractors. A total of fifty (50) were administered to the study respondents. Green building materials for innovation in construction is an aspect of the construction industry that is just growing up, therefore only a few professionals are aware of its use the major role of green building materials is that increases productivity and quality attached to the construction industry. The paper recommends that the construction industry and its professionals should mandate green building materials in the industry and government passing into law the inculcation of green building materials in building projects

KEYWORDS: Green Technology, Green Building, Climate Change

1.0 INTRODUCTION

A green building is an outcome of a design which focuses on increasing the efficiency of resource use - energy, water, and materials while reducing building impacts on human health

and the environment during the building's lifecycle, through better siting, design, construction, operation, maintenance, and removal. Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment. Promote efficient usage of energy, water, and other resources; protect building occupant health and improve the level of productivity, Furthermore, it is to reduce the level waste, pollution and environmental degradation A similar concept is natural building, which is usually on a smaller scale and tends to focus on the use of natural materials that are available locally.

In this globalization era, sustainable constructions have taken on some new steps to stimulate green building practices. Green building criteria basis is energy efficiency, material and resource conservation and sustainable design of the building itself. Energy efficiency still has a long way to go, due to some barriers that prevail in the practice of energy efficiency. Similarly, materials and designs that are originally used have created various issues related to the environment and human health. In Lagos, people's level of awareness about green building is still low and they have minimum understanding and lack of familiarity with green materials and sustainable design. According to Klufallah (2014), 24% of the total carbon dioxide (CO₂) comes from the construction sector in Lagos.

Green building refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life cycle: from planning to design. Green building practices aim to reduce the environmental impact of buildings. Buildings account for a large amount of land use, energy and water consumption, and air and atmosphere alteration. The environmental impact of buildings is often underestimated, while the perceived costs of green buildings are overestimated. This paper examines the role of green architecture in reducing greenhouse gas, and the effects, since building play a major role in carbon emission and the use of energy.

2.0 REVIEW

Green construction is an opportunity to use our resources more efficiently while creating healthier and more ecological-balanced buildings. For a building to become 'green', every phase of the building process (design, construction and operation) must incorporate sustainable considerations. Sailor (2008). A lighter footprint on the environment through green action, strategy, materials and technology is our contribution to the future. It is an idealism that challenges the industry to deliver better buildings and infrastructure. The conventional way of construction has stood firm for decades. The transition from a conventional to a sustainable approach will consume time as it requires changes from different facets in the industry ranging from individual and organisational to industry level and the transformation process will not be barrier-free. Worldwide, many local governments are adopting green building standards, introducing various regulations or providing permits for sustainable construction. Nevertheless, many more, especially from developing countries, are still unprepared to make the changes. As such, venturing into green construction for many practitioners would be their maiden experience.

Among the crucial challenges of green construction are the lacks of commitment from the clients and developers and behavioural factors which lead to change resistance. These two are interrelated. Behaviour changes will only come about through personal commitment to it. To encourage a person or organisation to commit to something, their values must be satisfied. Bandura stressed that intention and forethought will lead to prospective actions. Through the exercise of forethought, people will motivate themselves and create rational grounds of expectations that will guide their actions in anticipation of future benefits. The innovation factors and grounds of expectations derived during the forethought process will influence a

person or organization's commitment and decision to venture into new practices such as green construction (Hackler & Holdren, 2008). There is a raising awareness among builders of green construction which drives their involvement towards green construction. However, the implementation is a different matter. From previous studies it was found that many constructions are the greatest obstacle to green construction is the higher investment cost that may incur and the risk of unforeseen costs. Thus, some of the factors that hinder the implementation are related to future innovation i.e., may incur or unforeseeable aspects.

Green Building Council (2001), posit that building materials typically considered to be 'green' include rapidly renewable plant materials like bamboo (because bamboo grows quickly) and straw, lumber from forests certified to be sustainably managed, ecology blocks, dimension stone, recycled stone, recycled metal, and other products that are non-toxic, reusable, renewable, and/or recyclable (e.g. Trass, Linoleum, sheep wool, panels made from paper flakes, compressed earth block, adobe, baked earth, rammed earth, clay, vermiculite, flax linen, sisal, seagrass, cork, expanded clay grains, coconut, wood fibre plates, calcium sandstone, concrete (high and ultra-high performance, roman self-healing concrete etc.) The EPA (Environmental Protection Agency) also suggests using recycled industrial goods, such as coal combustion products, foundry sand, and demolition debris in construction projects.

Building materials should be extracted and manufactured locally to the building site to minimize the energy embedded in their transportation. Green buildings often include measures to reduce energy use. To increase the efficiency of the building envelope, (the barrier between conditioned and unconditioned space), they may use high-efficiency windows and insulation in walls, ceilings, and floors. Green architecture also seeks to reduce the waste of energy, water and materials used during construction. Integrating “sustainable” or “green” building practices

into the construction of state buildings is a solid financial investment. The benefits range from being fairly predictable (energy, waste, and water savings) to relatively uncertain (productivity/health benefits). Energy and water savings can be predicted with reasonable precision, measured, and monitored over time. In contrast, productivity and health gains are much less precisely understood and far harder to predict with accuracy (Kats and Capital, 2003).

3.0 RESEARCH METHODOLOGY

The paper adopted the survey research method. Primary and secondary data were collected from the case study location. The instrument of data collection is a questionnaire with structured and unstructured questions to allow for ease of expression by the study participants. Primary data was collected through questionnaires while secondary data were sourced from journals, official statistics, monographs, unpublished and published theses; and government policy frameworks on green architecture, green innovation and climate change. The study population are client organization, consultants and contractors. A total of fifty (50) were administered to the study respondents. A simple random sampling method was used to determine the distribution of the study data collection instrument (questionnaire). The study data was collected collated and analysed using IBM SPSS and descriptive statistical techniques.

4.0 RESULTS

Table 1

Respondents Educational Qualification

Educational Qualification	Respondents	Percentages
WASSCE/NECO/GCE/O'Level	2	17
OND/NCE	4	20
B.Sc/HND	20	40
M.Sc/MBA	14	23

Total **40** **100**

Sources: Author Field Survey, 2022

The above table shows that 17% representing 2 respondents is WASSCE/NECO/GCE/O'Level, 20% representing 4 respondents is OND/NCE, 40% representing 20 respondents is B.Sc/HND while 23% representing 14 respondents is M.Sc/MBA.

Table 2

Management Level

Management Levell	Respondents	Percentages
Lower Level	6	15
Middle Level	24	60
Top-level	10	25
Total	40	100

Sources: Author Field Survey, 2022

The above table shows that 15% representing 6 respondents is lower level, 60% representing 24 respondents is middle level and 25% representing 10 respondents.

Table 3

Working Experience

Working Experience	Respondents	Percentages
Less than 1 year	1	5
1-5 years	5	15
6-10 years	10	25
11-15 years	10	20
16 and above	14	35
Total	40	100

Sources: Author Field Survey, 2022

The above table shows that 5% representing 1 respondent have less than 1 year of working experience, 15% representing 5 respondents have 1-5years working experience, 25%

representing 10 respondents have 6-10years of working experience, 20% representing 10 respondents have 11-15 years working experience while 35% representing 14 respondents 16 and above years working experience.

Table 4
Factors that Influencing Green Building issues in Construction Industries

Factors that Influencing Green Building issues in Construction Industries	N	1	2	3	4	5	Mean	Rank
Green building change and global warming in construction industries	40	4	4	8	5	9	4.03	1
The demand for non-renewable resources minimizes in the construction industries	40	1	2	8	3	16	3.37	4
Building energy efficiency as an effect on the construction industry	40	8	10	6	4	2	2.40	5
The design employed in green buildings constructive is efficient	40	1	5	5	7	12	3.81	6
The beneficiary of utilizing energy is efficiency in green materials and sustainable design.	40	3	2	3	7	15	3.97	7
The design employed in green buildings achieves constructive sustainability	40	2	2	2	4	20	4.27	8
The builders maximize the use of efficient building materials in the construction industry.	40	4	6	4	5	11	3.43	9
The uses minimum energy to power itself work in green buildings.	40	8	6	4	7	5	2.83	10

Sources: Author Field Survey, 2022

The above table shows that design employed in green buildings achieve constructive sustainability have the highest rank among the factors that influence green building in

construction industries with a mean ratio of 4.27, green building change and global warming in construction industries have the second highest rank among the factors that influence green buildings on the construction industry with a mean ratio of 4.03 while the builders maximize the use of efficient building materials in the construction industry have the lowest rank among the factors that influence green buildings in the construction industry with a mean ratio of 2.40.

Table 5
Effects of Green Building Issues Innovation in Construction Industries

Effects of Green Building Issues Innovation in Construction Industries	N	1	2	3	4	5	Mean	Rank
A lighter footprint on the environment through green action, strategy, material and technology contributes to the future	40	3	6	14	4	3	2.93	1
Many local governments are adopting green building standards and introducing various regulations on providing permits for sustainable construction	40	1	2	8	3	16	3.37	4
The transition from a conventional to a justifiable approach will consume time as it requires changes from different faces in the construction industry ranging from individual and organization	40	2	4	8	4	12	3.67	3
To encourage a builder (person or organization) to commit to something their value must be satisfied	40	4	5	5	6	12	3.70	4
With the exercise of forethought, people will motivate themselves and create a rational ground of expectation that will guide in anticipation of future benefit in the construction industries.	40	5	5	5	10	5	3.17	5
The fast-growing economic countries, Lagos has both enjoy the benefit of rapid urbanization and suffer level of environmental impact due to uncontrollable development, although green construction is making their mark in the country.	40	3	7	2	12	6	3.37	6

Sources: Author Field Survey, 2022

The above table shows that many local governments are adopting green building standards, introducing various regulations on providing permits for sustainable construction have the highest rank among the green building adopted by the construction industry with a mean ratio of 4.10, to encourages a builder to commit to something their value must satisfy have the second highest rank among the green building adopted by the construction industry with a mean ratio of 3.70 while the lighter footprint in the construction through green action, strategy, material and technology contribute to the future have the lowest rank among the green building adopted by the construction industry with a mean ratio of 2.93.

The findings show that green building materials for innovation in construction are an aspect of the construction industry that is just growing up, therefore only a few professionals are aware of its use. The findings concluded that the major role of green building materials is that it increases productivity and quality attached to the construction industry. It is observed the most important factor that measures the contractor's perception and awareness of green building materials is the delivery of construction projects based on time and cost and the major factor that measures the clients' perception and awareness of green building materials is aesthetics.

5.0 CONCLUSION

Green building is today the most widely used form of architecture. Creating green buildings is an important focus of building owners and even governments worldwide. In Nigeria, some world-class Green Buildings have been constructed in the past few years, but still, the concept of green buildings for the general masses is infancy stage. The present work is an attempt in the direction to make people, communities and the general public aware of the advantages of green buildings for sustainable environmental development and management. Despite the wide range of building environmental assessment tools recently developed (which give valuable aid

in the early design stage), architects and engineers are presently left nearly alone in this selection.

Green building materials and approach as an interdisciplinary field, therefore its importance in the construction industry cannot be overemphasized. In light of the research findings and conclusions, the following recommendations should be noted:

- The construction industry and its professionals should mandate green building materials in the industry.
- The government enacts laws and regulations that inculcate green building materials in every building construction project to be carried out.
- During the life-cycle of the project and at review and decision points, emphasis should be placed on obtaining innovation and environmentally friendly materials to secure best practice performance throughout the project's life.
- The construction industry should not relent in its effort of globalizing the importance of green building materials, majorly because of the negative impression, it is portraying the industry and also because of its effect on the level of profitability attached to construction.
- Professionals in the construction industry who are holding positions of management in construction sites should be trained on the concept, rudiments and nitty-gritty of green building materials to equip them properly on the duties green building materials hold.

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