

## Understanding Sustainability in Building Construction

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### ABSTRACT

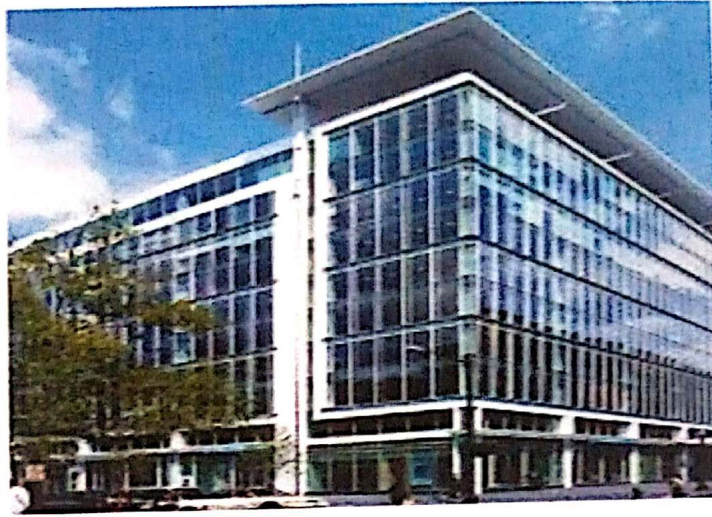
*Construction industry makes a significant contribution to the growth and development of every economy by providing infrastructure for productive ventures, shelter to the citizens and generating employment to people at different levels of knowledge and skills. It is the backbone of economic development globally. The construction industry can be vibrant when technologies, systems, materials and the processes are of quality standards. Issues of energy consumption, wastage, water and air pollution threatens the health and safety of the people as well as the built environment. The sustainability will not be feasible when the Construction industry have performed below expectations evident by high rate of building collapses, non-compliance of health and safety, loss of lives and properties as well as lack of standards and quality infrastructure for economic development. This has greatly affected the living standards of an average Nigerian. Therefore, understanding sustainable building construction is hinge to pivot development in the construction sector. The method used for the research is exploratory based on relevant literature survey for better understanding of the sustainable building construction. The study concludes that maximizing the use of efficient building material and construction practices, optimizes the use of onsite resources and use of renewable sources of energy, use efficient waste management practices and provide comfortable and hygienic indoor working conditions.*

**KEYWORDS:** Buildings, Construction, Standards, Sustainability, Systems, Technologies.

### INTRODUCTION

Construction industry makes a significant contribution to the growth and development of every economy by providing infrastructure for productive ventures, shelter to the citizens and generating employment to people at different levels of knowledge and skills. It is the backbone of economic development globally. Construction industry play an important role in developed economies such as job creation, product innovation, research and advancing technologies as well as employment and poverty reduction (Usman & Alaezi, 2016; Chris & Usman, 2019). The Construction industry is recognized globally because of its role in economic development.

Construction industry globally contribute to the economic development of any nation. Economic development can be determined by Gross Domestic Product (GDP). Construction is enhanced by gross domestic product (GDP). For instance, the construction industry accounts for about 5% in Nigeria as compared to South Africa 19%, Mexico 17.7% and Ghana 8% (Usman, 2014, Usman & Alaezi, 2016). This shows that Nigeria is lagging behind in terms of economic development. Studies have shown that the Nigerian economy is dwindling especially in joblessness (Usman, 2014). Evidently, 65% of Nigerian youths are unemployed (Usman, 2014). With the emerging technologies and skills development, the issue of poverty will be a thing of the pass. The construction industry can be vibrant when technologies, systems, materials and the processes are of quality standards. Therefore, understanding sustainable building construction is hinge to pivot development in the construction sector.

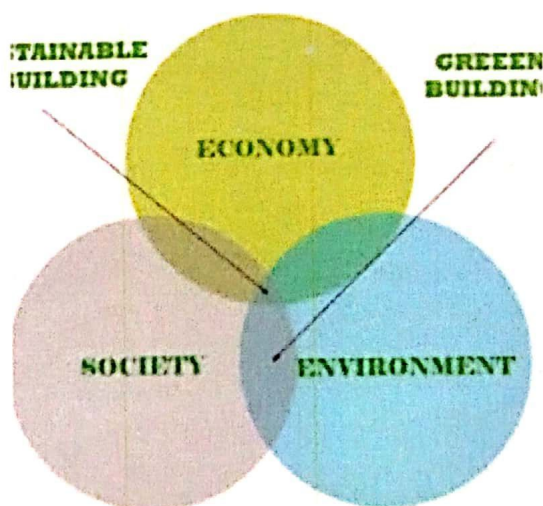


**Fig.1: Sustainable Construction**

Sustainable construction is a way of using renewable energy and recycling materials as well as reducing energy consumption and waste (Yilmaz & Bakis, 2015). This can also be referred to as green buildings. Sustainable construction is a compound of building that concerns design, economy, utility, durability and comfort. It uses less water and optimizes energy efficiency and consumes natural resources. Although sustainable building construction generates waste but provides health and safety compared to other conventional buildings.

Sustainable buildings are environmentally friendly and resource efficient throughout the life cycle of the building (Usman, 2014). Design can minimize resource and maximize reuse, recycling and utilization of renewable resources. So also maximizing efficient and construction practices by employing skills and quality product. In global arena, optimization of the use of onsite resources and waste management will enhance building sustainability. By this, it provides comfortable and hygienic indoor working conditions thereby minimizing the impact of the natural environment (Didel et al., 2017). Reduces energy and water usage promotes health and safety and increase productivity.

Although the construction industry is a big user of resources, the concern is the climate change and infinite nature of these resources. Construction firm's activities adversely affects and degrade the environment (Geelani et al., 2012). So, increasing pressure will reduce their environmental impact. It should be noted that sustainable construction does not end when the building is completed. The building should have a reduce impact on the environment over time (British Assessment Bureau, 2019). This means that the building design should include elements that can influence the built environment.



**Fig. 2: Environmental Factors**

## STATEMENT OF THE PROBLEM

Studies by Usman and Alaezi (2016) have shown that the Construction industry have performed below expectations evident by high rate of building collapses, non-compliance of health and safety, loss of lives and properties as well as lack of standards and quality infrastructure for economic development. This has greatly affected the living standards of an average Nigerian. There are several issues that pose challenges to construction industry such as the technologies, systems, skills, insecurity, politics and processes as well standards for sustainable building construction (Chris & Usman, 2019). In addition, high inflation rate has limited economic growth which affects the sustainability of the construction industry. Several efforts geared towards making the construction industry meet its requirements for sustainable economic development have failed. This study therefore, seeks to examine the sustainability in building construction by exploring the advances in technologies, systems and standards for sustainability based on global standards. This can be achieved by minimizing resources, maximizing the reuse, recycling and utilization of renewable resources.

## METHODOLOGY

This research used exploratory approach. McNabb (2009) in Usman (2014) advocates that exploratory design is carried out for either one or two purposes, namely; a preparatory examination of an issue for gaining knowledge or for collecting data for immediate application to an administrative or a management problem especially averting building collapses through enhancing sustainable building construction. Exploratory design can be used as a stand – alone design because of its limited scope; in the same vein, it could be used as a stand – alone design when it is used to provide information for management decision (Inuwa & Kunya, 2015). Hence, exploratory design was employed as a stand – alone to provide information for understanding sustainability in building construction. McNabb (2009) advised the use of Literature review as one of the most effective methods for data collection in exploratory design. Hence, the exploratory design examines sustainable building construction.

## WHY SUSTAINABLE BUILDING CONSTRUCTION

Buildings are supposed to provide comfort and healthy living. However, the construction industry is faced with numerous challenges such as construction processes, operation and maintenance. Buildings consume a lot of energy and natural resources with adverse effect on the climate change thereby affecting the quality of air and water in the built environment (Didel et al., 2017; British Standard Bureau, 2019). Studies has shown that 40% of the world energy, 50% water used by buildings grossly affects the sustainability of the built environment (British Standard Bureau, 2019). For instance, 23% air pollution, 50% greenhouse gas production, 40% water pollution as well, 40% solid waste decrease biological diversity (World Green Building Trends, 2018). Besides, forestry destruction is a clear indicator of global warming.

The use of unskilled workers, substandard materials and quackery has led to building failures that has adverse effect on the economy. The waste in terms of materials and professional indiscipline as well as obsolete construction materials is a signal that sustainable construction is obvious. The consumption of energy is very high in energy emission. The heavy machinery and equipment used in construction relied so much on fossil fuels which results to pollution. It may interest you to know that the construction industry accounts for 36% energy and 40% Carbon dioxide emissions (British Standard Bureau, 2019, Geelani et al., 2012). In the same vein, fabrication and shipping of materials also have impact on carbon emission. Mining raw materials results to pollution of the local water table. Studies revealed that Concrete manufacture increased from 2.8bn tonnes of carbon dioxide to 4bn tonnes annually. Construction is threatened from hazard especially improper disposal of waste. This posed threat to the environmental safety of the built environment.

## What Are the Salient Features of Sustainable Building Construction?

- A. Sustainable Site Design
- B. Indoor Environment Quality
- C. Energy and Environment
- D. Materials and Resources
- E. Water Quality and Conservation

According to Gatley (2020), the following are features for sustainable building construction:

1. There is the need to consider sustainability in all facets of building design and planning.
2. It must be health and safety compliance

3. It must be efficient
4. Its construction and systems must be easy to maintain
5. It is aesthetic and quality standards
6. The materials must be effective and efficient
7. Must be water efficient
8. It must reduce waste and toxics
9. It must be structurally efficient, thus minimizing the environmental impact associated to the life cycle of the building
10. It must be energy efficiency by reducing the operating energy cost. Thus, using renewable energy e.g solar power, wind power, hydro power, biogas etc.



**Fig 3: Energy Efficiency**

### **Construction Sustainability**

1. Imbibe renewable energy: A modular battery system that can be deployed on-site and recharge by solar panels. This can power electrical tools and vehicles as well as security equipment. With this, it can offset 1 ton of carbon dioxide per week and 400 liters of diesel.
2. Sustainable materials: Although wood is a common building material, but also provides habitat for wildlife.
3. Sustainable concrete; alternatives with plastics and recyclables can reduce carbon dioxide by 50%.
4. Alternative materials such as bricks, mud, wool, cigarette butts can be used as binders that can strengthens the material without firing from the kiln that results in harmful emissions.
5. Plastics: Plastic does not degrade but gives maximum strength especially when used in construction. A key issue in building sustainability is to produce a building with longer life span. Since plastic does degrade, it might not need maintenance.

### **CHALLENGES OF SUSTAINABLE BUILDING CONSTRUCTION**

According to the World Green Building Trends (2018), reveals 40% of UK firms are short changed in adopting sustainable construction practices; and 50% indicated that it is costly although 345 clients demand for green building for the sustainability of the built environment. Despite the cost, sustainable building construction can never be overemphasized. The benefits are erroneous for example, sustainable construction methods reduce impact on the environment. It demonstrates sustainable construction beyond environmental concerns. Statistics show that green buildings account for 7% increase in volume when compared with traditional buildings (World Green Building Trends, 2018).



**Fig. 4: Adopting Sustainable Construction**

## CONCLUSION

Buildings have great effect on the environment, human health and the economy. Therefore, embracing sustainable construction can minimize both economy and the environment performance of buildings. So, the reduction of water and operating energy costs during the life cycle of the building will have great impact on the built environment.

Therefore, sustainable construction is a dynamic environment that respond to the peoples changing needs and lifestyle. Sustainable construction can be addressed by imbibing intelligent technologies, systems and standardization especially with the convergence of urbanization, globalization and rapidly changing increasing economy. Consequently, sustainable construction will prevent environmental degradation.

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