

**ENVIRONMENTAL SUSTAINABILITY:  
LATERITE AS SOLUTION TO HIGH COST OF BUILDING PROJECTS**

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**ABSTRACT**

*Laterite has been the most widely known and used building materials in building construction. They were successfully used as a sustainable building material in various aspects of civil and building projects. The materials were employed in the construction of rural feeder roads, dams, airfields runways, highways roadsthus, has a high influence on the total cost of any projects. The high cost of projects led to a call for incorporating laterite in most past and present projects. This research is expected to answer some of the uncertain issues that arise from the ineffective utilization of literate as construction materials. This research is aimed to identify elements to be used for utilization of laterite as a solution to high cost of building materials in the construction industry. The research work was carried out in suitable civil and building construction companies in Katsina, Kano and Kaduna state in Northern Nigeria. The research findings identified that economic factors have the highest significant as sustainable building materials in the construction industry.*

**Keywords:** Construction, Building Materials, Economical, Environmental, High Cost. Laterite.

**INTRODUCTION**

Laterite which can be extracted and applied to the local production of low-cost construction products Okereke (2003) identified sources of materials on which laterite can be a sustainable building material. Utilization of literate in building, civil and engineering projects has economically, socially and environmentally improved the performance of construction industry as well as living conditions of developed and developing countries (Chung, 2010). Literate is important economically, socially and environmentally used to improve labor productivity and reduce environmental impacts. This presents tremendous opportunities for the construction industry (Abourizk, 2010). The use of literate as a building material, saves cost, time, energy and transportation cost, it requires less energy, used in roads, dams and airports construction using the mechanical plant and equipment in excavation, transportation, spreading and stabilization, it saves human-made energy, labor-intensive and enduring.

Nigeria one of the laterite producing country, but not entirely utilized. Fig.1 shows some states in Nigeria where laterite materials are abundant. One of the disadvantages of this material is lack of standards that lead to non-acceptability making the material as second class or inferior material. Laterite is most efficiently used in developing countries to house the most considerable number of people with the least cost. However, it must be noted that laterite buildings are not a phenomenon only of the third world countries, but also in developing countries (Lemougna *et al.*,



2011). Different types of laterite are suitable for use in large building and civil engineering works. The references that contribute in undertaking this research were listed at the last two pages of this paper in the order of APA styles fifth edition.

## **LITERATES AS SUSTAINABLE BUILDING MATERIALS**

Laterites, known as 'green' or environmentally friendly construction materials can easily be reused, have low energy consumption and toxicity and in applications. Building professionals have the responsibility to ensure that laterite used is environmentally friendly and sustainable.

This is part of the construction, environmental designs, and sciences. One of The main aims of Millennium Development Goals is to provide friendly environmental sustainable infrastructures. It is evident that environment is adversely affected, trees are cut down bushes, the grass is cleared, and soils are excavated randomly while construction activities generate noise and environmental pollution (Gonchar, 2007).

Laterite has been the most widely known and used construction materials in the construction industry, are successfully used as sustainable construction materials in various aspects of civil and building construction projects. Laterite was used in the construction of rural feeder roads, townships roads, intercity link roads, dams, airport runways, highways roads (Abdurrahman, 2010). United Nation Centre for Human Settlements stated that about half of the world's populations are still living in laterite buildings mostly in Africa and Asia. The materials are economical, easy to work and abundant universally, inexpensive, they eliminate transportation costs and workers with prior knowledge and experience can be employed in the construction (UNCHS 2011). Laterite buildings are resistance to sound transmission, fire resistance, and insect damage and provide coolness during hot weather. It requires little energy in the extraction, processing, and also environmentally friendly construction materials in the construction industry.

The benefits of having laterite as building materials in the regions are warming rooms during cold and cooling in hot seasons, availability in most areas, low cost of excavation, processing, and production of building products such as bricks, blocks, floor tiles, roofing tiles, water pipes and sanitary appliances. Another benefit is better properties while beauty can be obtained by adding color additives to these materials. It is good to ensure that the material meets all the specifications in every respect. It means that all relevant properties must be checked and checked before used as construction materials. Other benefits are low energy requirement; to produce laterite block or brick is only 5 (kWh)/cubic meter, while it is about 1000 (kWh)/ cubic meter for fired brick and 400 to 500 (kWh)/cubic meter for concrete block (Adamson, 2010). Laterite buildings are recyclable in many forms without pollution, using laterite for such environmental building will be an active component in the future of humankind.



Significant Factors for Laterite Utilization as Sustainable Building Materials	Categorical Mean ( $\bar{x}$ )
Economic factors	4.25
Environmental	4.24

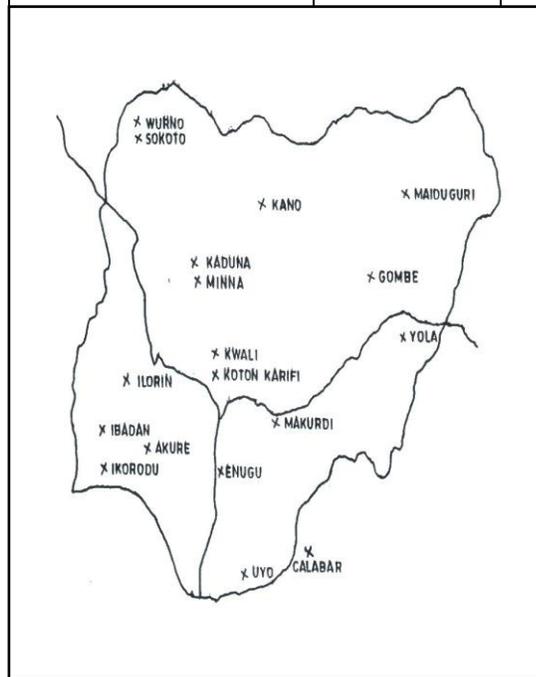


Fig 1; Laterites Areas in Nigeria

Fig2: Historical Gobarau Minaret Built with Laterite Over 1000 years

**RESEARCH FINDINGS**

The findings are base on the Likert scale statistics that any mean below 3.0 of the Likert scale is considered as *not significant* and mean above 3.0 to 4.5 is adopted as *significant*, while 4.5 to 5.0 is considered for this analysis as *highly significant*. Therefore, the majority of the respondents indicate *highly agree* on factors affecting utilization of laterite as sustainable building materials and *agree* for improving factors for laterite as the sustainable material as shown in table 2 below.

Factors of Laterite as a	Categorical
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Table1:Identified

<b>Solution to High cost of Building Projects</b>	<b>Mean (x)</b>
Economic Aspects	4.25
Environmental Aspects	4.24
Social Aspects	4.01
Mean average	<b>4.17</b>

Sustainable Factors

## DISCUSSION

This research identified elements to be used for improving the utilization of laterite as a solution to high cost of building materials in the construction industry; this is due to the high cost of building projects in the building industry.

The primary objectives were achieved by identifying social, economic and environmental elements which can provide a platform for researchers and students to seek further knowledge, comments and suggestions towards the improvement of these findings, to contribute knowledge in the field of postgraduate researchers and social sciences these will provide more opportunities to academicians and graduate students in their research work.

The contributions of this research have explored the previous contributions from researchers and established social economic and environmental elements to be used for improving utilization of laterite as a sustainable solution to the high cost of building projects in the construction industry.

## CONCLUSION

In conclusion, the aim of this research has been achieved by identifying the social, economic and environmental factors for improving utilization of laterite as building materials in the construction industry. Also, the findings established significant factors for sustainability of laterite as sustainable construction material. It also established **high significant factor** of laterite as sustainable building materials in the construction industry.

## RECOMMENDATIONS

This study has explored the economic, social and environmental elements for improving the utilization of laterite as a solution to the high cost of building projects in the construction industry. Other researchers can build on these findings, the recommendations are:

### Recommendations for Researchers

- Further research, this will contribute to social, economic and environmental aspects in the construction industry.



- Further identification of the factors against the utilization of literate, the findings can assist in the improvement in the use of these building materials in the construction industry.
- Further benefits can be gained from more utilization of literate in the building industry.
- More investigation on the benefits of literate has over other building materials.

### **Recommendations for Industry Practitioners**

These recommendations are the concerned to industry practitioners, to implement the findings.

- The initial aim of this paper is exploring issues with literate utilization; it further explored the social, economic, and environmental potential benefits to be gained from using literate in the construction industry.
- The established elements will bring changes to the issues affecting utilization of literate in the construction industry.
- Governments, Stakeholders, Non-Governmental Organizations, should design a programme that will improve utilization of literate particularly in rural and urban areas in developing countries.

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