ENVIRONMENTAL SUSTAINABILITY: LATERITE SOLUTION TO HIGH COST OF BUILDING PROJECTS IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

The objectives of this paper is to identify the social, economic and environmental factors affecting the sustainability of laterite as a solution to cost of projects in the construction industry. Building materials are considered the largest input in any project thus, has a great influence on the total cost of any projects. High cost of projects in developing countries led to a call for incorporating laterite in most past and present projects. The research is aimed to identify environmental, economic and social elements for effective utilization of laterite as reveled that economic factors has the highest significant as sustainable building materials in the construction solution to high cost of building projects in the construction industry. The research was carried out in suitable civil and building construction companies in Katsina, Kano and Kaduna states in Northern Nigeria. The research findings industry.

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

1. 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 categorized as sustainable construction materials. Nigeria one of the laterite producing country, but not effectively utilized. Fig.1 shows some states in Nigeria where laterite materials are abundant. One of the disadvantages of these materials is lack of standards that leads to non acceptability making the materials as second class or inferior materials. Laterite is most efficiently used in developing countries to house greatest 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 developed countries (Lemougna *et al.*, 2011). Different types of literate 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 1. 2. 3 to 28]. Figure 1 presents' historic building made of laterite in Northern Nigeria.

2. Literates as Sustainable Building Materials

Laterite, known as 'green' or environmental friendly construction materials can easily be re-cycled, have low energy consumption and toxicity in production and applications. Building professionals have the responsibility to ensure that laterite used is environmentally friendly and sustainable. This is part of 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, 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 construction industry, are successfully used as sustainable construction materials in various aspects of civil and building construction projects. The material is also employed 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 economically effective, easy to work, mostly abundant universal and 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.

Fig 1; Historical Gobarau Minerate Built with Laterite Over 1000 years

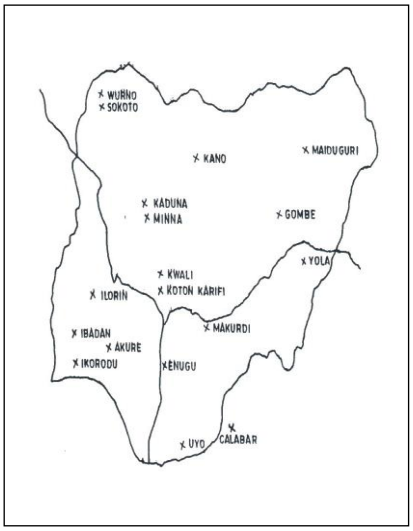

Fig 2; Laterite Areas in Nigeria

The benefits of having laterite as building materials in tropical 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 colour additives to these materials. It is important to ensure that the materials meet all the specifications in every respect. This means that all relevant properties must be checked and certified properly before used as construction materials. Other benefits is low energy requirement; to produce literate 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).Literate buildings are completely recyclable in many forms without environmental pollution, using laterite for such environmental buildings will be a strong component in the future of humankind.

Significant Factors for Laterite Utilization as Sustainable Building Materials	**Categorical Mean (x)**
Economic factors	4.25
Environmental factors	4.24
Social factors	4. 01
Mean average	**4.17**

Significant Factors: Economic, Environmental and Social Factor

3. 0 Research Findings

The findings are based 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 considered as ***significant***, whilst **4.5** to **5.0** is considered for this analysis as ***highly significant***. Therefore, the majority of the respondents indicate ***highly significant*** on factors affecting utilization of literate as sustainable building materials and ***agree*** for improving factors for laterite as sustainable building material as shown in table 2 below.

3.1 Discussion

The objectives of this research is to provide a platform for the researchers and students to seek further opinions, comments and suggestions towards the improvement of the conducted research, to contribute knowledge in the field of postgraduate research and social sciences and to provide wider opportunities to academicians and post graduate students to interact and create networking.

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3.2 Conclusion

In conclusion this research has identified the factors for improving utilization of laterite as building materials in the construction industry, also the research findings established significant factors for sustainability of laterite as sustainable construction material. It also established ***high significant factor*** of laterite sustainability as sustainable construction materials in the construction industry.

4. Conclusion, Limitations and Recommendations

The International Conference on Postgraduate Research 2015 (ICPR2015) offers researchers not only postgraduate students but also researchers who are interested to present papers on the system, curriculum and management of postgraduate school. This conference basically focuses on the area of postgraduate development and social sciences realizing the demand on this field and to explore the global issues.

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