

## **Knowledge as a Determinant of Acceptability of Compressed Stabilized Laterite Bricks for Affordable Housing in Nigeria.**

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### **Abstract**

Widening gap in housing need and housing supply to the populace has led to an apparent housing crisis in Nigerian urban centres. Various studies concluded that an acquisition of indigenous building materials is the way out of the housing crisis. The National Housing Policy in Nigeria has recognized earth in form of Compressed Stabilized Laterite Bricks (CSLBs) as one of the abundant indigenous building materials that can ease the housing supply crisis. Despite the call for acquisition of CSLBs in housing provision, the urban populace have not embraced its use as an acceptable building material for housing. This paper conducted a survey of randomly selected members of the urban populace in Ota, Ogun State, Nigeria. It was found out that the root cause of the apathy towards acceptability of CSLBs for housing is due to lack of knowledge about its physical properties. Lack of prototype CSLBs buildings in the urban landscape in addition to other socio-cultural factors were also identified as contributing factors. The paper concluded that the key to the acceptability of CSLBs as a building material for affordable housing by the urban populace lie with adequate public enlightenment through media campaigns and prototype buildings.

### **1. Introduction**

The importance of housing as a basic need for human existence cannot be overemphasized. The aspiration for home ownership is a phenomenon that is as old as the history of man himself. There is a broad consensus that housing has a central importance to everyone's quality of life and health with considerable economic, social, cultural and personal significance [1]. Housing is also seen as one of the best indicators of a person's standard of living and of his or her place in society [2]. By extension, [3] is of the view that housing and building conditions also reflect the living standards of a society. In the Nigerian context, housing transcends the border of the views as captured in its various definitions, but more of a worthy legacy that individuals aspire to own and bequeath to their successors.

In spite of this essential role of housing as a basic need, it has been observed that virtually all societies throughout history are experiencing inadequate supply of this commodity. The situation is particularly serious in the developing countries where population growth and urbanization are increasing very rapidly and where the gap between housing need and supply is greatest [2]. These two predominant factors are largely responsible for the imbalance experienced in the provision of adequate and

affordable housing for the Nigerian populace. Other salient factors responsible for housing shortages in Nigeria include but not limited to loss of interest in building with the traditional building materials which had hitherto being used mostly by rural dwellers to solve their housing problems, unprecedented rural-urban migration and the latest concept of urbanization of poverty.

In the preface of [4], it was observed that the dual problems of urban poverty and inadequate human settlements conditions in developing countries constitute two of the most fundamental challenges to politicians and policy-makers throughout the world. Nigeria is the 6<sup>th</sup> largest producer of crude oil in the elite league known as OPEC, whose members account for over two-third of the world's total supply of this commodity and the largest and potentially the richest country in Africa [5 & 6]. A cursory look at the present state of the housing provision in Nigeria tells a glowing tale of a huge paradox – a paradox of achieving so little with so much endowment. This was seen as an indictment of the government that ought to provide the lead [6]. It is not surprising then that Nigeria had been described as a rich country with the poorest population and most deprived in OPEC (7). Reports have it that a high percentage of Nigerians are living well below the universal poverty line of US \$1 per day. While the World Bank in 1996 estimated that 66 per cent of Nigerians were living in poverty, the Central Bank of Nigeria in 1997 reported that 69.2 per cent of the population were poor [7]. Therefore, it is not surprising that in many of Nigeria's urban neighbourhoods, adequate housing characterized by security, peace and dignity has clearly become a very scarce commodity [8].

Previous interventions by successive governments towards direct housing provision for the low-income group through various mass housing schemes have not yielded any positive result. This situation is manifested in unorganized housing generically referred to as slum and informal housing areas characteristics of many large third world cities [9]. The United Nations in 1988 adopted the enabling shelter strategies in its global response to the daunting challenge of provision of adequate shelter for all which was articulated in the Global Strategy for Shelter to the Year 2000 (GSS) and the Habitat Agenda. This came as the most pragmatic response to the growing urban housing challenges in developing countries.

Subsequently, the Nigerian government launched the first National Housing Policy (NHP) in 1991 with the ultimate goal of ensuring that all Nigerians own or have access to decent housing accommodation at affordable cost by the year 2000. Encouraging research into and promoting the use of locally-produced building materials as a means of reducing housing costs was one of the strategies highlighted to accomplish the objectives of the NHP. Compressed Stabilized Laterite Bricks (CSLBs) is a derivative from lateritic soil which is abundantly available in Nigeria. It is believed to be a cheaper and viable alternative to the widely used sandcrete blocks. However, it was observed that there is apathy towards its use by the populace. This factor in conjunction with others highlighted earlier have acted together to compound the housing problems in Nigeria.

## **2. Housing situation in Nigeria**

Nigeria has a landmass of 923,768 square kilometres with a population of 140,003,542 according to the report of the 2005 National Population Census. The average population density according to [10] is approximately 124 persons per square kilometre, making Nigeria one of the most densely populated countries in the world.

Provision of adequate and affordable housing for this figure is a daunting challenge which has made housing an issue of national importance. It has been established that the poverty level of most Nigerians made it difficult for them to own houses [11]. Various calls have been made on successive governments in Nigeria to give greater priority to the inherent housing problems. Relatively little continues to be done in improving housing supply in comparison with overall needs [2]. Thus, housing remains one of Nigeria's most intractable problems; one which is continually getting worse as the rapid population growth and consequent urbanization goes on unabated in spite of the seemingly huge assets allocated to this sector.

There is dearth of available statistics in Nigeria as regards to quantitative housing needs and housing supplied. Nigeria relies mostly on international organizations to obtain statistics needed for ameliorating her housing situations. Few statistics available paint a gloomy picture of the housing situation in Nigeria. Between 1975 and 1980, there was a plan to deliver 202,000 housing units to the public but only 28,500 units, representing 14.1% was achieved. Also, out of 200,000 housing units planned to be delivered between 1981 and 1985, only 47,200 representing 23.6% was constructed [12]. In the National Rolling Plan of 1990 - 92, government promised to increase housing supply from 4.8 million to 5.9 million by 2000. The 1991 housing policy estimated that 700,000 housing units are to be built annually if housing deficit is to be cancelled. In summary, it was stated that between 1973 and 2006, the Federal Housing Authority (FHA) built only 30,000 housing units nationwide [13]. The FHA estimated that it constructed a total of about 10,000 new housing units annually. Furthermore, to meet ever-growing demand, the country needs ten times more or at least 100,000 new housing units annually [14]. The current housing deficit is thus estimated at between 12 million and 16 million homes [15].

### **3. Advantages of CSLBs in ameliorating the housing challenge**

The term 'Laterite', according to [16] is derived from the Latin word '*later*' meaning brick. It was first used by Buchanan in 1807 for describing a red iron-rich material found in southern parts of India. Laterites are highly weathered soils, which contain large, though extremely variable, proportions of iron and aluminum oxides, as well as quartz and other minerals. They are found in abundance in the tropics and subtropics, where they generally occur just below the surface of grasslands or forest clearings in regions with high rainfall. The soil colour can vary from red, brown, and violet to black, depending on the concentration of iron oxides.

The term "Compressed Stabilized Laterite Bricks" (CSLBs) is used in this study as a generic name to cover a wide range of derivative building materials from laterite/soil/earth in which a stabilizer or soil additive has been added to alter the properties of the soil and to improve its engineering properties including compaction, density, bearing strength and safety (i.e. – fire). The addition of a stabilizer differentiates it particularly from compressed earth bricks (CEBs) and from other traditional earth building technologies – whether moulded into a brick or compressed in machines.

CSLB is a block unit formed from a loose, damp mixture of soil, cement and water, which is then compacted mechanically to form a hydrated block that is characterized by higher compressive strength, and improved durability as compared to a soil block produced in similar manner without the addition of cement. CSLB is a product of scientific research. It is a scientific improvement upon the traditional earth building techniques. CSLBs are formed by compressing laterite in a steel press which makes them come out in very regular shape and size, and much denser.

The major difference between CSLBs and the widely used sandcrete block is that while the former is a mixture of the laterite (soil) with cement, the latter is a mixture of sand and cement. According to [17], the term “soil-cement” and sandcrete have very different images in the public mind in developing countries, and they are of the opinion that there is no clear boundary between them. Furthermore, they opined that the production process between soil and sand cement being the same, there is no practical reason to discriminate between them in terms of use and application.

Two factors responsible for the revival of interest in laterite (CSLBs) buildings were identified by [18]. The first is the desire for a more humane environment while the second is the ecological advantage of laterite buildings in reducing the accelerating rise in energy cost. The revival is predominant in Africa, the Middle East and nearly the whole of Latin America. It has also gained wide acceptance in Australia, New Zealand, and South Western parts of USA, particularly in New Mexico, Arizona and Southern California. While there is a revival leading to the acceptance of CSLBs for adequate and affordable housing construction in some developed countries, the reverse is the case in most developing countries of Africa. As shown in Table 1, the main socio-cultural limitation against use of CSLBs is low acceptability amongst most social groups who considered it to be a second-class and generally inferior building material [16]. On account of this problem, earth as a building material lacks institutional acceptability in most countries and as a result building codes and performance standards have not been fully developed. A study conducted amongst in the urban town of Ota, Ogun State, Nigeria revealed that lack of knowledge about the physical properties of CSLBs is one of the major factors that militate against its acceptance.

**Table 1: Advantages and Limitations of CSLBs**

Advantages	Limitations
<ul style="list-style-type: none"> <li>• Soil is available in large quantities in most regions.</li> <li>• Cheap and affordable - in most parts of the world soil is easily accessible to low-income groups.</li> <li>• Ease of use - usually no very specialized equipment is required.</li> <li>• Suitable as a construction material for most parts of the building.</li> <li>• Fire resistant - non-combustible with excellent fire resistance properties.</li> <li>• Beneficial climatic performance due to its high thermal capacity, low thermal conductivity and porosity.</li> <li>• Low energy input in processing and handling soil - only about 1% of the energy required to manufacture and process the same volume of cement concrete.</li> <li>• Environmental appropriateness</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced durability - if not regularly maintained and properly protected, particularly in areas affected by medium to high rainfall.</li> <li>• Low tensile strength – poor resistance to bending moments, to be used only in compression e.g. bearing walls, domes and vaults.</li> <li>• Low resistance to abrasion and impact - if not sufficiently reinforced or protected.</li> <li>• Low acceptability amongst most social groups - considered by many to be a second-class and generally inferior building material.</li> <li>• On account of these problems - earth as a building material lacks institutional acceptability in most countries and as a result building codes and performance standards have not been fully developed.</li> </ul>

Source: [16]

#### 4. Assessment of impact of knowledge of CSLBs on its acceptability

Knowledge is a general awareness or possession of information, facts, ideas, truths, or principles about something [19]. This study posed a presupposition which states that an adequate knowledge of the potentials of CSLBs is prerequisite to its acceptability and usage for building construction by the populace. Adequate knowledge covers aspects such as an understanding of its potentials in terms of durability, cost implications, aesthetics and other physical properties that influence the choice of a walling material.

##### 4.1 Materials and methods

The study was conducted in Ota, the capital of Ado-Odo/Ota local government area (LGA) in Ogun State. It is the third largest LGA in the state with a land area of 1,460 square kilometers. It is the most industrialized LGA in Ogun State. The LGA is bounded by Lagos State in the south. It has a population of 267,497 according to the 1996 projection (Ogun State official website) the population has continued to experience a progression in its growth due to its proximity to Lagos State. Lagos State has a population of 17 million on a land mass of 356,861 hectares of which 75,755 hectares are wetlands yet it has the highest population which is over five per cent of the national estimate. It is projected that it will be the third largest mega-city in the world by year 2015. The consequence of this is that there is a large urban-urban drift from the over-populated Lagos to Ota and its environs leading to need for more housing supply. A field survey was conducted as the source of primary data. The instrument of research was the structured questionnaire. The study population consisted of household heads among the populace. A total of 650 questionnaires were administered on randomly selected respondents. 551 questionnaires were validly returned. The data were analyzed using descriptive and inferential analysis.

##### 4.2 Results and findings

A survey of participants on whether adequate knowledge of CSLBs can lead to its acceptance revealed the data shown graphically in Fig. 1. The data showed that 178 respondents (32.3%) 'strongly agree' while 281 respondents (51.0%) 'agree' with the notion. On the other hand, 9 respondents (1.6%) 'strongly disagree' while 28 respondents (5.1%) 'disagree'. 48 respondents (8.7%) were undecided while 7 participants did not represent their views.

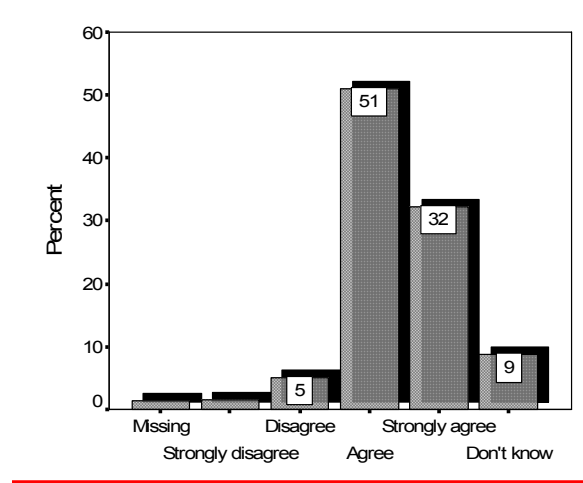


Figure 1: Bar chart showing whether knowledge of CSLBs will lead to its acceptance

In summary, this study revealed that 459 (83.3%) respondents opined that if they have an adequate knowledge about CSLBs, they will accept and use it for housing construction. However, 37 of the respondents (6.7%) were of the view that adequate knowledge of CSLBs has nothing to do with its acceptability. The deduction from this study is that adequate knowledge of the properties of a building material is a precursor to its acceptance and usage in building construction.

## 5. Conclusion

The paper concluded that housing situation crisis in Nigeria particularly for the urban poor needed to be confronted frontally. The negative notion that made the urban populace consider CSLBs to be a second-class and generally inferior building material also has to be addressed. Lack of adequate knowledge about CSLBs is a contributory factor to its non-acceptability. The paper concluded that the acceptability of CSLBs as a building material for adequate and affordable housing by the urban populace lie with adequate public enlightenment through continuous education, workshops and seminars, media campaigns and prototype buildings. The secret of increasing housing stock for the Nigerian urban populace may lie in the acceptability of CSLBs for housing construction not only by the urban poor, but by every stakeholder in the building industry.

## References

- [1] Erguden, S. Low-cost housing: policies and constraints in developing countries. *Proceedings of the International Conference on Spatial Information for Sustainable Development*, Nairobi, Kenya. 2 – 5 October, 2001.
- [2] UNCHS. *National Trends in Housing Production Practices Volume 4: Nigeria*. Nairobi, Kenya 1993.
- [3] Venkatarama Reddy, B.V. Sustainable building Technologies. *Current Science*. Vol. 87/7 (2004).
- [4] UNCHS. *An Urbanizing World Global Report on Human Settlements 1996*. Oxford University Press, Oxford 1996.
- [5] Nwaka, G. I. The urban poor, the informal city and environmental health policy in Nigeria. *Proceedings of the 12<sup>th</sup> International Interdisciplinary Conference on the Environment in Kona, Hawaii*. 22-24 June, 2006.
- [6] Ajanlekoko, J. S. Sustainable housing development in Nigeria – the financial and infrastructural implication. *Proceedings of the International Conference on Spatial Information for Sustainable Development, Nairobi, Kenya*, 2 – 5 October, 2001.
- [7] Ali-Akpajiak, S. C. A. and Pyke, T. *Measuring poverty in Nigeria*. [http://www.oxfam.org.uk/what\\_we\\_do/resources/downloads/wp\\_nigeria](http://www.oxfam.org.uk/what_we_do/resources/downloads/wp_nigeria) (10/03/2006).
- [8] COHRE. *Housing Rights in West Africa: Report of Four Fact-Finding Missions – A Draft Report, for Consultation, Discussion and Networking Purposes*. Centre on Housing Rights and Evictions (COHRE), February, 2004.

- [9] Olayiwola, L.M., Adeleye O. and Ogunsakin L. Urban housing crisis & responses in Nigeria: the planner's view point. *Proceedings of XXXIII IAHS World Congress on Housing*, Pretoria, South Africa 27 – 30 September, 2005.
- [10] UNDP *Human Development Report*. Oxford University Press, Oxford 1999.
- [11] Daramola, S.A., Alagbe, O.A., Aduwo, B. and Ogbiye, S. A. Public-private partnership and housing delivery in Nigeria. *Proceedings of African Union of Architects Congress*, Abuja, Nigeria. 23 – 28 May, 2005.
- [12] Ademiluyi, I.A. and Raji, B.A. Public and private Developers as Agents in Urban Housing Delivery in Sub-Saharan African: the Situation in Lagos State. *Humanity and Social Sciences Journal* Vol. 3/2 (2008).
- [13] Akeju, A. A. Challenges to providing affordable housing in Nigeria. *Proceedings of 2nd Emerging Urban Africa International Conference on Housing Finance in Nigeria*, Abuja, Nigeria. 17-19 October, 2007.
- [14] Adejumo, A. *Some thoughts on affordable and social housing in Nigeria* <http://www.nigeriavillagesquare.com> (13/01/2009).
- [15] Peterside, C. S. *Ameliorating housing deficit in Nigeria: the role of primary and secondary mortgage institutions and the capital market*. <http://www.nigeriaworld.com> (10/04/2007).
- [16] Adam, E. A. and Agib, A. R. A. *Compressed Stabilized Earth Block Manufacture in Sudan*. Paris: UNESCO, 2001.
- [17] Gooding, D. E. and Thomas, T. H. The Potential of cement-stabilised Building Blocks as an Urban Building Material in Developing Countries. DTU Working Paper No.44, 1995.
- [18] Arayela, O. Developing appropriate housing construction technology for medium and low-income earners in Africa: focus on Nigeria. *Proceedings of African Union of Architects Congress*, Abuja, Nigeria. 23 – 28 May, 2005.
- [19] Microsoft Encarta, Microsoft Incorporated 2007.