

# *Evaluation of Promotion of Compressed Stabilized Laterite Bricks in Predicting Its Acceptability for Housing Construction*

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## **Abstract**

Compressed Stabilized Laterite Bricks (CSLBs) has been canvassed as a viable alternative to sandcrete blocks due to its affordability and sustainability. However, it has not been widely accepted and used for housing construction as a result of certain inhibitors based on peoples' perception. This paper examined the correlation between promotions (one of the inhibitors) of CSLBs in the prediction of its acceptability by the urban populace in Lagos State, Nigeria. Ibeju-Lekki Local Government Area was purposively selected for this study. Structured questionnaires were used to collect data from 180 randomly selected respondents out of which 139 questionnaires were validly completed. Data collected were analysed using descriptive and inferential statistics models. Results of the analysis revealed that adequate promotions of CSLBs will significantly ( $P \leq 0.05$ ) influence its acceptability by the urban populace. In addition, low cost implication and high aspiration for home ownership were identified as other factors that significantly affected acceptability of CSLBs. It is recommended that public awareness campaign and education by government and stakeholders in the building industry is the key to acceptability of CSLBs for housing construction.

**Keywords:** Acceptability, Compressed Stabilized Laterite Bricks, housing, inhibitors, Nigeria

## **1.0 Introduction**

The significance of housing to human existence cannot be over-emphasized. Apart from being one of the basic needs of human existence in addition to food and clothing, human also place value attachments to housing beyond just mere shelter. The value attachment to housing varies between and among individuals, cultures, and regions as indicated by several studies on housing. Firstly, housing is seen as a measure of a country's welfare in addition to being an indicator of the social well-being of its citizenry. In this light, Adedokun, Akinradewo, Adegoke and Abiola-Falemu (2011) held forth that the housing sector plays a more critical role in a country's welfare as it affects not only the well-being of the citizenry, but also the performance of other sectors of the economy. Housing is also an important tool in economic development. Adeniyi (1985) supported this view submitting that it is a measure of the standard of living and level of development of a nation. Likewise, some individuals or households opined that housing is a consumable good which impacts on factors of productivity such as health, sanitation, security, privacy, neighbourhood and community relations (Erguden, 2001; Gichunge, 2001; UN-Habitat, 1993; Pynoos, Schafer and Hartman, 1973). Furthermore, housing also has a socio-cultural significance as opined by Ademiluyi (2010) who recognized housing as one of the greatly cherished material properties in the traditional African setting. This view was supported by Alagbe (2010) who identified that Nigerians place high premium on home ownership because it is a legacy that individuals aspire to bequeath. Consequently, people cannot be separated from their housing developments making housing to be an important aspect of mankind.

This paper investigated the correlation between promotions of Compressed Stabilized Laterite Bricks (CSLBs) as walling material by stakeholders in the building sector in predicting its acceptability for affordable housing construction by the urban populace. The study was motivated by the importance that housing plays in human existence and more significantly because of the deficit and near crisis situation that is being experienced in the housing supply chain particularly for the urban populace in Nigerian cities. While the paper observed recent advocacy for acquisition of indigenous building materials (IBMs) to ameliorate the housing crisis, acceptability of IBMs is an important issue that is yet to be addressed. Researchers have identified some inhibitors responsible for non-acceptance of IBMs. This study examined CSLBs as one of the IBMs and assessed promotion (awareness campaign) as an inhibitor that may aid in predicting the acceptability of CSLBs as a walling material for affordable housing construction.

## **2.0 Current housing statistics in Nigeria**

In spite of the importance of housing to human existence, adequate supply of this commodity has been observed to be lacking in virtually all societies throughout history (UN-Habitat, 1993). The intractable housing problems in Nigeria has generated much discuss and interest in the past three decades which gave rise to calls on governments at various levels to give greater priority to the inherent housing problems. Studies have attempted to enumerate the qualitative and quantitative housing challenges in Nigeria. Current housing statistics in Nigeria as presented by Alithea Capital (2012) revealed that there are 10.7 million houses in Nigeria, 90 per cent of these are self-built, with little or no mortgage attachment, and 5 per cent have formal title to property. This implies that a highly significant proportion of housing development in Nigeria is done by individuals without financial support from any financial institution, and perhaps without any oversight supervision by approved authorities. This suggests that the houses may not meet qualitative standards leading to growth of undesirable urban developments. This view is supported by Olokesusi and Okunfulure (2000) who identified that housing condition, especially those portrayed by the availability and efficiency of facilities and utilities have been worsening since 1980.

Housing deficit in Nigeria is estimated at 14 million units (Alithea Capital, 2012). It noted that to bridge the Nigerian housing gap, it will cost N49 trillion (\$326 billion) at an assumed cost of N3.5million per unit. Despite the fact that most housing developments in Nigeria are self-built, the report revealed that home ownership in Nigeria is low. 85 per cent of the urban population live in rented housing, spending 40 per cent of their income on shelter. Ogunsemi and Abiola-Falemu (2006) affirmed that about 70 per cent of the Nigerian population are very poor coupled with the fact that some 40 per cent of the country's population spends about 35 per cent of their income on rent, which is about 16 per cent higher than the 20 per cent recommended by the United Nation. The built environment is dominated by informal housing as 80 per cent of the urban population live in dense settlements with poor infrastructure (Alithea Capital, 2012). Existing formal supply the report says is targeted at the high income earners priced well above over 92 per cent of the population, contributing no more than 12 per cent of demand.

### **3.0 Theoretical framework**

To ameliorate the current housing crisis in Nigeria, there is a need to look inward for acquisition of appropriate IBMs and construction techniques. This is important because the rising cost of building materials has made it impossible to provide affordable housing for the low-income urban residents (Oruwari, Jev and Owei, 2002). It must be noted that housing construction in Africa is largely dependent on imported building materials which contributes significantly to the high cost of housing delivery due to high exchange rates. Oruwari et al (2002) reported that in Africa and Nigeria in particular, there is a need to reduce the import-dependence of the housing sector and at the same time contain the escalating cost of essential building materials. Therefore, they advocated for an acquisition and strengthening of domestic technological capacity to produce IBMs as a solution to reduce the escalating cost of the essential building materials. Their argument rested on the premise that Nigeria is endowed with the required raw materials needed for production. UN-Habitat (1993) also identified that building materials and components constitute 50 – 60 per cent of the total cost of construction inputs in Nigeria. In the same vein, Madedor and Omange (1985) pointed out the need to reduce the cost of walling materials since such constitute a fair percentage of the total building cost. Arising from the argument that wall constitutes a fair percentage of the total building cost, this study focused on CSLBs as an affordable and indigenous walling material.

CSLB is a product derived from earth (mud). Earth is the most basic, and the most ubiquitous, building material known to man (Walker and McGregor, 1996). It has been suggested that at least 50% of the world's population still live in earth houses (Easton, 1996). However, Sojkowski (2002) identified that potential use of 'earth' to build dwellings is hampered by a widespread socio-cultural perception that modern building techniques and materials are substantially better than traditional ones. He noted that earth materials and techniques are perceived as 'substandard' or 'second class', while modern construction methods and materials are seen as 'civilised' or 'symbols of affluence'. Conversely, CSLBs is a product of scientific research and have significant advantages which addresses most of the inhibiting perceptions associated with traditional earth building technique. The advantages include but not limited to higher compressive strength, improved durability and strength, reduction of ingress of moisture into the block, cheap and affordable, fire resistant, low energy input in processing and handling, environmental appropriateness, regular shape and size as shown by researchers such as Adam and Agib, 2001; Montgomery, 1998; Norton, 1997; Houben and Guillaud, 1989; Bush, 1984. However, a comprehensive literature reviewed by Zami (2011) identified a number of inhibitors responsible for low acceptability of CSLBs. He noted that inhibitors identified were mostly based on perceptions of the researchers because they lack empirical data and validation through a research methodological process.

Summary of literature reviewed in this study revealed that: there is a shortfall in housing supply in Nigerian urban centres which is almost leading to a housing crisis; dependence on imported building materials at the expense of readily available IBMs is a clog in the wheel of housing supply; there is a need to acquire and strengthen domestic technological capacity to produce IBMs; despite the preponderance of arguments that acquisition of CSLBs will make housing affordable, some identified inhibitors limit its acceptability; the identified inhibitors were mostly subject of researchers perceptions rather than of empirical validation through research methodological process. This paper therefore quantifiably assessed the correlation between stakeholders promotion of CSLBs in predicting its acceptability as a walling material by the urban populace. The null hypothesis tested is that there is no significant difference between stakeholders promotion of CSLBs in prediction of its acceptability for housing in a typical Nigerian urban center. It is expected that the result of this study will aid in developing a policy direction that will enhance the acceptability of CSLBs as a walling material and subsequently improve housing delivery among the urban populace.

#### **4.0 Methodology**

##### **4.1 Study area**

The study was carried out in Ibeju-Lekki Local Government Area (LGA) in the Epe Division of Lagos State, Nigeria. The administrative seat was formerly at Akodo but now in Igando-Oloja due to the recent creation of Lekki Local Council Development Area (LCDA). This change aided the rapid development of the LGA as compared to when it was treated as a backwater suburb of the Epe Division. The National Population Commission census result of 1991 estimated the population of Ibeju at approximately 24,000. However, statistics and enumeration conducted recently by Lagos State government estimated the population of the LGA at approximately 54,000. Ibeju-Lekki LGA has a land area of about 646 square kilometres which equals one quarter of the total land mass of Lagos State – the commercial capital of Nigeria. Hence, it is regarded as the fastest growing LGA in Africa and the future of Lagos State (Ibeju-Lekki Official website). These characteristics make it appropriate for this study.

Despite the rapid urbanization of the LGA, Ibeju-Lekki Official website reported that not much has been accomplished in the area of housing. The LGA have a few housing infrastructure developments awaiting implementations in the area. However, private estates such as Eko Akete Estate (proposed to contain over 6,000 housing units when completed), Beechwood Estate amongst others are springing up under the auspices of private developers. Housing development comprising of residential estates in different parts of the LGA necessitated springing up of block (sandcrete blocks) making factories. The preference of sandcrete blocks for walling despite the abundance of earth (Ibeju-Lekki Official website) which is the raw material for CSLBs was the thrust of this study. Although many inhibitors had been identified (Zami, 2011) as factors militating against acceptability of CSLBs, this study investigated the aspect of inadequate stakeholders promotion of CSLBs for housing construction. The study assumed that information about a building material is best disseminated through prototype construction which is easily facilitated by stakeholders (public-private) in the building sector. This is because they are the biggest participants in the building construction industry. Therefore, this study assessed the role of stakeholders' promotion of CSLBs in predicting its acceptability for housing construction by the urban populace.

##### **4.2 Data collection**

The study area was purposively selected due to its characteristics as a budding LGA in the Lagos metropolis as discussed earlier. Data was collected through use of structured questionnaires administered on one hundred and eighty randomly selected respondents within the vicinity of the

LGA. The respondents were briefed on the objective of the study and confirmation gotten of their knowledge of the walling material being studied through use of pictures of completed CSLBs buildings. The questionnaire collected information on the socio-economic status of the respondents, importance they attached to home ownership and their perception of public-private partnership promotion of CSLBs in predicting its acceptability as a walling material. A pretesting of the questionnaire was undertaken in similar neighborhoods before actual data collection took place. Pretest result showed that some randomly selected respondents do not have any idea about CSLBs, yet they completed the questionnaire. Modifications were made by attaching pictures of prototype buildings and by ensuring that only respondents who showed evidence of knowledge of the walling material were selected and administered the questionnaire. Questionnaires returned were validated and 139 (representing 77% response rate) found to be properly completed were used for data analysis.

### **4.3 Data analysis**

Statistical Package for the Social Sciences (SPSS) software was used to analyze data generated using three main statistical methods. Descriptive statistics using frequency counts and percentages were used to analyze the socio-economic characteristics of the respondents and the importance they attached to home ownership. Six items identified in this category were namely highest educational level, average monthly income, preference ranking of basic human needs, home ownership as a legacy, income status as a function of duration of home ownership and CSLB is inadequately promoted. Secondly, individual mean satisfaction scores were computed for all the 139 respondents to determine strength of influence of each item. Finally, a standard multiple regression analysis was used to explore the relationship between promotion of CSLBs by stakeholders and the other identified socio-economic variables in predicting its acceptability.

## **5.0 Results and Discussions**

### **5.1 Socio-economic characteristics of respondents and importance attached to housing:**

The socio-economic characteristics of respondents and importance they attached to housing is shown in Table 1. Majority of respondents (83.5%) have tertiary education. Monthly income distribution of respondents is concentrated around the middle and high income level with 39.6% and 41.0% respectively while 19.4% are low income earners. This suggests that income status is largely a function of educational background. Result also revealed that majority of respondents (87.1%) agreed that home ownership is a legacy while 11.5% think otherwise. This supports the view of Ozo (1990) who established that the aspiration to own a house constitutes one of the strongest incentives for savings and capital formation in Nigeria. This study further affirms that the importance that Nigerians attached to home ownership transcends issue of just shelter provision but more of a legacy that every individual strive to bequeath. It implies that majority of Nigerians attach premium importance to home ownership and will thus aspire to have one. This aspiration perhaps explain why 9.6 million (90%) of the 10.7 million houses in Nigeria were self-built, with little or no mortgage attachment (Alitheia Capital, 2012).

Respondents were asked to rank the following basic needs in order of importance: housing, health and education. Results revealed that education has the highest mean score of 2.42, followed by housing and health with mean scores of 2.35 and 1.33 respectively. This contradicts findings by Adisa, Agunbiade and Akanmu (2008) study on well-being indices preference among retirees where good health has the highest mean score of 3.69, followed by personal house and sufficient rest/leisure period with mean scores of 3.12 and 3.10 respectively. This is expected because of the nature of respondents who are retirees. The nature of their age will make good health to be a priority to them. However, the authors observed that results from focus group discussions ranked personal

house a major determinant of one's well-being closely followed by good health. It can be concluded that the aspiration for home ownership is a legacy for individuals in the Nigeria context. The need to satisfy this aspiration calls for acquisition of affordable and sustainable IBMs to reduce cost of housing construction thereby improving rate of housing delivery. Individual mean score shows that home ownership has the highest – 3.32 which further confirms the importance that respondents attach to home ownership.

**Table 1: Respondents' socio-economic characteristics and importance attached to housing**

Variables	Frequency N = 139	Percentage	Mean Score
Highest education level			2.66
No response	6	4.3	
Below tertiary	17	12.2	
Tertiary	116	83.5	
Average monthly income (naira)			2.85
No response	0	0.0	
Below 45 000 (low income)	27	19.4	
46 000 – 100 000 (middle income)	55	39.6	
101 and above (high income)	57	41.0	
Preference ranking			
Education	139		2.42
Housing	139		2.35
Health	139		1.33
Home ownership is a legacy			3.32
No response	2	1.4	
Yes	121	87.1	
No	16	11.5	
Income status and home ownership duration (years)			2.66
Less than 1	13	9.4	
1 – 3	47	33.8	
4 – 6	51	36.7	
7 and above	26	18.7	
CSLB is inadequately promoted	137		3.68

The study sought to know from the respondents the duration to build a typical three bedroom home based on their current monthly income. The result revealed that only 13.0% will complete a home in less than a year, 33.8% between one and three years and 36.7% between 4 and six years. It will take 18.7% of the respondents seven years and above to complete completion of a three bedroom house with their current income. Thou the result may be based on respondents' perception rather than experience, but it confirms Ferguson (2000) submission that in emerging countries, the low- and moderate- income majority build their own homes incrementally over a period of 5 to 15 years, largely without the support of the formal-sector private and public institutions. Finally, the highest mean score computed was 3.68 which indicated that respondents felt that CSLB is inadequately promoted by stakeholders which in turn affect its low acceptability as a walling material by the urban populace.

## 5.2 Determinant of stakeholders promotion as a predictor of acceptability of CSLBs

Standard multiple regression was used to assess the ability of four control measures (stakeholders promotion of CSLBs, education level, monthly income, home ownership is a legacy) in

predicting acceptability of CSLBs by the urban populace. As articulated by Pallant (2011), preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. Multiple regression analysis was used to test if stakeholders' promotion of CSLBs significantly predicted its acceptability as a walling material for housing by the urban populace. The results of the regression are presented in Table 2 and Table 3. The result indicated the two predictors explained 28.3% of the variance ( $R^2 = .283$ ,  $F(4, 124) = 12.2$ ,  $p < .001$ ). It was

**Table 2: Model Summary of multiple regression of stakeholders promotion of CSLBs in predicting its acceptability**

Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.532 <sup>a</sup>	.283	.260	.845

a. Predictors: (Constant), Stakeholders promotion of CSLBs, Home Ownership is a Legacy, Monthly Income, Education Level  
 b. Dependent Variable: Acceptability of CSLB

**Table 3: ANOVA of stakeholders' promotion in predicting acceptability of CSLBs.**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.915	4	8.729	12.216	.000 <sup>b</sup>
	Residual	88.599	124	.715		
	Total	123.514	128			

a. Dependent Variable: Acceptability of CSLB  
 b. Predictors: (Constant), Stakeholders promotion of CSLB, Home Ownership is a Legacy, Monthly Income, Education Level

Table 4 shows the coefficients analysis to evaluate the strength of the significant relationship between the variables in predicting the acceptability of CSLBs.

**Table 4: Evaluation of the strength of variables in predicting acceptability of CSLBs**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
		(Constant)	1.158	.477		
1	Education Level	-.125	.071	-.146	-1.742	.084
	Monthly Income	.009	.069	.011	.129	.897
	Home Ownership is a Legacy	.337	.099	.266	3.399	.001
	Stakeholders Promotion of CSLB	.457	.085	.422	5.407	.000

It was found that stakeholders promotion of CSLBs significantly predicted acceptability ( $\beta = .42$ ,  $p < .001$ ), as well as home ownership is a legacy ( $\beta = .27$ ,  $p < .001$ ). Therefore, the probability of the null hypothesis that there is no significant difference between stakeholders promotion of CSLBs in prediction of its acceptability for housing in a typical Nigerian urban center is extremely small with  $p < .001$ . The null hypothesis is rejected and the conclusion is that there is a linear relationship between these variables.

This is consistent with theoretical expectations that the more public awareness campaign about a product, the more knowledgeable the public becomes about the product. This explains the reason manufacturers continue with aggressive promotions to sensitize or reaffirm the quality of their product. It is logical therefore that promotion and acceptability are fairly strongly related. Consequently, improving public awareness through public-private partnership promotion will enhance acceptability of CSLBs as a walling material for housing construction by the urban populace. This can be achieved through construction of prototype homes with CSLBs by stakeholders in the construction industry.

## **6.0 Conclusion**

This study has investigated the correlation between stakeholders' promotion of CSLBs and its acceptability for housing by the urban populace. It was found out that there is a significantly high correlation between promotions of CSLBs by stakeholders in predicting its acceptability. The study also identified a high aspiration for home ownership among respondents. In terms of preference ranking out of the three basic necessity of modern living, home ownership took a close second after education with health issues taking the rear. Despite the aspiration for home ownership and the satisfactory income of respondents, the study showed that it will take majority of respondents a minimum of 4 to 6 years to finance construction of a home using sandcrete blocks. This is a major cause of concern for adequate housing delivery in Nigeria since majority of houses are done through self-built procurement system. The policy implication suggests that stakeholders should exploit alternative IBMs which are affordable, sustainable and readily available. CSLB is one of such materials.

In view of these findings, it is recommended that government and stakeholders in the building construction industry should take the lead to promote the acquisition of CSLBs as a walling material for affordable housing delivery. This can be achieved by initiating prototypes public mass housing construction of CSLB walls across the six geo-political zones of the country. This will encourage acceptability of CSLBs for building construction thereby reducing the level of drawbacks associated with earth as an IBM.

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