EXPLORING THE UTILIZATION OF INDIGENOUS BUILDING MATERIALS IN OYO STATE OF NIGERIA

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ABSTRACT

This paper examines indigenous building materials in Nigeria, taken Oyo State, Southwest, Nigeria as a case study. However, challenges or problems associated with the utilization of the materials were highlighted, and respondents identified prospects and solutions to the problems based on the level of importance. Eighty (80) questionnaires were administered to the respondents, seventy-five (75) were returned. The respondents considered for the study are construction-related professionals, building owners/developers, masons and others. Purposive and random sampling techniques were adopted for the study. Thus, data collected were analyzed using percentage, and relative importance index (RII) methods and the values obtained were also ranked accordingly. According to respondents, some of the major challenges facing the use and acceptance of indigenous building materials are low production capacity, low demand for the materials by the prospective clients, and lack of cost comparison between the materials and the conventional types. These variables were ranked 1st (0.931), 2nd (0.925) and 3rd (0.893), respectively.

Moreover, an increase in research on the properties of the materials and an increase in the use of the materials by professionals in building construction industries were both ranked first (0.907). Enforcement of construction of mega housing units with the materials and promulgate national housing policy to promote production and utilization were also ranked third (0.856) and fourth (0.840). Hence, it can be concluded that establishment of standard requirements the materials must be met before recommended for use, provision of appropriate technology for the production of the materials and improvement on the production method in both processes and finishes were considered the most preferred solutions to the utilization of indigenous building materials in Nigeria.

Keywords: Building Materials, Challenges, Indigenous, Nigeria, Oyo State, Utilization.

INTRODUCTION

Building materials are materials that are recommended by professional bodies or related standard bodies such as British Standard (BS), Indian Standard (IS), American Standard for Testing Materials (ASTM), Nigeria Industrial Standard (NIS), among others and certified by government regulatory body like Standard Organisation of Nigeria (SON) to use in the construction of buildings. The use of indigenous construction materials was proven to be one of the best methods that enable affordable housing to be realistic. This involves utilizing natural materials, renewable materials, eco-friendly materials, and innovative methods that can be implemented to reduce the cost of building production (UN-Habitat, 2006). According to Osasona (2007), the stagnant economic development and rapid population growth of most developing countries make effective and efficient housing delivery difficult for the

government. However, Daramola (2006) emphasizes embracing indigenous building materials to achieve functional and affordable housing schemes in Nigeria. Olayiwola et al. (2005) advocated for using indigenous building materials to reduce construction costs in Nigeria as it has been practice and proven profitable in Tanzania and some other African countries. According to Fisk (2008), many abundant traditional building materials can be adopted to reduce housing problems, but unfortunately, they are socially unaccepted.

Meanwhile, building construction industries in Nigeria are essential and crucial to the economy. Thus, building materials should be one of the driving tools for the adequate performance of the industries (Oni, 2009; Abiola, 2002). Ademiluyi and Raji (2010) Opined that a shift toward utilizing traditional building materials accelerate the scenario of higher construction cost in Nigeria if they are properly harnessed. This study focuses on assessing the usage of indigenous building material in Oyo state, South-west, Nigeria. This intends to appraise problems and prospects on the utilization of materials and proffer materials ways of improving the qualities and properties of the materials. However, some of the most typical indigenous building materials in the study area based on field survey are; mud, clay bricks, bamboo, stones, straw/thatch, and coconut leaves.

LITERATURE REVIEW

According to Hall and Jarkko (2010), olden days, mud and clay were the most common local materials used in building construction. Although they were referred to as weak materials compared to concrete, it was revealed that the materials help keep houses cool during summer. Moreover, it was postulated that mud and clay have excellent thermal mass qualities and keep indoor temperatures constant. Meanwhile, these materials are ubiquitous and available at low-cost, energy-efficient, higher performance, ecological green materials, but they may require constant maintenance and structural support. Sruthi (2013) described mud as a natural building material found in abundance, mainly where other building materials such as bricks, stone or woods are sourced due to affordability or availability. In the same vein, Alagbe (2010) posited that the usage of traditionally produced compressed stabilized laterite bricks (SLBS) as an alternative building material could solve the problem of sustainable housing development. Also, Dayaratne (2011) established that local materials such as earth, timber, straw, stone/rock and thatch were constructed together with the most straightforward tools and methods to build simple liveable dwellings. Daramola (2006) corroborated that many naturally occurring substances such as; clay, rock, sand, wood and leaves have been used to construct buildings. Hence, most researchers on local building materials believe that the materials need to be supported and reinforced to produce sufficient quantities of adequate quality to withstand the effects of climatic conditions, ranging from humidity rainy seasons to scorching dry seasons.

RESEARCH METHODOLOGY

Oyo state is located in the Southwest, Nigeria, and it consists of 33 local governments and three senatorial districts. The senatorial districts are Oyo south, Oyo central, and Oyo north. The study considered Oyo North senatorial distinct as a case study. The senatorial district consists of 11 local governments. The study sampled 7 out of the 11 local governments. A survey research approach was employed for the study. However, purposive and random sampling

techniques were adopted. The study was purposely focused on a senatorial district (Oyo North) out of three senatorial districts, and the respondents were randomly selected to gather information on the study. A structured questionnaire was designed and administered to construction-related professionals, building owners/developers, masons and contractors. Moreover, the questionnaire was also designed to elicit responses in the three key areas, which include; problems or challenges encountered on the use of indigenous building materials, prospects associated with the usage of the materials and lastly, to proffer feasible solutions on how the materials can be absorbed and given recognition in the society. Most of these materials have been subjected to a series of laboratory tests and consequently recommended for construction, but unfortunately, they are still not recognized as building materials.

Furthermore, a relatively small number of people (sample size) were chosen to represent a larger population. Therefore, a population of 100 was targeted in which 80 was determined to be the sample size. Thus, the determination of sample size in this study was based on Ghyoot (1994), which stated that the corresponding value of sample size is 80 when the population is 100. Therefore, the total number of questionnaires given out is 80 and were administered randomly to the targeted respondents. However, the questionnaire used to collect information was divided into two sections. Section A was designed to obtain information regarding the respondents' profiles. In contrast, section B was designed to source information on problems, prospects, and way forward on adopting indigenous materials in building construction.

It was suggested by kado and Avul (2010) that the numerical scores for the completed questionnaires indicated the varying degrees of impact of the variables identified and their usage. In this study, those variables presented under problems, prospects and way forward would be analyzed using the relative importance index (RII). Meanwhile, to establish the levels of significance of the variables, RII was calculated for each variable in accordance with Memon and Mustaffar (2006). The Relative Importance Index (RII) is calculated using the formula stated below;

$$RII = \frac{\sum_{X-1}^{N} W}{AN}$$

Where,

N = Total number of respondents

W = weighting assigned to each variable by a respondent (ranging from 1 to 5)

X = Numerical index for counting

A= Highest weighting used (i.e 5).

The value of RII ranges between O and I (i.e., $0 \leq RII \leq 1$). According to Othman et al. (2005) cited Kado and Avul (2010), the results obtained from the analysis by RII are classified into there as follows:

I.   RII < 0.60 indicates low frequency in use

II. $0.6 \leq RII \leq 0.80$ shows high frequency in use.

III. $RII \geq 0.80$ means very high frequency in use.

This research adopted five points (5) of the Likert scale as suggested by Tawil et al. (2013) and Kado and Avul (2010). The scale is presented below:

1- Insignificant, 2 – Slightly significant, 3 – significant, 4- very significant, 5- Extremely significant.

RESULTS AND DISCUSSION

The results of information received from respondents related to the study's objectives were presented in tabular form and discussed accordingly, while the respondents' demography was presented in a descriptive approach.

Analysis of Administered Questionnaires

The total number of questionnaires given out is eighty (80), of which seventy-five (75) were returned. This represents a retuned of 93—75%. The returned rate is considered adequate in line with Aibinu and Jagboro (2002) and Neese and Ledbetter (1991), which stated that the field survey results could be considered biased if the return rate is lesser than 30 to 40% of the distributed questionnaires.

Information on Respondents.

Out of seventy-five (75), responses received 26: 67% are respondents that fall in construction-related professionals, 24% are building owners/ developers, while 26.67% and 22.66% are the percentages of masons and contractors, respectively. The results from the profile of respondents also showed that 16.67% hold Bachelor's degrees, 20.00% had Higher National diplomas, 30. 67 % obtained National Diploma whereas those obtained other forms of qualification give 33.33%.

Table 1: Challenges Associated to the use of Indigenous Building Materials.

Challenges	1	2	3	4	5	RII	Rank
Low production capacity to meet increasing demands in construction	0	3	5	7	60	0.931	1st
Low demand for indigenous building materials by prospective clients.	0	2	2	20	51	0.925	2nd
Lack of basis for cost companion between indigenous and conventional building materials	0	5	0	25	45	0.93	3rd
Low value of buildings constructed with indigenous materials.	1	4	16	19	35	0.84	4th
Low level of importance attached to its social status and symbolism.	5	6	12	17	35	0.789	5th
Apathy towards the indigenous building materials	12	7	6	33	17	0.696	6th

The results presented in the Table1 above indicates that some of the most common challenges and problems related to the utilization and adoption of indigenous building materials, according to the respondents, are low production capacity of the materials to meet the demand for construction, which is ranked first (0.931) followed by low demand from the

4

prospective client (0.925). Thus, lack of basis for cost comparison between indigenous and conventional building materials, low value of the materials and low level of importance attached to its social status was ranked 3rd (0.893), 4th (0.821) and 5th (0.789), respectively. Furthermore, it was also observed from Table 1 that apathy and lack of interest from the social and prospective building owner towards the use of indigenous and locally available materials were ranked least (6th, 0.696).

Table 2: Prospects Related to the use of Indigenous Building Materials.

Prospects	1	2	3	4	5	RII	Rank
Increase in research on the properties of the materials in post-graduate research and government sponsored research.	0	0	5	25	45	0.907	1st
Spate in awareness by professionals and government agencies on the advantages of using indigenous materials.	0	0	0	35	45	0.907	1st
Promulgate enforceable national housing policy to promote the production and utilization of indigenous materials.	0	4	12	24	35	0.840	3rd
Encourage indigenous building materials in public building and government projects.	1	5	18	16	35	0.811	4th
Government should facilitate research on the durability and lifespan of indigenous building materials.	5	3	12	30	25	0.779	5th
Government should also make policies to reduce demand for some conventional building materials.	14	16	11	21	13	0.608	6th

Looking at Table 2, as shown above, some of the prospects and improvements relating to the use of indigenous building materials presented in the questionnaires were responded to by the respondents in the study area. It was deduced from the table that an increase in research on the prosperities of indigenous building materials and spate in awareness by professionals and government agencies such as Council of Registered Builders of Nigeria (CORBON) and Council for Regulation of Engineering in Nigeria (COREN) among others were both ranked first (0.907). On the other hand, the third (0.840) and fourth (0.811) ranked factors promulgate and enforce the utilization of the materials in housing policy and encourage the use of the materials in the construction of public buildings and government projects. Moreover, government policies such as facilitation of research on durability and life –span of the materials and reduction in demand for some conventional buildings materials were ranked 5th (0.779) and 6th (0.608), respectively.

Table 3: Solution to Embracement of Indigenous Building Materials.

Solutions	1	2	3	4	5	RII	Rank
Establish standard requirements the indigenous building materials must meet before releasing them to the public.	0	3	9	28	35	0.853	1st
Appropriate technology should be employed in the production of indigenous building materials.	0	4	0	52	19	0.829	2nd
Government intervention through access to the fund, tax reduction and incentives.	8	14	12	15	26	0.715	3rd
Improve the production method of indigenous building materials either in processes or finishes.	8	10	16	22	19	0.691	4th
Skill and innovative approach to enhance the quality of indigenous building materials.	5	20	5	29	16	0.683	5th
Advert through public lectures/ seminars, daily news publication among others.	10	12	15	26	12	0.648	6th

Regarding Table 3, various solutions to indigenous building materials were identified and responded to according to respondents' views. Meanwhile, the establishment of standard requirements the materials must meet, appropriate technology to be put in place during the production of the materials and government intervention through funding, tax reduction and incentives to the producer of the materials were considered 1st 2nd and 3rd respectively according to the RII and ranking from the table. Therefore, those factors that were ranked 4th, 5th and 6th solutions are improvement on production methods, skills and innovative approach to enhance the quality of the materials and public lectures, seminars, daily news publications.

CONCLUSION

The performance of indigenous building materials considered for building construction has not been adequately assessed and documented. The materials are readily available locally with low-cost procurement and simplicity of equipment in the exploitation production and utilization. However, they also have the potential to enhance sustainable construction practice. This study concluded that the significant challenges and problems associated with using indigenous building materials in the study area are low production capacity, low demand by

the client and lack of basis for a cost comparison with conventional materials. Hence, a solution such as establishing a standard requirement for the materials, appropriate technology should be employed in the production of the materials and government intervention through financial assistance to the manufacturer of the materials and reduction in tax to encourage the local manufacturers.

RECOMMENDATIONS

1. Government should enhance the manufacturer/producer of indigenous building materials in production capacity.
2. There is a need for sensitization of the populace on the locally produced or discovered materials that have been certified and recommended for construction work.
3. Outputs and appreciable research findings related to indigenous building materials should be encouraged to use for building construction.
4. The government needs to be more supportive in sponsoring research related to local/indigenous building materials discoveries.
5. It is also recommended that the government establish an agency to regulate only discoveries on the materials.

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