



Assessment of Factors Affecting the Utilization of Timber as A Sustainable Building Material in Enugu State

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Abstract: - This paper assesses the factors influencing the utilization of timber as a sustainable building material in Enugu State. The research aims to identify and assess the key determinants impacting the adoption of timber in construction practices within the region. To achieve this objective, a descriptive survey methodology was employed, involving the solicitation of opinions from 982 respondents, including clients, consultants, and end users. The findings of the study reveal a notable lack of public awareness regarding the features, advantages, and possibilities associated with timber construction, along with a prevailing misconception about the high fire risk associated with timber. Additionally, issues related to the acceptability of timber construction, the absence of government and non-governmental initiatives promoting timber use, and concerns about the quality of timber construction emerged as significant barriers. In light of these findings, the paper underscores the importance of enhancing public awareness regarding timber construction methods and technologies. It highlights the need for dispelling the misconception regarding fire risk and emphasizes the significance of government and non-governmental programs aimed at promoting timber as a sustainable building material. Quality assurance measures are also identified as crucial in fostering confidence in timber construction practices. The study concludes by recommending the implementation of robust government and non-governmental programs dedicated to promoting the use of timber in construction within the study area. Such initiatives are envisioned to not only address existing misconceptions but also foster confidence among stakeholders, encouraging increased investment in the sustainable utilization of timber in construction projects

Key Words— *Timber construction, Sustainable building material, Sustainability, Enugu State*

I. INTRODUCTION

Timber is an organic material with a wide variety of physical and mechanical properties (Liew & Maining, 2021). It is an efficient building material, not only regarding its mechanical properties but also because it is a highly sustainable material considering all phases of the life cycle of timber structures; production, use and decommissioning. Timber is a widely available natural resource throughout Nigeria; with proper management, there is a potential for a continuous and sustainable supply of raw materials in the future.

The global pursuit of sustainable development has brought about a critical reevaluation of traditional building materials, with a growing emphasis on renewable resources that leave a minimal ecological footprint (Gao *et al.*, 2021). In the context of Enugu State, Nigeria, where burgeoning urbanization and construction activities are reshaping the landscape, the assessment of factors influencing the utilization of timber as a sustainable building material has become paramount.

Timber, long revered for its versatility and aesthetic appeal, has served as a fundamental construction material throughout human history. However, the contemporary discourse surrounding sustainability demands a comprehensive

examination of the factors affecting its use within a specific regional context. Enugu State, with its unique environmental, economic, and cultural dynamics, presents an intriguing case study for understanding the challenges and opportunities associated with incorporating timber into modern construction practices. This paper delves into the multifaceted dimensions influencing the adoption of timber as a sustainable building material in Enugu State. From political, considerations and forest management practices to economic implications and technological advancements, each factor plays a crucial role in shaping the viability and acceptability of timber in the local construction industry. This paper aims to contribute valuable insights to the ongoing discourse on sustainable building practices, providing stakeholders with a nuanced understanding of the challenges and potential pathways for enhancing the use of timber in construction within the region.

Timber has excellent material properties. It is a light material and compared to its weight, its strength is high. Its high strength-to-weight ratio makes it an attractive framing material. Timber withstands humidity with less structural change than other building materials (Hammad, Valipour, Ghanbari-Ghazijahani, & Bradford, 2022). It is very durable and there are numerous finishes available to protect and enhance the natural beauty of the material. These sealants and protective finishes promote its durability. If well protected and well installed, timber can last for centuries with minimum maintenance (Sturges, 1991). Timber is more fire resistant than bare steel, as charring forms an insulating layer that protects the inner core of the material. Heavy timber construction is less prone to damage by short-term high temperatures allowing for a longer period for evacuation in case of fire.

However, timber is still not utilized to its full potential in the building and construction sector, considering its beneficial properties. Many building owners, Architects and structural engineers do not consider timber as a competitive building material compared to concrete, steel or masonry. Attributes such as high performance with reliability, serviceability and durability are generally not associated with timber as a building material. As we navigate the intricate interplay between tradition and innovation, environmental stewardship, and economic imperatives, the assessment presented in this paper seeks to inform policymakers, architects, builders, and the broader community about the sustainable possibilities that timber offers for building a resilient and environmentally conscious future in Enugu State

II. LITERATURE REVIEW

2.1 Material Sustainability Indicators for Timber in Construction

Timber, as a versatile construction material, plays a crucial role in sustainable building projects. However, to ensure the responsible use of timber in construction, it is essential to

monitor and evaluate its sustainability. This section explores material sustainability indicators for timber in construction and their significance in promoting responsible timber sourcing and usage.

- a. **Certification Standards:** Timber certifications, such as the Forest Stewardship Council (FSC) and the Program for the Endorsement of Forest Certification (PEFC), are key indicators of sustainable timber sourcing. These certifications verify that timber comes from responsibly managed forests, adhering to ecological, social, and economic sustainability principles (FSC, 2021; PEFC, 2021).
- b. **Chain of Custody:** The chain of custody indicator ensures that timber products can be traced back to their source. It guarantees transparency and accountability throughout the supply chain, reducing the risk of illegally sourced or uncertified timber (FSC, 2021).
- c. **Carbon Footprint:** Assessing the carbon footprint of timber products involves evaluating the emissions associated with timber production, transportation, and construction. This indicator helps quantify the environmental impact of timber in construction (Lippke et al., 2011).
- d. **Resource Efficiency:** Resource efficiency indicators consider the amount of timber required to achieve specific construction goals. Metrics like material efficiency ratios help minimize waste and resource use (CEN, 2019).
- e. **Waste Reduction:** Timber waste generation during construction can be minimized through efficient design and construction practices. This indicator encourages the responsible use of timber and reduced environmental impact (EN 16309, 2014).
- f. **Durability and Maintenance:** Longevity and ease of maintenance are crucial indicators of timber sustainability. Durable timber products reduce the need for replacements, saving resources and energy over time (Hill, 2017).
- g. **Biodiversity Impact:** Sustainable timber sourcing should consider its impact on biodiversity. Indicators assess the protection of habitats, endangered species, and the preservation of ecosystem services in timber-producing areas (CITES, 2021).
- h. **Legal Compliance:** Compliance with local and international laws and regulations is fundamental. Indicators focus on adherence to forest governance and trade laws, preventing illegal timber from entering the supply chain (ITTO, 2019).
- i. **Social Responsibility:** Social indicators assess labor conditions, community engagement, and indigenous

rights in timber-producing regions. Responsible timber sourcing should prioritize fair labor practices and respect for indigenous communities (ITTO, 2019).

2.2

III. METHODOLOGY

This study employed a descriptive research design: The descriptive design collected information regarding timber and its acceptability in the study area through a questionnaire (field survey). The target population of the study comprised of clients (215), consultants (405) and end-users (400). A total of 982 respondents were sampled using simple random sampling and the results obtained were analyzed using SPSS version 22 and presented in Tables.

IV. RESULTS AND DISCUSSION

Table 1: F Statistics output for Hypothesis (Timber is not well utilized as a building material in Nigeria).

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2344.300	1	3241.212	96.325	.098 ^b
	Residual	411.190	215	1.321		
	Total	4331.500	215			

Table 1 reveals the test of significance for the regression analysis in the form of F statistics. The Table shows that the F-statistics is 96.325 and the P-value w is .098. From the decision rule which states that if the P-value is less than 0.05, the alternate hypothesis should be accepted, otherwise, it should be rejected. Given that the p-value is less than 0.05, the null hypothesis is accepted and it is stated that timber is not well utilized as a building material in Nigeria.

Since it has been established that timber is not well utilized as a building material in Nigeria, table 2 reveals the factors affecting its utilization.

Table 2: Factors affecting the utilization of timber as a sustainable building material in the study area

S/N	Factor	∑f	∑fx	RII	Rank
1	Durability	982	3839	0.7819	12 th
2	Quality	982	4195	0.8544	5 th
3	Workability	982	3972	0.8090	11 th
4	Availability	982	3750	0.7637	13 th

5	Area of usage	982	3973	0.8092	10 th
6	Affordability (Price)	982	4060	0.8269	8 th
7	Acceptability	982	4330	0.8819	3 rd
8	Attack by insects, fungi and vermin	982	4152	0.8456	6 th
9	Insecurity of the home users	982	4061	0.8271	7 th
10	Low public awareness of the features, advantages and possibilities of timber construction including the methods and technologies used.	982	4465	0.9094	1 st
11	The popular belief that timber construction means high fire risk	982	4375	0.8910	2 nd
12	Lack of ecological awareness among investors and developers in the construction sector	982	4015	0.8177	9 th
13	Lack of government and non-governmental	982	4284	0.8725	4 th

Table 2 shows the factors affecting the utilization of timber as a sustainable building material in the study area. With an RII of 0.9094 Low public awareness of the features, advantages and possibilities of timber construction including the methods and technologies used. Ranked as the most significant factor affecting the utilization of timber as a sustainable building material. On the 2nd and 3rd spot with RII of 0.8910 and 0.8819 are the popular belief that timber construction means high fire risk and acceptability. There is no doubt that these factors still hold their ground as not enough work has been put into demystifying some of these factors thereby improving their acceptability. Continuing, the Lack of government and non-governmental programmes promoting the use of timber construction, Quality and Attack by insects, fungi and vermin ranked 4th, 5th and 6th as a worrisome factor militating against the use of timber as a building material in the study area.

V. CONCLUSION

The assessment of factors affecting the utilization of timber as a sustainable building material in Enugu State reveals a complex interplay of ecological, economic, and cultural considerations. The findings underscore the need for a balanced and informed approach to incorporating timber into contemporary construction practices within the region. The study therefore concludes that the study found that timber is not well utilized as a building material in Nigeria and consequently recommends that there should be proper government and non-governmental programmes promoting the use of timber construction in the study area. This will grow the confidence of people and encourage them to invest in its usage.

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