

DETERMINING STRATEGY FOR ADOPTION OF PREFABRICATED HOUSING BY DEVELOPERS IN LAGOS STATE: AN AHP APPROACH

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ABSTRACT

Research has shown that there is presently a housing deficit of about 17 million in Nigeria yet it appears the concerted efforts that have been put in place to address this issue by government has not yielded the expected results. Though the Nigerian government, in the Vision 2020 policy document recognized that one of the ways of resolving the issue of provision of adequate housing in Nigeria is to move from the traditional brick and mortar system to modern construction methodology like the prefab housing system, not much may have been done to promote the adoption of this new methodology by relevant built environment stakeholders among whom are developers. This study employed the survey research approach using the AHP model to investigate the relative importance of factors that can promote the adoption of the prefab Housing Technology by developers in Lagos State with a view to formulating appropriate strategies.

Keywords: Developers, Prefabrication, Adoption, Strategy, AHP, Lagos State.

1. Introduction

Shortage of housing has been a major problem in Nigeria in recent years. Research has shown that there is presently a housing deficit of about 17 million in Nigeria yet it appears the concerted efforts that have been put in place to address this issue by government has not yielded the expected results (Adebayo and Ogbechi, 2017a). Though the Nigerian government, in the Vision 2020 policy document recognized that one of the ways of resolving the issue of provision of adequate housing in Nigeria is to move from the traditional brick and mortar system to modern construction methodology like the prefab housing system, not much may have been done to promote the adoption of this

new methodology by relevant built environment stakeholders among whom are developers (Report of the Vision 2020 National Technical Working Group on Housing, 2009; Adebayo and Ogbechi, 2017a). This is in support of Johnson (2006)'s view that though the prefab housing system is one of the solutions to a nation's housing needs yet there is little scholarly research on prefabricated housing in both developed and developing countries. In fact, to the best of our knowledge not much research has been done in this area in Nigeria. This study seeks to see how this gap in knowledge can be bridged by investigating the factors that can promote the adoption of the prefab Housing Technology by developers in Nigeria using the Analytic Hierarchy Process Model (AHP). This is of significance given that research by scholars such as [Wei](#), [Gibb](#) and Dainty (2008) on house builders' utilization of offsite construction methods revealed that though the level of usage of offsite-MMC by large house builders is low, the level is likely to increase, given the pressures to improve quality, time cost, productivity, and health and safety.

1.1 Statement of Problem

Developers are private corporate bodies that are registered with Real Estate Developers Association of Nigeria (REDAN), who engage in the business of building houses for sell/rent to the public. Aside from government, developers are the main key environment stakeholders that engage in medium to large scale building of houses in Lagos State. However, they may not have been able to make as much impact as they could in ameliorating the housing shortage problem because they mostly adopt the traditional brick and mortal system of construction (Adebayo and Dixon-Ogbechi, 2017a). In their study, Adebayo and Dixon-Ogbechi (2017a) sought to investigate the perception of developers on the use of Developers the prefab methodology for housing delivery in Lagos State with the aim of determining their acceptability of this modern construction methodology. They discovered that though developers are aware and quite knowledgeable about the prefab construction methodology, not many of them have used it extensively in their line of profession despite their belief about its marketability. Nevertheless, majority of the developers studied believed that they can adopt prefab construction methodology for housing delivery if its advantages are effectively communicated.

Adebayo and Dixon-Ogbechi (2017a) further discovered that developers are of the view that sixteen (16) factors can promote their adoption of prefabricated methodology for housing delivery in Lagos State, Out of which the most prominent factors are: Faster Project Completion Time (FPT), Greater Quality Control (GCT), Usage of Specialised Production Labour (USPL), Reduced Site Labour (RSL), Minimal Environmental Impact (MEI), Less Site Material (LSM), Cost Effectiveness (CE). Therefore, there is a need to determine the relative importance of these factors to enable government to formulate appropriate policies and strategies to promote the adoption of the prefab housing system by developers using the AHP model.

2. Literature Review

The concept prefabrication refers to factories manufacturing processes whereby various materials are combined to form a component part of a final installation (McGraw Hill Construction, 2011). Prefabrication is based on off-site technology; off-site technologies

are structures that are manufactured in different locations other than the location of usage with the aim of saving cost and time (Panjehpour & Abang ali, 2013). These offsite technologies are also called Modern Methods of Construction - MMC (Wei, Gibb & Dainty, 2008). This construction technique uses assembly line manufacturing strategies to assemble the components of a house prior to arrival at a construction site (Tam, 2013) to produce prefab homes. The US Department of Commerce in Johnson (2016) defined prefab homes as those homes made up of components such as walls, floors, roof, panels etc. which have been fabricated in a factory prior to erection on the building foundation. The Prefab homes differ from the traditional brick and mortar homes because of the assembly-line production method used in their construction (Johnson, 2006).

2.2 Types of prefab Systems

Scholars such as Tam (2013) and Smith, Asiz and Gupta (2007) identified the following types of prefab systems which vary in terms of degree of flexibility, labour and transportation costs, namely: Manufactured Systems; Modular Systems; Panelized Systems and Pre-Engineered Systems. Smith, Asiz and Gupta (2007) opined that Manufactured Systems are the prefab homes that are fully completed before arriving on the building site; Modular Systems are made up of multiple modules which are assembled together on site and are also mostly produced in the factory; Panelized systems are those highly flexible prefab systems made up of prefab floor, roof, and wall panels that are assembled on the building site; and Pre-Engineered Systems are the simplest types of prefab systems made up of individual components produced in the factory but whose components are easily assembled at the site without the need for any additional work. On the other hand, Johnson (2006) in her study identified the types of prefab systems as Precut, Panelized, Sectional, and Preamsembled. According to her the Precut system entails incorporating assembly-line method of production by cutting/processing the lumber at the factory; Panelised system is similar to the precut system but its framing members are cut to specification and then the individual pieces are assembled into larger units, called panels, that are connected with bolts at the factory Carr (1947); Sectional prefab system entails manufacturing the building in units of three dimensional modules which are completed in the factory and subsequently sent to the building site for assemblage into a complete house Graff (1947); and preassembled prefab system is the one in which prefab houses are fully constructed at the factory and then moved to the permanently installed at the building site.

3. Hypotheses/Objectives

The main the objective of this study is to add to the body of knowledge by employing the AHP as a tool, to investigate the relative importance of factors that can promote the adoption of the prefab Housing Technology by developers in Lagos State. Precisely, it sought to:

- i. Determine the relative importance of factors that can promote the adoption of the prefab Housing Technology by developers in Lagos State.
- ii. Identify the most adoptable prefab system by developers in Lagos State.
- iii. Recommend appropriate marketing strategy(ies) that will promote the adoption of the prefab system by developers in Lagos State.

4. Research Design/Methodology

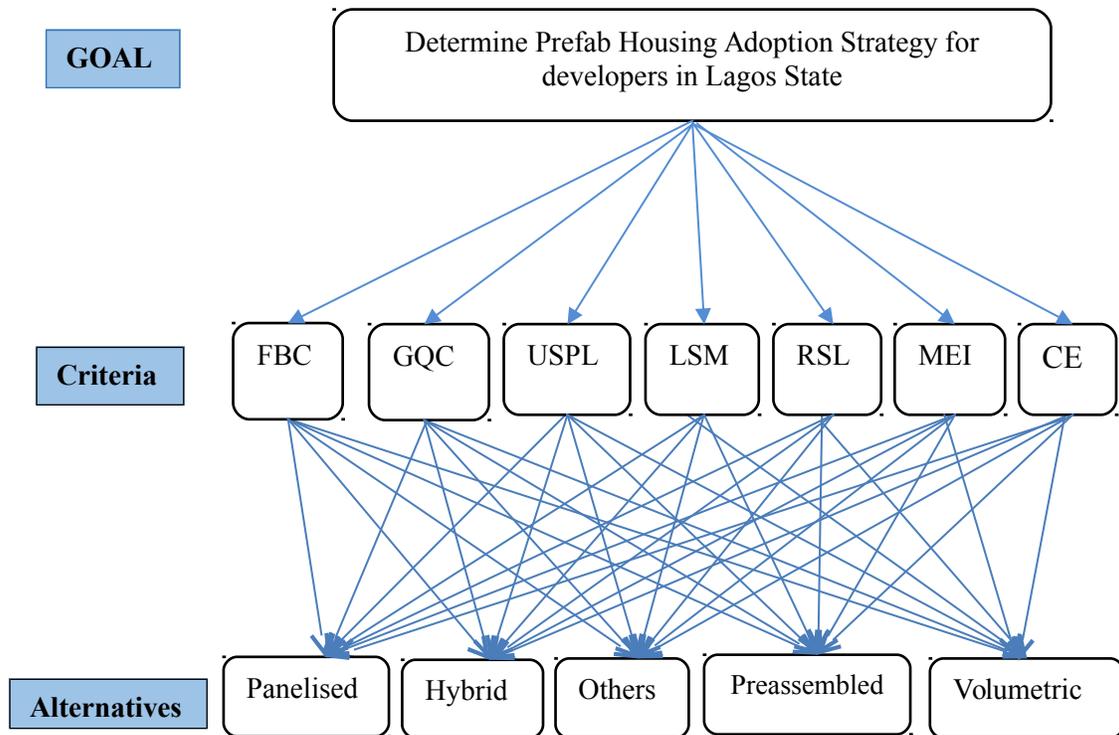
This study used the AHP model (Saaty, 2001) as follows:

Goal: Determine Prefab Housing Adoption Strategy for developers in Lagos State.

Criteria: The most popular evaluative criteria for the adoption of the prefab system as identified in a study by Adebayo and Ogbechi (2017a) are: Faster Project Completion Time (FPT), Greater Quality Control (GCT), Usage of Specialised Production Labour (USPL), Reduced Site Labour (RSL), Minimal Environmental Impact (MEI), Less Site Material (LSM), Cost Effectiveness (CE).

Alternatives: The prefabricated housing system that are marketable to consumers in Lagos State as identified in previous studies by Adebayo and Dixon-Ogbechi, 2017b) are: Panellised prefab system (PFS), Other prefab systems (OPS), hybrid prefab system (HPS), preassembled completed prefab system (PCPS) and volumetric/pod prefab system (V/PPS).

Figure 1: Analytic Hierarchy Process Model of factors that can promote the adoption of the prefab Housing Technology by developers in Lagos State.



Source: Developed for this study by the authors.

5. Data/Model Analysis

This will be done once the field work has been completed and subsequently included in the full paper.

6. Limitations

This will be written once all feedback has been obtained from field work has been completed and subsequently included in the full paper.

7. Conclusions

This will be written after data analysis and subsequently presented in the full paper.

8. Key References

Adebayo, Anthony Kayode and Dixon-Ogbechi, Bolajoko Nkemdinim (2017a). Developers' perception of prefabricated housing methodology in Nigeria: A study of Lagos State", Presented at the *2017 IAABR/ACADEMIC OASIS – Jamaica International Multidisciplinary Academic Conference*, Held at Holiday Inn Resort: A1 Montego Bay, Jamaica.

Anthony Kayode and Dixon-Ogbechi, Bolajoko Nkemdinim (2017b). Urban Mass Housing in Lagos Metropolis, Nigeria – The Potentials and Marketability of Prefabricated Housing Systems, *Journal of Strategic And International Studies*, XII (1):25-30.

Saaty, T.L. (2000). *Fundamentals of Decision making and Priority Theory with Analytical Hierarchy Process*. Pittsburgh, PA: RWS Publications.

Johnson E. Cynthia (2006). House in a Box: Prefabricated Housing in The Jackson Purchase Cultural Landscape Region, 1900 to 1960. *Kenturcky Heritage Council*. Retrieved from <http://heritage.ky.gov/NR/rdonlyres/69811BB7-B64C-43E7-AC2B-C7A83390E09D/0/Houseinabox.pdf>.

Wei Pan; [Alistair G.F. Gibb](#) & [Andrew R.J. Dainty](#) (2008). Leading UK housebuilders' utilization of offsite construction methods, *Building Research & Information*, 36:56-67, Retrieved 8/7/17 from: <http://www.tandfonline.com/doi/full/10.1080/09613210701204013?scroll=top&needAccess=true>.

9. Appendices

Not needed for this proposal.