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Review of Motivations, Success Factors, and Barriers to the Adoption of Offsite Manufacturing in Nigeria

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Abstract

Despite several mitigation attempts, Nigeria is still facing a deficit of 17 million houses. Seminal literature argues that this problem is predominantly due to a myriad of issues, including high construction costs, skills shortages, the slow pace of construction, lack of infrastructure and logistics, poor quality of available housing stock etc. Given these issues, offsite manufacturing has been proffered as an innovative method for addressing these challenges. This paper reports on the findings of a substantial literature review investigated the needs, promises and barriers of adopting offsite manufacturing in Nigeria. Seminal literature elaborating on offsite construction and Nigerian construction industry has been thoroughly reviewed and results were analysed using thematic analysis, and Nvivo software was used to code and analyse the research data. Findings highlighted that the housing deficit in Nigeria is on the increase and nothing significant was being done at the moment. The results also posited that although OSM could improve housing delivery efforts in Nigeria, the prevalence of this is still considerably low; and that this was influenced by many factors, such as negative local perception about OSM, client resistance, lack of infrastructure and skills shortage. This study concludes that for OSM to be adopted in Nigeria, there is a need for greater awareness, collaboration, training and encouragement from Government. This study presents additional understanding of OSM in Nigeria based on expert opinion, the results of which were used to develop a framework for the effective adoption of OSM in Nigeria. It is concluded that the adoption of OSM could help support housing delivery efforts in Nigeria, and leverage wider benefits to the industry and associated supply chain.

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1. Introduction

Nigeria is currently facing a significant and progressive housing deficit. Whilst it could be argued that this is similar to many other rapidly developing countries, there are some unique contextual facts that need to be noted. For example, it has a population of 177 million, with an annual growth rate of about 2.5% [1]. It also needs about 17 million new houses in short term [2]. Thus, in order to address these issues, several mitigation efforts have been deployed by the local industry, including: promoting locally manufactured building materials as a means to improve housing delivery [3]; pushing the industry towards better implementation of the Nigeria National Housing Policy [4]; and seeking possibilities for introducing better mortgage systems in Nigeria [3]. Notwithstanding these attempts, a wide margin still exists between housing demand and supply [5]. It has also been argued in seminal literature that these problems are mainly due to the inherent challenges of the exiting conventional housing delivery systems in Nigeria, particularly: time and cost overruns, skills shortage, inadequate quality, and labour intensive activities [4, 6-9]. As such, Dada [10] suggested that a paradigm shift from the conventional construction approach to a more innovative housing production processes was vital for Nigeria.

This kind of radical change in housing delivery methods has also been advocated in several other countries, including the UK [11, 12]; USA [13]; Australia [14] and in South Africa [15]. The essence of all of these major Government reports is that collaborative working and integrated project delivery must be promoted in order to make a 'revolution' in construction projects. To leverage these, seminal literature has proffered the adoption of Modern Methods of Construction (MMC) and Offsite Manufactured Construction (OSM) as viable delivery mechanisms for both developed and developing countries [e.g., 16, 17-22]. In this respect, the primary role of OSM here is to move some of the effort and risk-prone construction site activities into a controlled environment - typically associated with a manufacturing or factory facility [23]. This controlled environment and application of OSM offers several benefits, particularly: a higher speed of construction; improved quality of the finished product; lower costs; and lower labour requirements on-site [21]. These achievements are sustained and significant, which offer a palpable platform for addressing the specific housing problems of Nigeria (discussed above).

Notwithstanding the aforementioned benefits of OSM, the use and deployment of OSM and MMC in the Nigerian housing market is negligible [24]. On this theme, Taylor [19] asserted that failure in many countries could be due to inaccurate public assumptions regarding offsite. Similarly, Arif, Goulding [25] argued that much of this miscommunication among different sectors of the housing industry, could potentially hinder the adoption of OSM and exacerbate the lack of consent between industry and academia in terms of remit, functionality, expectations, motivations, and final goals. In other words, there are multi-aspect drivers that affect the process of industrialising the sector as a whole, not least semantics and technology adoption issues [26]. These are significant challenges. This study therefore posits that, if offsite production and manufacturing are to make a positive contribution to the Nigerian construction industry, there is a need to identify the causal drivers and issues associated with the uptake and adoption of this. This undertaking needs to encompass several areas, not least, market drivers and dynamics, culture, societal issues, and existing economic business models.

Given the importance of these factors, this study investigated these issues within the context of Nigeria; specifically, to identify the pivotal drivers and priorities of OSM for future uptake. The aim of this study is to develop a research roadmap which identifies prioritised areas for OSM adoption in Nigeria. This paper presents the results of in-depth interviews conducted with 26 experts who have been directly involved in Nigerian construction industry for several years, in order to identify the main motivations, success factors, and barriers to the of adoption of OSM in Nigeria.

2. Housing problems in Nigeria

Statistics are not promising on the housing delivery success in Nigeria, where only 10% of Nigerians can currently afford to either purchase or build their desired house, compared to other countries e.g. 72% in USA, 78% in UK, 60% in China, 54% in Korea and 92% in Singapore [27]. Olayiwola and Adedokun [3] noted that the housing situation in Nigeria was far from being satisfactory, taking into account the high rates of urbanisation and population growth. Makinde [4] asserted that there was no perspective of improvement in the near future; if the country decides to continue to rely on its conventional housing delivery systems - which is deficient in terms of quantity and quality of housing units delivered. These problems tend to have a cascading effect that results in other housing problems, such as unstable

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