

PRIORITIZING FACTORS MITIGATING THE IMPLEMENTATION OF SUSTAINABLE PROJECTS IN NIGERIAN CONSTRUCTION INDUSTRY

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ABSTRACT

The construction industry plays a crucial role in the economy of any nation, and its activities are vital to achieving national socio-economic development goals of providing shelter, infrastructure and employment. However, statements as to the poor sustainability nature of construction projects executed in most developing countries have been made in recent times, and the Nigerian Construction Industry is no exception. This research was carried out to study the most severe factors mitigating implementation of sustainable projects within Nigerian Construction industry. The research instrument used was structured questionnaire designed and administered to construction participants in Nigeria. Ten (10) critical factors mitigating implementation of sustainable projects in the entire construction industry were identified from detail review of past literature and all were used in the questionnaires in order to prioritize the factors in the order of their severity within the construction industry. A

Introduction:

The construction industry plays a crucial role in the economy of any nation, and its activities are vital to achieving national socio-economic development goals of providing shelter, infrastructure and employment. According to Ayodele and Alabi (2011) a healthy economy usually experiences an increase in construction activities. However, statements as to the poor sustainability nature of construction projects executed in most developing countries have been made in recent times, and the Nigerian Construction Industry (NCI) is no exception (Aje, 2016; Alabi, 2012; Al-Saleb and Taleb, 2010; Baron and

Total of fifty five (55) questionnaires were distributed to the construction participants; 15 each to Clients and Contractors while twenty five (25) to Consultants comprising of five (5) Quantity Surveyors, Five (5) Architects, Five (5) Services Engineers, five (5) Civil Engineers and five (5) project managers. Thirty nine (39) questionnaires were successfully retrieved representing (71% of the total). The data obtained in the returned questionnaires was used for analysis. Relative importance index method (RII) was used to determine the relative importance indices of the various factors. From the findings made, it was concluded that the major factors mitigating the implementation of sustainable projects in order of their severity are; Lack of government commitment, Lack of owner or developer's full support for sustainable concepts, the assumption of additional cost of building projects, Lack of financial incentives for construction participants, budget constraints among others.

Keywords: *Sustainable development, Construction Industry, Nigeria, Relative Importance Index*

Donath, 2016). Ding (2008) postulates that the “construction has been accused of causing environmental problems ranging from excessive consumption of global resources both in terms of construction and building operation to the pollution of the surrounding environment. Many a time building industry commonly referred to as an industry that is unfriendly and unkind to the natural environment (Kibert 2007).The built environment and its continuous expansion have been recognized worldwide to be one of the contributors to the escalation of environmental challenges faced by the planet. It accounts for about 33% of worldwide energy use and greenhouse gas emissions (Price et al. 2006).

Construction sector should without any doubt be one of the first sectors in which sustainability requirements are met. There are several reasons for this. Firstly, construction is, in some cases, responsible for serious environmental damages. It uses vast amounts of materials and resource. It was discussed that the construction industry uses most raw materials than any other industry (Myers 2004). Achieving sustainable construction has become a global challenge, which is even bigger for developing countries due to the fact that these countries also have to deal with the problems resulting from continuing development (Makenya

1999). Specifically, construction sector uses energy, materials, water and land in order to carry out its operations. It is responsible for highest amount of green house gas emissions, which use vast amount of natural resources and produces vast amounts of waste (CIOB 2004). Products of the sector are durable, lasting for years and form an unavoidable part of human life and hence affect human life. Therefore, the global construction sector must without any doubts, familiarize itself with the concept of sustainable development and transform its structure from traditional to modern sustainable construction (Offon 2007). Sustainable construction, together with sustainability is a growing concern in developed countries. There is a great work being conducted in order to influence companies to make “achieving sustainability” a prior objective in projects delivery (Kibert 1999)

The construction industry in Nigeria is very huge, for instance, there was an average growth rate of 18.08 percent between 2010 and 2012 in the industry (NBS, 2015). As such, this couple with the growing population in the country calls for an urgent skill development and awareness of the factors mitigating the application of sustainability in the country’s construction industry. and that necessitated the research to be carried out. However, when reviewing literatures on sustainability in construction, some studies has been carried out in several developed countries such as Italy and Sweden. But none of the research envisage the most severe factors mitigating sustainable construction within the industry. Therefore this study aims to prioritize the factors in the order of their severity. It is hope to be a step forward in implementing sustainability in the Nigerian Construction Industry.

The Concept of Sustainable Development

The concept of sustainability in the human realm is all about caring for the future while solving current issues. Fergus & Rowney (2005) also argue in line with this and assert that the concept of sustainable development can “stimulate discursive engagement with respect to the future development of society within an ethical framework based around the values of inclusivity, diversity, and integration”. As such Labuschagne & Brent (2005) posit that “social equity, economic efficiency and environmental performance” are the key goals of sustainable development and all these must be adhered to in order to get the best out of both human and the environment. Nonetheless, the whole idea of sustainable development

started to attract stakeholders in the 1970s and 1980s when the potentials of the detrimental effects of the activities man to the environment began to emerge. In 1987 the United Nations World Commission on Environment and Development (WCED) published a report with the theme Common Future, and this was a byproduct of the 1972 Stockholm Conference on the Human Environment (Robert, Parris, & Leiserowitz 2005). Sustainable development is multidimensional in a broader sense; the World Commission on Environment and Development defines the concept as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” And in the context of the economy, scholars such as Goldin and winters (1998) posit that “sustainable development refers to an economy in which future growth is not compromised by that of the present.” In essence, the concept of sustainable development suggest the meticulous maximum utilization of resources to get a best result, while not compromising its future usage that might be detrimental to nature.

Definition of Sustainable Construction

In the context of construction industry, there is no central definition of sustainability. However, scholars have tried to inculcate the concept of sustainability in the field. For instance, Kibert (2005) sees the concept as “the design and operation of a healthy built environment using ecological based principles,” Kibert (2003) also reported sustainable construction as ‘the creation and responsible management of a healthy built environment pivoted on the prudent use of resources and ecological principles’.

Raynsford (2000) provides a detailed definition for sustainable construction. He defined Sustainable construction as the set of processes by which a profitable and competitive industry delivers built assets (buildings, structures, supporting infrastructure and their immediate surroundings) which

- (i) Enhance quality of life and offer customer satisfaction
- (ii) Offer flexibility and the potential to cater for user changes in the future
- (iii) Provide and support desirable natural and social environments
- (iv) Maximize the efficient use of resources.”

The definition offered by Raynsford puts emphasis on both the process and the product and introduces some aspects of social, economic and environmental sustainability. However, the definition does not fully capture all the aspects

implied by the term. A more comprehensive definition is offered by Constructing Excellence (2004) which introduces sustainable construction as the application of sustainable development in the construction industry and suggests that sustainable development is “all about ensuring a better quality of life for everyone, now and for generations to come, through:

- (i) Social progress which recognizes the needs of everyone
- (ii) Maintenance of high and stable levels of economic growth and employment, whilst
- (iii) Protecting, and if possible enhancing, the environment, and
- (iv) Using natural resources prudently

Sustainable development embraces the three broad themes of environmental, social and economic accountability, often known as the 'triple bottom line.

Research Methods

The research instrument used was structured questionnaire designed in sections and administered to construction participants in Nigeria. Section A dwelt on the background information of respondent, while Section B dwelt on the objectives of the study, which were to prioritize the factors mitigating implementation of sustainable projects within the Nigerian construction industry. The questions were designed to retrieve information on the most critical factors mitigating the practice of sustainable projects in the Nigerian Construction Industry. Section A comprises total of five (5) questions aimed at providing information about the respondents whereas section B had Ten (10) questions which focused on the subject matter of the study i.e. critical factors hindering the implementation of sustainable projects in the Construction Industry. These factors were derived from the detail review of previous studies from related works. However, the factors highlighted may not cover all but commenting effort was made to identify the most severe factors mitigating implementation of sustainable projects in the Construction Industry. For each question in section B the respondents had been provided with five options in the form of a Likert's Scale ranging from 1 (Little important); 2 (Some important); 3 (Quite important); 4 (Important) and 5 (Very important).

The interviewees checked and evaluated the Ten (10) well organized questions based on their professional judgment. Relative importance index method (RII) was further employed to determine the relative importance indices of the various

factors mitigating implementation of sustainable projects within the construction industry as used by some scholars in their work. The sample of the study was randomly selected for active Consultants and Contractors from Federal Inland Revenue Service (FIRS) while that of Clients was selected from the government ministries and agencies. Total of 55 questionnaires were distributed to the entire respondents; 15 each to Clients and Contractors while 25 to Consultants comprises 5 Quantity Surveyors, 5 Architects, 5 Services Engineers, 5 Civil Engineers and 5 project managers. 39 questionnaires were successfully retrieved representing (71% of the total), i.e. 18 Consultants (72%), 10 Client (67%) and 11 Contractors (73%) which were valid and used in the analysis. The data obtained in the returned questionnaires was analyzed using the Statistical Package for Social Sciences (SPSS) software.

Table 1: Nature of Respondents' Work

Nature of work	Frequency	Percent (%)	Commulative percent
Clients	10	25.6	25.6
Contractors	11	28.2	53.8
Consultants	18	46.2	100
Total	39	100	

Factors Mitigating Implementation of sustainable Projects in the Nigerian Construction Industry

Based on reviews of previous related studies (Ten) 10 factors mitigating implementation of sustainable projects within Nigerian Construction Industry were identified, these factors were adopted in section B of the questionnaire and the data retrieved from them was further analyzed. Table (2) below shows the identified critical factors mitigating implementation of sustainable projects with their sources as used in the questionnaire.

TABLE 2: Factors mitigating implementing sustainable projects within construction industry

S/No	Factors	Sources
1	Budget constraints	Baron and Donath (2006)
2	Lack of alternative building materials	Baron and Donath (2006)

3	Limited understanding of the benefits of sustainable construction	Aigbavboa et al. (2017)
4	Assumption of additional cost of building projects	Love and Zhou (2003); Aigbavboa et al. (2017); Hakinen and Belloni (2011); Hydes and Creech (2000)
5	Lack of financial incentives for construction participants	Ayarkwa et al. (2017)
6	Lack of government commitment	Ametepey et al. (2015)
7	Lack of professional knowledge	Ametepey et al. (2015); Oberander (2000); (Babalola et al. 2015)
8	Lack of legislation	Ametepey et al. (2015)
9	Lack of support and measurement tools on sustainability	Zhang et al. (2011)
10	Lack of owner or developer's "full support for sustainable concepts"	Ojo et al. (2014)

Results

Relative Importance Index Ika et al. (2012) had used relative importance index method (RII) to determine the relative importance indices of the various factors in their work; a similar method was adopted in this study using the following equation.

$$RII = \sum w_i / (A * N) \quad (\text{where } i=1, 2, 3, \dots, N)$$

Where RII: Relative Importance Index

W_i: weighing given to each factor by the respondents from (1 – 5)

A: Highest weight (i.e. 5); N: Total number of participants

The RII value had a range from 0 -1 (0 as not inclusive); and the higher the RII the more important the factor mitigating implementation of sustainable projects. The RII were then ranked, the results are shown in the table below.

TABLE 3: Relative Importance Index and Ranking of factors mitigating implementation of sustainable projects

S/No	Factors	Respondents' Scoring					RII	Rank
		1	2	3	4	5		
1	Budget constraints	2	7	6	7	17	0.7538	5
2	Lack of alternative building materials	17	0	5	16	1	0.5282	8

3	Limited understanding of the benefits of sustainable construction	4	7	7	5	16	0.7128	6
4	Assumption of additional cost of building projects	7	6	7	6	13	0.8051	3
5	Lack of financial incentives for construction participants	1	4	9	5	20	0.8000	4
6	Lack of government commitment	2	1	2	8	26	0.8821	1
7	Lack of professional knowledge	21	0	0	15	3	0.4923	10
8	Lack of legislation	12	8	6	11	2	0.5128	9
9	Lack of support and measurement tools on sustainability	7	11	10	8	3	0.5436	7
10	Lack of owner or developer's "full support for sustainable concepts"	2	1	2	6	28	0.8667	2

Discussion of Results

Lack of government commitment is the most important factor mitigating implementation of sustainable projects in the Nigerian Construction Industry with RII (0.8821) and ranked first. Another leading factor as discovered from the research is Lack of owner or developer's "full support for sustainable concepts" that was ranked second with RII (0.8667), this factor often happen because of the negative perception of higher investment costs for sustainable buildings compared with traditional building and the risks of unanticipated costs are the major hindrance to the acceptability of sustainable buildings (Ojo et al. 2014). Similarly, the assumption of additional cost of building projects ranked third with RII (0.8051). Lowe and Zhou (2003) pointed out that the assumption that Sustainable Construction cost more, without proper evaluation, poses a big challenge in the adoption of sustainable construction practices in most developing countries around the world. Lack of financial incentives for construction participants was ranked fourth most important factor mitigating sustainable projects in the Nigerian Construction Industry with RII (0.8000). Moreover, another leading factor mitigating implementation of sustainable projects according to the study is Budget constraints. It is fifth with RII (0.7538). Baron and Donath (2016) observed that the major challenge of sustainability implementation in is not that of awareness but appropriateness. It was observed that, while there is awareness about the concept of sustainability, it is not implemented correctly. It is completely neglected due to budget constraints.

Conclusion

From the findings made, it can be concluded that the major factors mitigating sustainable projects in the Nigerian Construction Industry are; Lack of government commitment, Lack of owner or developer's "full support for sustainable concepts", the assumption of additional cost of building projects, Lack of financial incentives for construction participants and budget constraints among others. If these can be control and contain within the Industry, the frequent occurrences of executing construction projects that that are not sustainable would be reduced drastically.

Recommendations

- ✓ Government policy should be made in favor of sustainable construction and energy saving. Regulations should be developed in Nigeria, which should assist the built environment in becoming more sustainable. Complete overhaul of planning and implementation policies such as building codes that regulate performance standards for design and construction works based on sustainable principles.
- ✓ There should be severe punishment for any act that is not in line with the practice of sustainability in order to serve as detriment to others.
- ✓ (Most clients with deficient knowledge of sustainability in the industry could inevitability be injurious to the overall concept of sustainability. As such, Awareness should be created by relevant agencies to enlighten the clients about the benefits of sustainability
- ✓ Project managers should identify the essential knowledge and skills required to be a competent project managers of green construction projects; to discover the challenges that project managers encounter in managing green Construction projects
- ✓ Tertiary Institutions in Nigeria both Undergraduate and Post graduate level need to optimize sustainable design in their semester curriculum. It could include sustainable development, sustainable design processes, principles and benefits, policies and building regulations. This is going to build the mentality of the younger designers to be more conscious of sustainable development and construction.

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