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Appraisal of Required Incentive Strategies for Green Building Practices amongst Construction Stakeholders in Nigeria

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ABSTRACT: Green construction has become an essential technique to limit the negative impacts of the construction operations on the environment and climate change. Unfortunately, the delivery cost of green building projects is much more than that of conventional buildings enough to dissuade construction stakeholders. Consequently, incentive methods have arisen as efficient enticement mechanisms for the adoption of green construction in numerous nations. This study emphasised the necessary incentive strategies required to encourage the adoption of green building practices among construction stakeholders in Nigeria from the perspective of consultants and contractors through a survey design. The respondents were sampled from Abuja, the capital of Nigeria by the use of structured questionnaire. A total of one hundred and twenty (120) questionnaires were randomly administered to the respondents through personal and online delivery. Ninety-Two (92) questionnaires were retrieved and analysis using Mean analysis, One-sample t-test and Mann Whitney U test. The proposed incentive strategies were statistically significant to promote GB adoption in Nigeria. The top Three (3) strategies were "assess to government loan", "tax abatement and credit", and "government awards". There was a consensus in the groups' recognition of the importance of these incentive strategies. This conclusion serves as a point of reference for understanding the aspirations and expectations of construction stakeholders in the adoption of green building practices, while also supporting policymakers in the development of market-based tools for GB adoption in Nigeria.

Keywords: Green building practices, Incentive strategies, Construction stakeholders, Nigeria

I. INTRODUCTION

Green Building Technologies have gotten a lot of attention recently because of their ability to reduce negative environmental impacts of construction activities, and promote long-term economic growth (Darko, Zhang and Chan, 2017). A lot of benefits and positive impacts attributed to Green Building (GB) play a significant role in the eagerness of stakeholders to implement this concept. World Green Building Council defined Green Building as a building that, through its design, construction, or service, decreases or removes negative impacts, and can create positive impacts on our climate and natural environment (WGBC, 2017). GB technologies offered range of environmental, economic and social sustainable benefits that could not be derived from traditional buildings (Chan et al., 2018; WGBC, 2017; Zainul Abidin, 2009).

Nevertheless, as an innovation in the construction industry, the delivery cost of GB projects is significantly higher than conventional buildings (Darko and Chan, 2016; Dodge Data Analytics, 2016). According to Wilson and Tagaza (2004), the initial project cost for conventional building is almost 25 percent cheaper than GB projects. These additional costs are attributed to the adoption of sustainably sourced materials, efficient mechanical systems, passive design, advanced energy modeling, and other high-performance features in GB projects (Zhang et al., 2019; Alshamrani, 2017; Kang et al., 2013). Even though researchers believed that, the long-term benefits of green buildings outweigh the additional cost associated with its construction (Taemthong and Chaisaard, 2019; Balaban and de Oliveira, 2016; Dodge Data and Analytics, 2016), these advantages are generally realized post-production, thus significant stakeholders like developers and contractors that focus on short-term profitability

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have little or no motive to focus on sustainability (Gundes and Yildirim, 2016; Balaban, 2012). Consequently, the implementation of GB Incentive has emerged as effective inducement mechanisms towards the adoption of GB practices in many countries (Nurul Diyana and Zainul Abidin, 2013; Choi, 2009). Gundes and Yildirim (2016) described incentive as a useful resource for raising awareness and motivating people to choose green building practices over traditional ones, while the absence of incentives constitute a major impediment to the adoption of sustainable practices including green building concept (Gluch et al., 2013; Ang and Wilkinson, 2008).

GB incentives are designed to address the market barriers and failures of GB development. According to Varone and Aebischer (2000), government drive is needed for the green building sector to become self-motivated. Consequently, many nations and regions have adopted both financial and non-financial incentives such as tax breaks, subsidies, grants, density bonuses, fee reductions, and accelerated permitting among others (Nguyen et al., 2017; USGBC, 2014; Nurul Diyana and Zainul Abidin, 2013; Shapiro, 2011; Choi, 2009). Nigeria is not exempted from this global challenge (Oluwunmi, Oladayo and Afolabi, 2019; Onososen, Osanyin and Adeyemo, 2019; Oyewole, Ojutalayo and Araloyin, 2019). Yet, the country, unlike the others, has no policy on the adoption of incentive strategies to drive GB practices in the country. According to Adetayo et al. (2019), there is little or no guiding policy to improve the technical capacity of construction practitioners to participate in green building practices in Nigeria. This has undoubtedly contributed to the country's dismal performance in the delivery of green building projects. For instance, Green Building Information Gateway's website in 2022 identified only five certified green buildings in Nigeria. As a rapidly developing country that is in the early phase of GB development, there is need to develop the pre-requisites required for GB market.

Thus, given the importance of incentives in promoting the development of green building markets, it becomes imperative that effective incentive programs are adopted to ease GB adoption in Nigeria. It is on this note that this study examines construction stakeholders' perspective on the required incentive strategies for green building practices in Nigeria. According to Ghodrati, Samari and Shafiei (2012), it is critical to consider the preferences and demands of the users when designing incentives.

II. LITERATURE REVIEW

2.1 Green Building Concept

The progress of a nation's economy and society has a close relationship with the construction industry (Yin, 2018). The construction industry makes a very significant contribution to the sustainable development of the overall economy by achieving basic objectives of development including employment creation, re-distribution, and the generation of output and income; satisfying basic social and physical needs, including the provision of infrastructure, the production of accommodation, and of consumer goods; stimulates a sizeable amount of economic growth through inter-sectorial linkages between construction and other sectors, giving it a powerful role in economic development (Durdyev and Ismail, 2017). These roles have direct or indirect effects on the health, economic, social, and cultural lifestyles of humans (Mogbo, 2014). As Ahn et al. (2013) pointed out, every country's economic, political and developmental affairs, as well as the state and welfare of its communities are greatly influenced by construction activities. Nevertheless, the industry is been described as unkind and unfriendly to the natural environment (Ametepey et al., 2015). The implementation of construction practices globally have led to severe depletion of natural resources, economic instabilities and loss of cultural heritage (Kibert 2013). Researchers have established the impact of construction activities on the environment through a series of factors, such as environmental pollution, climate change, carbon emissions, depletion of natural resources, generation of waste, and land use changes (Alwan et al., 2017). Construction activities such as extraction, processing and transportation of raw materials, design, construction, use and demolition of built products use a lot of resources and energy (Wi et al., 2018; Guna et al., 2019), that negatively affects the physical environment in the form of greenhouse gas emission, wastes, and carbon emission (Aigbavboa et al., 2017) and social lifestyles in the form of poor health and safety (Jiang and Wong, 2016).

Sustainable construction is a concept developed to overcome the negative impacts of construction, thereby achieving sustainable development in the process (Anigbogu, 2015). It is perceived to be a holistic and integrative concept that aims to restore harmony and balance between the environment, economy, and society (Du Plessis, 2002). Consequently, a construction project is said to be sustainable if it meets environmental challenges, responds to social and cultural demands, and delivers economic improvement (Bal

et al., 2013). Sustainable construction offers first-rate response to present environmental and socio-economic problems, as it is an application of principles of sustainable development to comprehensive construction cycles from the extraction of raw materials through planning, design and construction of buildings and infrastructure until the final deconstruction and management of resultant waste (Yunus and Yang, 2011). The use of such a notion in the construction industry aims to preserve a balance between natural and constructed environments by focusing on the use of instruments targeted at decreasing the environmental, economic, and social impacts generated during the various stages of a building project's life cycle. Therefore, a sustainable building refers to application of sustainability principles to design, construction and management of buildings so as to mitigate environmental footprints of building sector and its surroundings, and consequently on humans (Balaban, 2012).

Green building is broadly acknowledged concept which works on implementing sustainable development that considers the environmental, economic and social structures in the construction industry. Green buildings (GB) are designed, built and operated to boost health, environmental, productivity and economic performance over the conventional buildings (Shi and Liu, 2019). It involves the creation of constructed items using best-practice and resource-efficient techniques, from the extraction of the raw materials to the demolition and disposal of their components (Ojo, Mbowa and Akinlabi, 2014). United States Environmental Protection Agency (USEPA) certified green building as environmentally responsible and resource-efficient buildings throughout its life-cycle from siting to design, construction, operation, maintenance, and deconstruction (Jiang and Wong, 2016). Similarly, Kubba (2010) described it as a building built with preference for natural, reused, and recycled materials and are planned for maximum energy efficiency. Through the maximization of effective use of resources such as energy, water, and raw materials, these buildings provide residents with healthier, more pleasant, and productive indoor environments. Green building concept is a recent response to address the environmental and health challenges that stem from buildings and reduce impacts of the building sector on natural environment, as well as on humans. There is a consensus in the literature that green buildings outperform conventional (non-green) buildings in several performance areas. Lower energy and water consumption, improved indoor air quality, enhanced health and productivity, increased property value, among others, are frequently cited benefits associated with green building (Ibrahim et al., 2018; Choi, 2009).

2.2 Green Building Incentives

The delivery of green building projects as a new invention in the construction industry is a highly difficult task, particularly when contrasted with more traditional methods of project delivery. The involvement of newer technologies and sustainable materials influence the investment cost of GB projects which is often view as the biggest obstacle to green building adoption (Alshamrani, 2017; Kang et al., 2013). According to Wilson and Tagaza (2004), the initial project cost for conventional building is between 1-25 percent cheaper than green building. The higher operating expenses is attributed to higher efficiency mechanical systems, passive design elements, advanced energy modeling, and other high-performance components in green construction (Zhang et al., 2019; Alshamrani, 2017). Although, the long-term benefits of a green construction exceed the higher initial expenses (Taemthong and Chaisaard, 2019; Balaban and de Oliveira, 2017), nevertheless, the benefits are mostly recognized after construction, and certain stakeholders like developers and contractors who are more concerned with short-term revenue are unwilling to bear the high initial investment costs, hence the choice of traditional buildings (Balaban, 2013; Wilson and Tagaza 2004).

Tam (2013) opined that the availability of government incentives can influence the decision-making process of the stakeholders. That is, if there are financial advantages to be had by contractors, they are more inclined to adopt green construction. As a result, governments are faced with the issue of formulating and implementing laws and programs, such as incentive programs, that would encourage construction stakeholders to participate in the execution of GB projects. Samari et al. (2013) observed government incentives to play a crucial role in encouraging contractors to participate in the adoption of green buildings due to contractor's exposure to minimal risk and financial assistance. As more emphasis is placed on sustainable development in the construction industry, the governments are encouraged to offer incentives to encourage green building practices among various construction industry players (Saka et al., 2021). GB incentives can be described as a particular enticement that is planned for, developed, and carried out with the intention of swaying or motivating individuals to engage in green building

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development. It is believed that they are valuable tools that may help raise awareness and motivate individuals to select green construction approaches over regular ones (Gundes and Yildirim, 2016).

2.3 Incentive Strategies

Many countries that have seen substantial progress in the adoption of green building practices have used incentive programs. For example, the governments of the United States of America, the United Kingdom, Canada, Australia, Hong Kong, Singapore, China, Malaysia, and other countries have implemented incentive strategies, such as grants, tax incentives, rebates, discounted fees, Floor-to-Area density, technical assistance, expedited permitting, business planning assistance, marketing assistance, regulatory relief, and other similar measures, in order to encourage the adoption of green building practices in their respective countries (Nurul Diyana and Zainul Abidin, 2013; Shapiro, 2011; Choi, 2009). GB incentives has been classified into structural (or non-monetary, intangible) and financial (or monetary, tangible, fiscal) incentives (USGBC, 2014; Olubunmi et al., 2016). These two categories of incentives aim to increase the attractiveness of green building for construction stakeholders; nevertheless they are distinct in their manner of motivation.

2.3.1 Financial Incentives

Financial incentives are the monetary help provided by the government to parties who propose or are interested in green building construction. These incentives are supplied in the form of tax breaks, loans, rebates, grants/subsidies, and fee reductions (Onuoha et al., 2018; IFC, 2017; USGBC, 2014; Wentz, 2010; Rainwater, 2008), with the goal of compensating for the increased expenses involved with the development of green buildings that incorporate specified sustainability measures. Tax Incentive is a powerful and commonly used government- sponsored financial incentive to encourage desirable behavior that is ideal for GB projects because of its unique nature of meeting specific levels of green certification, as well as short- and long-term objectives (Onuoha et al., 2018; IFC, 2017; USGBC, 2014;). Stakeholders with green building ideas and development are provided tax breaks or are completely exempted from paying taxes for a period of time having satisfied GB standards (Kubba, 2010). Tax incentives, according to VanderDoes (2008), can be used as a deterrent to unsustainable practices, which implies they can be used positively or adversely. Low-interest loan is also available from governments for green development projects (Onuoha et al., 2018; Rainwater, 2008). Typically, these schemes work by assigning a significant fund to be used for low-interest loans to people looking to build or upgrade to green building standards, with repayments replenishing the fund so that it can be used for other loans (USGBC, 2014; Pippin, 2009). Green Technology Financing Scheme (GTFS) is an example of GB incentive loan program adopted in 2010 to attract Malaysian green technology innovators and users (Nurul Diyana and Zainul Abidin, 2013; Aliagha et al., 2013).

Government grants is another strategy to offset some of the higher development costs associated with green building projects. Grants are one-time monetary contributions made to homeowners or developers to help subsidize the cost of certification or lump sum for other green building costs (Nguyen et al., 2017; Cotten, 2012; Van der Heijden, 2018). In China for instance, there is a direct payment subsidy program that applies a cash subsidy per square meter to various levels of certification in the country (IFC, 2017). Similarly, in Australia, developers of office buildings, hotels, and retail malls get a building innovation subsidy to stimulate innovative concepts that minimize energy use and greenhouse gas emissions (Van der Heijden, 2018). Fee reductions or a waiver is a form of monetary incentive that can equally be combined with structural incentives like expedited permitting to motivate the stakeholders. They are offered by the government inform of charge fees during permit processes if stakeholders fulfill GB requirements (Gundes and Yildrim, 2015; Onuoha et al., 2018; USGBC, 2014). Stakeholders also take advantage of government rebates and discounts to get their hands on environmentally friendly products at a reduced price (Onuoha et al., 2018; Choi 2009). These products are purchased by the government and sold at a discount to individuals (Rainwater, 2008; Pippin, 2009).

2.3.2 Non-financial Incentives

Non-financial or Structural incentives are administrative incentives that focus on indirect way of how the stakeholders could get their benefit from building green. The primary aim is to attract developers through the provision of time and money savings for green developments (USGBC, 2014; Gundes and Yildrim, 2015). These incentives work by encouraging developers to practice green building through rewards such as density and height bonuses, technical assistance, marketing assistance**,** and expedited permitting processes,

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which is of low or no cost to the government. Density Bonus is non-financial incentives that require little or no financial investment by the government. This strategy offers opportunities to increase or expand constructed space beyond stipulated for engaging in green building practices (Rainwater, 2008; Pippin, 2009; Qian et al., 2016). The types of density bonuses include increases in the permitted Floor Area Ratio (FAR), increases in the number of approved dwellings, and increases in the number of building stories (IFC, 2017; USGBC, 2014). For instance, the developers in Arlington are granted additional density up to 0.25 FAR and an additional height up to 3 stories if the building meets the Silver LEED rating or higher (IFC, 2017). Similarly, in Hong Kong, developers can acquire additional gross floor area from the government in exchange for the provision of social amenities (Fan et al., 2016).

Expedited permitting is also incentive strategy that promotes timely completion of green building projects. This is accomplished by bypassing the standard design approval processes, which often take a longer time to allow for speedier design approvals (Rainwater, 2008; Choi, 2009; Pippin, 2009). According to Walker et al. (2018), expediting the approval process and shortening the review period can significantly influence the timely and cost performance of green building practices. A demonstration project is an additional technique for encouraging GB practices. Theaker and Cole (2001) described it as a government strategy to promote public acceptability of GB activities. According to Perkins and McDonagh (2012), stakeholders are faced with the difficulty of selecting the appropriate materials and construction methods for GB practices. Therefore, governments create prototype projects to show and demonstrate GB concepts. In China, for instance, heat pumps were installed in select buildings throughout the country, which serve as a guide to the stakeholders (Yunna and Ruhang, 2013). Similarly, Chan and Ma (2016) recognized the "Lochiel Park Sustainability Center" in Adelaide as a showcase project for the effective use of energy and water. In addition, stakeholders can also be assisted to build green through the provision of technical assistance such as free consultation with green building experts, unrestricted access to government resources, free planning, or a certification training that can familiarize a developer with green building practices (Choi, 2009; Wentz, 2010; Pippin, 2009). Energy efficient equipments can also be leased to businesses and residents so that the initial cost of purchasing and installing this equipment is passed on to the government (USGBC, 2014). Thus, making energy efficiency attainable in instances where it might not be affordable otherwise.

A government award is another strategy by which the government incentivizes by recognizing and rewarding stakeholders who have exhibited excellent green construction techniques (Cotten, 2012). Facilities with high level of sustainability design are officially recognised and reward publicly by the government.

Table 1: List of identified incentive strategies from published literature

Incentive Strategies	**References**																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Tax abatements and credits	√	√		√	√	√															
Government loans		√	√	√	√	√															
Grants		√		√	√	√	√					√			√						
Fee reductions & waiver	√	√			√	√															
Rebates			√		√	√					√			√							
Expedited Permitting Process	√	√	√	√		√					√		√							√	
Density Bonuses	√	√	√	√		√					√		√			√					
Technical & Material Assistance		√				√		√			√		√	√				√			
Demonstrated Projects								√											√		√
Government Awards											√	√			√			√			
Eco-labelling									√	√						√	√	√			

Gundes & Yildrim (2016)-**1**; USGBC (2014) –**2**; Rainwater (2008) –**3**; IFC (2017) –**4**; Onuoha et al. (2018) –**5**; Wentz(2010) – **6**; Nguyen et al. (2017) -**7**; Perkins & McDonagh (2012) –**8;** Yang & Zhou (2010) –**9**; Fuerst et al. (2014) –**10;** Pippin (2009) –**11**; Cotten 2012 –**12**; Choi 2009 – **13**; Qian & Chan 2008 –**14**; Van der Heijden 2018 – **15**; Qian et al. (2016) – **16**; Balaban & de Oliveira (2017) – **17**; Liu et al. (2019) –**18**; Yunna & Ruhang (2013) -**19**; Walker et al. (2018) –**20**; Theaker & Cole (2001) –**21**

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An example is annual award to different GB developments in Gainesville, Florida which confers a public prestige on the beneficiaries (Pippin, 2009; Liu et al., 2019).

Eco-labelling is another structural incentive aimed at providing accurate information regarding the environmental performance of green building projects and components (Fuerst et al., 2014; Liu et al., 2019). It was described as a strategy that provides credibility and confirmation regarding the degree to which a product and its production method are environmental friendly (Fuerst et al., 2014). Balaban and de Oliveira (2017) opined that, the standards for the environment, health, and the economy should all be combined in the labeling of GB products. Similarly, a lot of studies have concluded that Eco-labelling will boost consumer's readiness to pay more for green building projects, and also increase the market brand of the owners and producers of GB projects and features (Jang et al., 2018; Yang and Zhou, 2010).

III. RESEARCH METHODOLOGY

3.1 Data Collection

This study set out to appraise the required incentive strategies for green building practices among construction stakeholders in Nigeria. An empirical questionnaire survey was carried out to examine the relative importance of different incentive strategies towards the adoption of GB practices. The population comprised Consultants and Contractors in the Nigerian construction industry. The study adopted a structured questionnaire that was informed through the review of relevant literature. The questionnaire was divided into sections, with the first section concentrating on the respondents' background information, such as organisation, years of experience, profession, and knowledge of GB incentives, while the second part presented Eleven (11) incentive strategies proposed to promote the uptake of GB practices which were deduced from the literature. The respondents were asked to rank the significance of each of the strategies as a motivation for GB practices in Nigeria using a Five-point Likert rating scale (very important = 5, important = 4, average= 3, less important = 2 and not important = 1). The primary data was obtained through online and manually distributed questionnaires. A total of 120 questionnaires were randomly distributed to various organizations, with a target of 60 questionnaires per each group of respondents. However, only 92 were retrieved, representing 76.7% response rate. The questionnaire survey was conducted in the city of Abuja. The city was preferred not only as the capital of Nigeria, but as one of the largest host of construction companies and stakeholders in the country.

The analysis of the respondents' profiles signified that the reliability and credibility of the findings from this research is of high standard. As shown in Table 2, 42.2% of the respondents were Consultants by organisation while 57.6% represent the Contractors. Majority of the respondents totaling 91.4% had over 5 years of industrial experience implying that majority of the respondents had significant years of experience in the construction industry to understand the objective of this study. Similarly, 77.2% of the respondents were fully registered with their professional bodies, while probationer and graduate members had a minimal contribution of 13% and 9.8% respectively. In term of contribution by profession, 18.5%, 23.9%, 14.1%, 22.8% and 20.7% represent the Architects, Quantity surveyors, Engineers, Builders and Estate surveyors respectively. Over 84.5% of the respondents had a significant knowledge of incentive strategies. It is thus evident from this finding that majority of the respondents had a significant knowledge of incentive strategies enough to decide the implication of the proposed strategies on the adoption of GB among construction stakeholders in Nigeria. Cronbach's alpha coefficient was used to measure the internal consistency among various factors in order to access the reliability of the five-point likert scales adopted. The test value for this objective is 0.847, which is greater than 0.70 thresholds as indicated by Norusis (2011), indicating that the measurement scales were reliable at the 5% significance level. Hence, the samples collected were suitable for analysis.

3.2 Data Analysis

The data collected were subjected to three statistical analyses with the aid of IBM SPSS Version 22 statistical software. These analyses included descriptive means, a one-sample t-test, and Mann-Whitney U Test. The importance of the proposed incentive strategies were analysed using Mean Item Score (MIS) technique and One-sample t-test. The MIS technique was adopted to compute and prioritize the mean values of the incentive strategies as observed by the respondents, while one-sample t-test was employed to ascertain the significance of their means scores (Zhao et al.,

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Table 2: Demographic characteristic of the respondents

Title Characteristic	Category	Frequency (N=92)	Percent (%)
Organisation	Consultant	39	42.4
	Contractor	53	57.6
Years of Experience	1 – 5 years	8	8.7
	6 – 10 years	23	25.0
	11-15 years	11	12.0
	16 -20 years	18	19.6
	21 years & Above	32	34.8
Professional Membership	Registered Member	71	77.2
	Probationer Member	12	13.0
	Graduate Member	9	9.8
Profession	Architect	17	18.5
	Quantity Surveyor	22	23.9
	Engineer	13	14.1
	Builder	21	22.8
	Estate Surveyor	19	20.7
Knowledge of Incentive Strategies	Very High	12	13.0
	High	25	27.2
	Average	41	44.6
	Low	14	15.2

Source: Author (2022)

2016), against a test value of 3.50, which represent a significance level in the rating scale adopted for this study as suggested by Darko et al. (2017). Where two or more strategies had the same mean score, the strategy with the lowest standard deviation (SD) was assigned the highest rank (Mao et al., 2015). The significance of the mean values was tested through one-sample t-test, the Null hypothesis (H_0) states that "the mean value is not statistically significant", while the alternative hypothesis (H_1) states that "the mean value is statistically significant". The Null hypothesis (H_0) should be rejected if the p-value of incentive strategy is less than 0.05. Since the respondents emerged from two different groups i.e. consultant and contractor, Mann-Whitney U Test at 5% confidence level was adopted to test for any statistical difference in the ranking of both groups on the required incentive strategies for GB adoption in Nigeria. The Null hypothesis states there is no significant difference (H_0), while the Alternate (H_1) states there is a statistical difference between the groups. Hence, if the p-value is greater than 0.05, Ho is accepted and H_1 is rejected, otherwise, the H_0 is rejected and H_1 is accepted (Pallant, 2010).

IV. ANALYSIS RESULT AND DISCUSSION

Table 3 displays the survey results regarding the required incentive strategies for GB adoption among construction stakeholders in Nigeria. The mean values of the incentive strategies ranged from 4.34 to 3.83 significantly above the benchmark of 3.50 adopted. Similarly, the incentive strategies were deemed statistically significant through the one-sample t-test analysis since their p-values were lesser than 0.05, indicating that the eleven (11) strategies were significantly essential in the adoption of GB practice in Nigeria. However, the top six strategies (Mean ≥4.01) include "assess to government loan," "Tax abatement & Credit," "Government awards," "Rebates on Eco-products," "Fee reductions & Waivers," and "Government grants," while the use of "density bonus" and "demonstrated projects" were identified as the least effective strategies. The top six incentive schemes are detailed in the next section.

Government loan, with a mean score of 4.34, was chosen as the most significant strategy needed for GB practices by respondents. Other authors, such as Rainwater (2008), Onuoha et al. (2018), and Pippin (2009), have backed this position. Nigeria is not exempt from the countries that face high initial costs as a barrier to GB adoption (Oluwumi et al., 2019; Onososen et al., 2019), therefore a support in the form of low-interest loans to stakeholders with GB developmental plans will go a long way to ease the tension associated with the initial cost of GB projects, thereby promoting the adoption of GB

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Table 3: Survey Results on the required Incentive Strategies for GB adoption

Incentive Strategies	Consultants			Contractors			All Respondents			
	MIS	SD	Rank	MIS	SD	Rank	MIS	SD	Rank	P-value
Government loans	4.46	0.600	1	4.25	0.998	2	4.34	0.855	1	0.00[a]
Tax abatement & Credit	4.15	0.812	2	4.15	0.744	5	4.15	0.769	2	0.00[a]
Government Awards	3.92	1.156	10	4.30	0.822	1	4.14	0.990	3	0.00[a]
Rebates on Eco-products/equipment	4.10	1.165	4	4.17	1.156	4	4.14	1.154	4	0.00[a]
Fee reductions & Waivers	4.03	0.986	6	4.17	0.935	3	4.11	0.955	5	0.00[a]
Government Grants	4.13	1.260	3	3.92	1.107	6	4.01	1.172	6	0.00[a]
Eco-labelling	4.08	0.900	5	3.91	0.925	8	3.98	0.914	7	0.00[a]
Expedited Permitting process	4.03	1.013	8	3.91	1.244	9	3.96	1.148	8	0.00[a]
Technical assistance	4.00	1.147	9	3.92	1.342	7	3.96	1.257	9	0.00[a]
Demonstrated Projects	4.03	0.987	7	3.77	1.325	11	3.88	1.194	10	0.00[a]
Density Bonuses	3.87	0.894	11	3.79	1.133	10	3.83	1.034	11	0.00[a]

SD =Standard deviation; [a]One-sample t-test result is significant at the 0.05 significance level (p-value < 0.05; 2-tailed)

Table 4: Mann-Whitney U Test

	Group	N	Rank	Sum of Ranks
Incentive strategies	Consultant	11	12.05	132.50
	Contractor	11	10.95	120.50
	Total	22		

Test Statistics[a]

	Incentive strategies
Mann-Whitney U	54.5
Wilcoxon W	120.50
Z	-.395
Asymp. (2-tailed)	.693
Exact Sig. [2*(1 tailed Sig.)]	.699[b]

a. Grouping variables: Group; b. Not corrected for ties
Source: Author (2022)

practises amongst the stakeholders. Tax exemptions and credits scored second with a mean score of 4.15. This method has been defined by earlier authors as a potent and widely utilized government-sponsored financial incentive to induce a desirable behaviour necessary for the development of GB practices (Onuoha et al., 2018; USGBC, 2014). This incentive scheme exempts construction stakeholders with green building plans and concepts from paying taxes on GB projects for a period of time. Consequently, the cost of development is reduced sufficiently to incentivize future investments in GB techniques. Government award is the third most essential strategy, with an average score of 4.14. This strategy has been classified as a non-monetary reward (USGBC, 2014; Cotten, 2012). It is a non-financial aid offered by the government in the form of formal recognition and prizes to stakeholders or projects that have demonstrated excellent GB approaches. According to Varone and Aebischer (2000), for the green building sector to become self-motivated, government intervention is required. Recognizing and rewarding facilities with a high level of sustainability design by the government will not only impart public prestige on the recipients, but

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will also increase interest in adopting GB practises. Similar to this technique is a "demonstration project" recognised as the 10th incentive method with an overall mean score of 3.88, which aimed to increase the public's acceptance of GB activities (Theaker and Cole 2001).

Rebates on eco-products and equipments shared a mean score of 4.14 with the third strategy. However, due to variances in standard deviation (SD), it was ranked fourth. This strategy's ranking suggests that the availability of environmentally friendly items and equipment at a discount can persuade construction stakeholders to adopt GB practises (Rainwater, 2008). According to Wilson and Tagaza (2004), the initial project cost for conventional construction is around 25 percent lesser than green construction. Green building projects incurred these higher expenses due to the use of sustainable materials, efficient mechanical systems, and other high-performance components (Zhang et al., 2019). With the assistance of discounted items sponsored by the government, the initial expense of purchasing and installing these items is transferred to the government thereby making GB components affordable (USGBC, 2014). Fee reduction and waivers came fifth in the overall ranking table with an average score of 4.11. It is a monetary incentive that can be supplemented with non-monetary incentives, such as quicker permitting. This policy enables the government to lower the fees associated with the permit process for stakeholders with GB standards (Pippin, 2009; Onuoha et al., 2018). Government grant was the sixth incentive strategy, indicating that the availability of a one-time monetary contribution available to stakeholders for discounting the cost of certification or as a lump amount for GB development is an additional effective method for boosting GB adoption in Nigeria. This observation is in agreement with Cotton (2012) and Van der Heijden (2018). In China, for example, different subsidy programmes are associated with different levels of Green Building (GB) certification in order to promote GB practises. Similarly, developers in Australia have access to innovation subsidies in order to encourage innovative concepts that reduce energy consumption and greenhouse gas emissions (Van der Heijden, 2018).

In addition to the overall ranking of incentive strategies, Table 4 provides Mann-Whitney U Test results of the agreement between consultants and contractors regarding the ranking of incentive strategies required for GB adoption in Nigeria. The test value has a Z score of -.395 and an exact significance value of [2*(1 tailed Sig.)] of.699. As a result, the study retained the null hypothesis (H_O) and concluded that there is no significant difference between consultants' and contractors' perspectives on the required incentive methods for GB practises among construction stakeholders in Nigeria. In light of the above discussions, it can be concluded from the overall perceptions of the respondents that, despite the fact that the development of GB is in its infancy in Nigeria, the respondents are aware of the necessary incentives strategies to encourage the adoption of GB practises among the stakeholders.

V. CONCLUSION

Green construction has become an important approach for limiting the negative impacts of the construction industry on the environment and climate change. Unfortunately, the delivery cost of green building projects is considerably more than that of conventional buildings, enough to dissuade construction stakeholders. Consequently, incentive strategies have evolved as efficient enticement mechanisms for the adoption of green construction principles in several nations. This study highlighted the necessary incentive strategies to promote the adoption of green building technologies among construction industry stakeholders in Nigeria. Through a comprehensive examination of the relevant literature, eleven (11) incentive strategies were selected and subsequently evaluated by ninety-two (92) construction consultants and contractors using a structured questionnaire. All incentive strategies were statistically significant, however the top six were assess to government loan, tax abatement and credit, government awards, rebates on eco-products, fee reductions and waivers, and government grants. In addition, there was a substantial consensus among consultants and contractors recognising the significance of these strategies in Nigeria. To bridge the gap between the government and construction stakeholders, it is necessary to have a greater awareness of their requirements and objectives. This empirical study sheds light on the promotion of green construction practices through the use of incentives. Incentives, as a market-based instrument, are more effective and competitive in addressing market failure than regulatory instruments. The prerequisites for the development of the green building market in Nigeria have not yet been fully defined, and there is a need for policymakers to design market-based instruments that are appropriate. Consequently, this result serves as a point of reference for comprehending the preferences and expectations of construction stakeholders.

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