West Africa Built Environment Research (WABER) Conference
10th Anniversary Conference, 5-7 August 2019, Accra, Ghana
Proceedings Edited by Laryea, S. and Essah, E.
ISBN: 978 – 9988 – 2– 6010 – 1
DOI: https://doi.org/10.33796/waberconference2019.18

BUILT ENVIRONMENT EDUCATION FOR GREEN BUILDING DEVELOPMENT IN NIGERIA

Olubunmi Comfort Ade-Ojo[1] and Deji Rufus Ogunsemi[2]
[1,2]*Department of Quantity Surveying, Federal University of Technology, Akure, Nigeria*

The built environment is at the center of construction activity with its attendant problems the world over. Efforts to minimize the negative impact of the built environment include the development of green buildings. Therefore, the paper aimed at assessing the level of awareness of the requirement for green building development among built industry professionals in the Physical Planning Units (PPU) in Federal Tertiary Educational Institutions in South-West Nigeria. The LEED v4 Project checklist for New Construction and Renovation was adapted on a five points Likert's scale for data collection. The questionnaire survey was administered on built industry professionals through census. The Mean Item Score (MIS) was used to rank the level of awareness of the requirements for green building while Kruskal Wallis Rank Sum Test was used to determine the variation in the level of awareness. The Least Square Difference (LSD) was also used for Post-Hoc assessment to determine the significant variation from one professional to the other. The results showed that only three of the professionals have significant levels of awareness of green building requirements. The Kruskal Wallis Rank sum Test showed a significant variation in the level of awareness of the requirements among the professionals with 0.027 at 95% confidence interval. The paper concluded that there was a high variation in the level of awareness of the requirements among the professionals. The Post-Hoc test also proved that it would be difficult to achieve the integration and collaboration required for green building development among the built industry professionals in Nigeria. The paper therefore recommended the need for training and workshops by professional bodies to educate their members and develop requisite skills for green building development in Nigeria.

Keywords: built industry, green building, LEED, professionals, requirements

INTRODUCTION

The built environment is at the center of construction activity with its attendant problems the world over. Efforts to minimize the negative impact of the built environment include the development of green buildings. Green buildings are buildings developed with consideration for sustainability according to the California's Sustainable Buildings Task Force (SBTF) report (2001). These are also referred to as Green or High performance buildings. A sustainable development

[1] oluwabunmiade@gmail.com; ade-ojoco@futa.edu.ng
[2] dejifeyi@yahoo.com; drogunsemi@futa.edu.ng

harmonizes the three aspects of environmental, social and economic concerns (Boyd & Kimmet, 2005; Shen, Hao, Tam, & Yao, 2007; Morelli, 2011; Bal, Bryde, Fearon, & Ochieng, 2013; Hussin, Rahman, & Memon, 2013). Therefore, a building is classified as green when it is developed taking into consideration environmental, social and economic concerns. Despite the many benefits of green building development, the construction industry in Nigeria is yet to embrace the principle of sustainable development (Windapo and Rotimi, 2012; Nduka & Ogunsanmi, 2015).

Ejohwomu and Oshodi (2014), reviewing research in construction economics and management, observed that over a 29year period (1984-2012) there was no research work carried out on sustainable building at PhD level. Not much has been done to improve education for green building development in Nigeria compared to other countries like Malaysia (Onuoha et al., 2017). Lack of training and tools was identified as barriers to sustainable facility development in Nigeria (Oladokun, 2010). The study reported that though the professionals under the study were graduates of universities and polytechnics, no formal training was received either from the educational or professional institutions. This underscores the wide gap that exists in the level of knowledge required for effective implementation of green building development in Nigeria. The construction industry is complex due to the fragmented nature of its activities and requiring inputs from different professionals in the execution of its activities. The fragmented nature has made it imperative for every profession to redefine sustainable development along its professional obligation. This is to ensure that the client gets value for his investment and that the users derive maximum comfort for using the property (Shen et al., 2007; Waniko, 2012; Ejohwomu & Oshodi, 2014). Despite the knowledge gap widely acclaimed, no tangible effort has been made by these studies to assess specifically the knowledge gap among the built industry professionals in relation to green building requirements. Therefore the objective of the study is to identify the level of awareness of the requirement for green building development along professional lines with the aim of .the establishing the variations in the level of awareness among built industry professionals in the Physical Planning Units (PPU) in Federal Tertiary Educational Institutions in South-West Nigeria.

LITERATURE REVIEW

A Green Building refers to a high-performance building designed, built, operated and disposed of in a resource-efficient manner. Green buildings are designed to minimize the overall (negative) impact of the building on the built environment, human health and the natural environment (Kats, 2003; Langdon, 2007). Green building practices refer to design and construction techniques meant to reduce waste, to promote the efficient use of resources and lessen the ecological impact of the built environment. It is an integrated design process which requires that all of the design professionals work cooperatively towards a common goal from the inception of the project. However, lack of awareness has been one of the major challenges to green building development in Nigeria (Dahiru, Dania & Adejoh, 2014; Amasuomo, Atanda & Baird, 2017). In the same vein, Onuoha et al. (2017) observed that efforts towards green building development in Nigeria is still at infancy in comparison with Malaysia. The study also noted that there is lack of professional skill for green building construction in Nigeria. hence this paper seeks

to assess the level of awareness of the professional to enhance skill development through green building education.

Green building requirements

Implementing green building development goals requires the establishment of some form of assessment tools. Although these tools differ in concepts and principles depending on the nature and scope of its intended implementation, the basic sustainable parameters for green building development are the same (Pandey and MIT-UTM, 2016). The LEED has been the global market player for green building standards. It is being used in over 135conutries the world over. Due to its flexibility making its adaptation to local environment easy and the recognition of regional context in its implementation (U.S. Green Building Council, 2013). Each rating system is organized into 5 environmental categories known as requirements: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Innovation in Design (or Operations), addressing sustainable building expertise as well as Regional bonus points are additional feature of LEED which acknowledges the importance of local conditions in determining best environmental design and construction practices. LEED Credits are earned by complying with requirements that distinguishes a green building from the other. A client has the liberty to decide which particular credit the project intends to earn.

RESEARCH DESIGN AND METHODS

The study adopted a cross-sectional survey of built industry professionals in South-West Nigeria. Cross-sectional survey is useful in getting definite information about a group at a particular time. The research population included the built industry professionals in the Physical Planning Units of the Tertiary Educational Institutions in South-West, Nigeria. These included the Architects, Quantity surveyors, Builders, Town planners, Estate surveyors and Valuers, Engineers and Land Surveyors totaling 69 in number. Due to its finite number, a census of the whole population was carried out.

Quantitative and qualitative analytical tools were employed for the data analysis. This included Mean Item Score (MIS) and Kruskal-Wallis H test. The Kruskal-Wallis H test is a non-parametric statistical test of variance between different means. The test allows the comparison of more than two independent variables under a free distribution unlike the One-way ANOVA in which the assumption of a normal distribution is required (Hole, 2011; Cheng et al., 2014).

The Kruskal-Wallis test statistic for k samples, each of size ni is:

$$H = \frac{12}{n(n+1)}\sum\frac{T_i^2}{n_i} - 3(n+1) \qquad \text{..... i}$$

Where n is the total number (all ni) and Ri is the sum of the ranks for the ith sample and the null hypothesis of the test is that all k distribution functions are equal. The Kruskal-Wallis H test result is interpreted by stating the chi-squared statistic (the "Chi-Square" row), the degrees of freedom (the "df" row) of the test and the statistical significance of the test (the "Asymp. Sig." row) i.e $\chi 2(df) = , p =$ Asymp.Sig.

H is statistically significant if it is equal to or larger than the critical value of Chi-Square for the given d.f. Therefore, Ho Rejected if H is greater than the chi-square table value (Dupont, 2009; Cheng et al., 2014). A Post-Hoc test is used as a follow-up if H reports a statistically significant result implying a difference (variation) in the group means. Examples of Post-Hoc tests include Bonferroni Procedure, Dunn's test, Fisher's Least Significant Difference (LSD) among others (Stevens, 1999; Dupont, 2009). The LSD was used to carry out Post-Hoc test on the H value. The LSD calculates the smallest significance between two or more means which allows direct comparisons between two or more means from different individual groups. Any difference larger than the LSD is considered a significant result(Cheng et al., 2014).. The LSD returns t-values and the **formula** for the least significant difference is:

$$LSD = t\sqrt{2MSE/n*} \quad \text{.....ii}$$

Where:
t = critical value from the t-distribution table
MSw = mean square within, obtained from the results of ANOVA test
n* = number of scores used to calculate the means

Data collection

The data collection instrument was a well-structured questionnaire adapted from the LEED scoring system. Respondents were requested to score their level of awareness of the requirements for green building development using the LEED v4 project checklist for New Construction and Major Renovation developed by US Green Building Council (U.S. Green Building Council, 2017). The Procedure for Data Collection was by group administration (Hampton and Vilela, 2018). The method is suitable for this study because the population were together in the same unit.

Data analysis

Table 1: Level of awareness of the requirements for green building development among construction industry professionals

S/N	Green Building Requirements	Professional Background (Mean)						
		ARC	BLD	ES&V	ENG	L/SV	QS	TPL
1.	Location and Transportation	3.60	2.81	3.13	2.92	3.13	2.77	2.92
2.	Sustainable Sites	3.90	3.36	3.39	3.66	3.78	3.33	3.42
3.	Water Efficiency	3.15	2.38	2.25	3.18	3.33	2.40	2.98
4.	Energy and Atmosphere	3.36	2.69	2.71	3.04	3.48	2.61	3.33
5.	Materials and Resources	3.15	3.06	2.93	2.71	3.33	2.93	3.14
6.	Indoor Environmental Quality	3.87	3.50	3.19	3.53	4.07	3.24	3.53
7.	Innovation	2.82	2.33		3.13	3.50	2.54	2.59
8.	Regional Priority	2.67	1.50	2.33	2.47	3.00	2.19	1.89
	Overall Average	3.32	2.70	2.85	3.08	3.45	2.75	2.97

Key: QS- Quantity Surveyors, ARC- Architects, BLD-Builders, TPL-Town Planners, ES&V-Estate surveyor & Valuer, L/SV- Land Surveyors, Eng- Engineer

Table 1 indicates that Land Surveyors has the highest awareness rate on the requirements for green building development with mean value of 3.45 closely followed by the Architects with 3.31, Engineer (3.08), Town Planners (2.97), Estate surveyor & Valuers (2.85), Quantity Surveyors (2.75) and Builders (2.70). The table also shows that the Architects had the highest awareness rate for sustainable sites, Indoor Environmental Quality and Location and Transportation with mean scores of 3.90, 3.87 and 3.60 respectively. In the same vein, the awareness rate was also high by Land Surveyors for Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Regional Priority.

The result of the Kruskal-Wallis H test in table 2 shows that there a statistically significant difference in the level of awareness of requirements for green building development among Construction Industry Professionals, $\chi 2$ (6) = 14.265, p = 0.027, with a mean rank awareness level of 42.4 for Land Surveyors, 37.6 for Architects, 29.8 for Engineers, 27.9 (Town planners), 22.9 (Estate Surveyors & Valuers), 20.6 (Builders) and 18.4 for Quantity Surveyors. Therefore the null hypothesis was rejected at 0.05 alpha levels.

The Post-Hoc test (table 3) shows that there is significant difference in the level of awareness between Architects and Builders (0.11), as well as Architects and Quantity Surveyors (0.019), Similarly, Builders and Land Surveyors (0.02), Estate surveyor & Valuers and Land Surveyors (0.015), Land Surveyors and Quantity Surveyors (0.004). So also Town Planners and Land Surveyors since the significant probability in all cases were less than 0.05.

Table 2: Kruskal-Wallis H test on the level of awareness of the requirement for green building development among construction industry professionals

Professional (Grouping Variable)	Mean Rank	Ranking	Chi-Square	df	Asymp. Sig.
Land Surveyors	42.4	1	14.265	6	0.027
Architects	37.6	2			
Engineer	29.8	3			
Town Planners	27.9	4			
Estate Surveyor	22.9	5			
Builders	20.6	6			
Quantity Surveyors	18.4	7			

Table 3: Post-hoc test on the level of awareness of green building requirements among construction industry professionals

(I) Professional	(J) Professional	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Architects	Builders	.6119500*	.2317784	*.011	.146174	1.077726
	Estate Surveyor	.4492250	.2317784	.058	-.016551	.915001
	Engineer	.2359375	.2317784	.314	-.229839	.701714
	Land Surveyors	-.1369750	.2317784	.557	-.602751	.328801
	Quantity Surveyors	.5636625*	.2317784	*.019	.097886	1.029439
	Town Planners	.3408250	.2317784	.148	-.124951	.806601
Builders	Architects	-.6119500*	.2317784	*.011	-1.077726	-.146174
	Estate Surveyor	-.1627250	.2317784	.486	-.628501	.303051
	Engineer	-.3760125	.2317784	.111	-.841789	.089764
	Land Surveyors	-.7489250*	.2317784	*.002	-1.214701	-.283149
	Quantity Surveyors	-.0482875	.2317784	.836	-.514064	.417489
	Town Planners	-.2711250	.2317784	.248	-.736901	.194651
Estate Surveyor & Valuers	Architects	-.4492250	.2317784	.058	-.915001	.016551
	Builders	.1627250	.2317784	.486	-.303051	.628501
	Engineer	-.2132875	.2317784	.362	-.679064	.252489
	Land Surveyors	-.5862000*	.2317784	. *015	-1.051976	-.120424
	Quantity Surveyors	.1144375	.2317784	.624	-.351339	.580214
	Town Planners	-.1084000	.2317784	.642	-.574176	.357376
Engineer	Architects	-.2359375	.2317784	.314	-.701714	.229839
	Builders	.3760125	.2317784	.111	-.089764	.841789
	Estate Surveyor	.2132875	.2317784	.362	-.252489	.679064
	Land Surveyors	-.3729125	.2317784	.114	-.838689	.092864
	Quantity Surveyors	.3277250	.2317784	.164	-.138051	.793501
	Town Planners	.1048875	.2317784	.653	-.360889	.570664
Land Surveyors	Architects	.1369750	.2317784	.557	-.328801	.602751
	Builders	.7489250*	.2317784	*.002	.283149	1.214701
	Estate Surveyor	.5862000*	.2317784	*.015	.120424	1.051976
	Engineer	.3729125	.2317784	.114	-.092864	.838689
	Quantity Surveyors	.7006375*	.2317784	*.004	.234861	1.166414
	Town Planners	.4778000*	.2317784	*.045	.012024	.943576
Quantity Surveyors	Architects	-.5636625*	.2317784	*.019	-1.029439	-.097886
	Builders	.0482875	.2317784	.836	-.417489	.514064
	Estate Surveyor	-.1144375	.2317784	.624	-.580214	.351339
	Engineer	-.3277250	.2317784	.164	-.793501	.138051
	Land Surveyors	-.7006375*	.2317784	*.004	-1.166414	-.234861
	Town Planners	-.2228375	.2317784	.341	-.688614	.242939
Town Planners	Architects	-.3408250	.2317784	.148	-.806601	.124951
	Builders	.2711250	.2317784	.248	-.194651	.736901
	Estate Surveyor	.1084000	.2317784	.642	-.357376	.574176
	Engineer	-.1048875	.2317784	.653	-.570664	.360889
	Land Surveyors	-.4778000*	.2317784	*.045	-.943576	-.012024
	Quantity Surveyors	.2228375	.2317784	.341	-.242939	.688614

RESULT AND DISCUSSIONS

Assessing the level of awareness of the requirement for credits among the construction industry professionals shows the Land Surveyors having the highest

mean score closely followed by the Architects, Engineers, Town Planners, Estate surveyor & Valuers, Quantity Surveyors and lastly the Builders. From the analysis, only three of the professionals have significant level of awareness which is the Land Surveyors, the Architects and the Engineers. The levels of awareness of the other four professionals were though above average score of 2.5, but not statistically significant. These are the Town Planners, Estate surveyors and Valuers, Quantity Surveyors and Builders. The level of awareness for Estate Surveyors and Valuers had earlier been reported to be low while most of the professionals have not received any education or training for green building development (Oladokun, 2010; Waniko, 2012).

The analysis also reveals that Architects, Estate surveyor & Valuers, Engineers and the Quantity Surveyors have their highest levels of awareness in Sustainable Sites with 3.90, 3.39, 3.66 and 3.33 respectively. While Builders, Land Surveyors and Town Planners are more aware of indoor environmental qualities having 3.50, 4.07 and 3.53 respectively. On the other hand, the Indoor Environmental Quality is second on the level of awareness for the Architects, Estate surveyor & Valuers, Engineers and Quantity Surveyors while sustainable sits is vice versa for Builders, Land Surveyors and Town Planners. Overall, the Architects have the highest mean ranking for Sustainable Sites and Location and Transportation. Land Surveyors have the highest mean for Water Efficiency and Energy and Atmosphere including Materials and Resources, Indoor Environmental Quality, Innovation and Regional Priority. Conversely the Builders have the least level of awareness of 2.70 though above average of 2.5 mean score on a scale of 5. The low level of awareness of the requirements have earlier been identified as a hindrance to the adoption of green building practices which has implication for green building cost (Djokoto et al., 2014; Dalibi et al., 2017).

The Kruskal-Wallis H test shows a significant variation in the levels of awareness from one professional to the other, 0.02 at 95% confidence interval. This implies that there is approximately 100% variation in the level of awareness among the building industry professionals. Hence the null hypothesis was rejected. This is in contrast with the report that there is no difference in the level of awareness of green building practices among construction industry professionals (Dalibi et al., 2017). The success of green building development requires an integrative involvement and collaboration of all stakeholders (Bal et al., 2013). The high level of divergence in the awareness for green building development does not give any hope for its adoption very soon. This has been observed by earlier studies (Cole & Pearl, 2007; Oladokun, 2010; Ikediashi, Ogunlana, Oladokun, & Adewuyi, 2013; Nduka & Ogunsanmi, 2015b).

Having rejected the null hypothesis, the Post Hoc test using the LSD indicates that a significant difference exists in the level of awareness of the Architects, Builders and the Quantity Surveyors at 0.11 and 0.19 respectively. With this result, it will be difficult for this group of professionals to work together in interpreting the Architects' intention for the project. Yusuf, Mohamed, Yusof and Misnan (2013) had earlier suggested that the Quantity Surveyors need to develop structured approach to cost of green building. Given the level of awareness recorded by the quantity surveyors, it will be difficult to effectively discharge the duty of being a construction economist (Salama & Alshuwaikhat, 2006; Yusuf et al., 2013). Consequently,

suggestions have been made by earlier studies for the professional bodies to provide education and training for green building development in Nigeria (Seah, 2009; Waniko, 2012).

A significant difference also exists between the Builders and Land Surveyors (0.002). The Estate Surveyor & Valuers and Land Surveyors also exhibit significant difference in the level of awareness (0.015). This will influence the decisions on building development in response to green building requirements. There exists no significant difference in the level of awareness between the Engineers and all other professionals with significant figures above 0.05. The Land Surveyors as earlier discussed exhibits a significant level of difference with all the other professionals except Architects and Engineers having 0.557 and 0.114 respectively. The Quantity Surveyors is at ends with the Architects (0.019) and the Land Surveyors (0.004). The import is that if this level of divergence in knowledge exists, the two cannot work together to deliver value to the client for green building development. Lastly the Town Planners exhibits a significance difference only with the Land Surveyors at 0.045.

The summary is that there is so much divergence in the level of awareness from one professional to the other. This high level of divergence in the awareness is in line with Issa, Rankin, and Christian (2010) report on the level of awareness about cost of green building. The report observed the need to improve the knowledge and skill of designers and engineers as this will in turn affect the cost of the green building project. Developing a green building requires an integrated design and construction processes with contributions from various professionals. To ensure an integrated Design Process, (Cole and Pearl, 2007) recommends the need to blur boundaries among the design professional specifically Land Surveyors (Physical environment), Architects (Building) and Engineers. The high significant difference is an indication that there is dearth of coordinated education and training for green building development for the professionals. Hence, it is obvious that Nigeria cannot be moving towards implementing green requirements into the building development processes especially in the tertiary educational institutions.

CONCLUSION AND RECOMMENDATION

Having carefully analyzed and discussed the findings of this study, the conclusion is that there is a statistically significant difference in the level of awareness of the requirements among professionals. From the analysis it is concluded that the Architects, Estate surveyor & Valuers, Engineers and the Quantity Surveyors are more aware of requirements for Sustainable Sites while the Builders, Land Surveyors and Town Planners are more aware of indoor environmental qualities. However, in the overall, the Architects have the highest level of awareness followed by Land Surveyors with the Builders having the least awareness of the requirements.

This high level of divergence in the level of awareness will be a great hindrance to the development of green buildings in Tertiary Educational Institutions in Nigeria. The study therefore recommends that there is need to propagate the requirements for green building development among the construction industry professionals in Nigeria. There is need for each professional institution to develop professional

skills for green building requirements by the provision of adequate training. It is also pertinent for the building industry professionals to develop collaborative efforts towards the awareness of the requirements for green building development. The population of the study is limited to Built-Industry professionals in the physical planning units of Tertiary Educational institutions. Consequently, this may not be representative of the professionals in other sectors of the economy at large.

REFERENCES

Amasuomo, T. T., Atanda, J. and Baird, G. (2017) 'Development of a building performance assessment and design tool for residential buildings in Nigeria', Procedia Engineering. The Author(s), 180, pp. 221–230. doi: 10.1016/j.proeng.2017.04.181.

Bal, M., Bryde, D., Fearon, D. and Ochieng, E. (2013) 'Stakeholder engagement: achieving sustainability in the construction sector', Sustainability, 6(2), pp. 695–710. doi: 10.3390/su5020695.

Boyd, T. and Kimmet, P. (2005) The triple bottom line approach to property performance evaluation, Australian Cooperative Research Centre for Construction Innovation.ation. Available at: http://www.prres.net/Proceedings/..%5CPapers%5CBoyd_The_Triple_Bottom_Line_Approach.Pdf.

Cheng, G., Liu, N., Khan, F., Zhang, Z., Huang, D., Porcaro, C., Zhao, H. and Huang, W. (2014) 'Nonparametric statistical methods', p. 110.

Cole, R. J. and Pearl, D. (2007) 'Blurring boundaries in the theory and practice of sustainable building design', in International Conference on Whole Life, Urban Sustainability and its Assessment. Available at: http://www.leap.umontreal.ca/pdf/pearl/2007_PEARL_COLE_Blurring Boundaries.pdf.

Dahiru, D., Dania, A. A. and Adejoh, A. (2014) 'An investigation into the prospects of green building practice in Nigeria', Journal of Sustainable Development, 7(6), pp. 158–167. doi: 10.5539/jsd.v7n6p158.

Dalibi, S. G., Feng, J. C., Shuangqin, L., Sadiq, A., Bello, B. S. and Danja, I. I. (2017) 'Hindrances to green building developments in Nigeria 's built environment : "The project professionals ' perspectives "', in IOP Conference Series: Earth and Environmental Science. 63 012033. IOP Publishing, pp. 1–9. doi: doi :10.1088/1755-1315/63/1/012033.

Djokoto, S. D., Dadzie, J. and Ohemeng-ababio, E. (2014) 'Barriers to sustainable construction in the Ghanaian construction industry: Consultants perspectives', Journal of Sustainable Development, 7(1), pp. 134–143. doi: 10.5539/jsd.v7n1p134.

Dupont, W. D. (2009) Statistical Modeling for Biomedical Researchers: A Simple Introduction to the Analysis of Complex Data. 2nd edn. Cambridge: University Press.

Ejohwomu, O. A. and Oshodi, O. S. (2014) 'A review of construction management and economics research outputs in Nigeria: Towards a sustainable future', Journal of Construction Project Management and Innovation, 4(SI), pp. 900–905.

Hampton, C. and Vilela, M. (2018) 'Section 13 . Conducting Surveys', in Community Tool Box. Kansas: e Center for Community Health and Development at, pp. 1–15.

Hole, G. (2011) 'The Kruskal-Wallis test', pp. 1–10.

Hussin, J. M., Rahman, I. A. and Memon, A. H. (2013) 'The way forward in sustainable construction: Issues and challenges', International Journal of Advances in Applied Sciences, 2(1), pp. 15–24. doi: dx.doi.org/10.11591/ijaas.v2i1.1321.

Ikediashi, D. I., Ogunlana, S. O., Oladokun, M. G. and Adewuyi, T. (2013) 'Assessing the level of commitment and barriers to sustainable facilities management practice : A case of Nigeria', International Journal of Sustainable Built Environment. The Gulf Organisation for Research and Development, 1(2), pp. 167–176. doi: 10.1016/j.ijsbe.2013.06.002.

Issa, M. H., Rankin, J. H. and Christian, A. J. (2010) 'Canadian practitioners ' perception of research work investigating the cost premiums , long-term costs and health and productivity benefits of green buildings', Building and Environment. Elsevier Ltd, 45(7), pp. 1698–1711. doi: 10.1016/j.buildenv.2010.01.020.

Kats, G. H. (2003) Green Building Costs and Financial Benefits. USA.

Langdon, D. (2007) Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption. Carlifonia. doi: 10.1093/jhmas/jrr055.

Morelli, J. (2011) 'Environmental sustainability: A Definition for environmental professionals', Journal of Environmental Sustainability, 1(1), pp. 1–10. doi: 10.14448/jes.01.0002.

Nduka, D. O. and Ogunsanmi, O. E. (2015) 'Construction professionals' perception on green building awareness and accruable benefits in construction projects in Nigeria', Covenant Journal of Research in Built Environment, 3(2), pp. 30–52.

Oladokun, T. T. (2010) '" Sustainable Property Management Practice in Nigeria ".', in Proceedings of International Research Conference on Sustainability in Built Environment. Columbia, Sri Lanka, pp. 157–165.

Onuoha, I. J., Kamarudin, N., Aliagha, G. U., Okeahialam, S. A., Atilola, M. I. and Atamamen, F. O. (2017) 'Developing policies and programmes for green buildings: What can Nigeria learn from malaysia's experience?', International Journal of Real Estate Studies, 11(2), pp. 50–58.

Pandey, S. and MIT-UTM (2016) Impact of Green Building Rating Systems on The Sustainability and Efficacy of Green Buildings: Case analysis of Green Building Index, Malaysia Sustainable Cities Program, 2014–2015. Malaysia.

Salama, A. M. and Alshuwaikhat, H. (2006) 'A trans-disciplinary approach for a comprehensive understanding of sustainable affordable housing', Global Built Environment Review, 5(3), pp. 35–50. doi: 1474-6832.

Seah, E. (2009) 'Sustainable Construction and The Impact on the Quantity Surveyor', in 13th Pacific Association of Quantity Surveyors Congress, pp. 36–48.

Shen, L., Hao, J. L., Tam, V. W. and Yao, H. (2007) 'A checklist for assessing sustainability performance of construction projects', Journal of Civil Engineering and Management, 13(4), pp. 273–281. doi: 10.1080/13923730.2007.9636447.

Stevens (1999) 'Post Hoc Tests in ANOVA', pp. 1–4.

U.S. Green Building Council (2013) LEED v4 User Guide.

U.S. Green Building Council (2017) LEED v4 for BUILDING DESIGN AND CONSTRUCTION.

Waniko, D. P. (2012) 'Green building in Nigeria emerging opportunities for the quantity surveying profession', Academia, n.a(n.a), pp. 1–7.

Windapo, A. O. and Rotimi, J. O. (2012) 'Contemporary issues in building collapse and its implications for sustainable development', Buildings, 2, p. 283299. doi: 10.3390/buildings2030283.

Yusuf, G. A., Mohamed, S. F., Yusof, Z. M. and Misnan, M. S. (2013) 'Role of building services quantity surveyors in managing cost of green buildings', Advanced Materials Research, 13, pp. 71–74. doi: 10.4028/www.scientific.net/AMR.689.71.