

Green Building Training of Nigerian Quantity Surveyors in Preparedness for Green Building Practice¹

Adetayo O. Onososen

ABSTRACT

The surge in emergence of new technologies and advanced construction methods and processes is a strong indicator of the dynamism of the construction industry and its little or no unopposed acceptance of disruptive processes. While developed economies are fast dictating the pace of transformation as regards green building, it is imperative to cross-examine the training of quantity surveyors for green building practice as to determine the suitability of their skills and competence in competing locally and globally. The course contents of academic curricula of higher institutions offering quantity surveying at undergraduate level were examined to gauge the availability of green building courses. From the study, green building education is vastly absent in the curricula of Nigerian Universities as it is almost non-existent. Also, inadequacies were observed in competencies areas. To prepare quantity surveyors for green building practice, formal education needs to be checked by reworking the curricula to accommodate green building competencies, more so, informal education through training and retraining, workshop and conferences should be organized for practicing quantity surveyors to upgrade their skills and keep them abreast with necessary knowledge and competencies to function as green building experts.

Keywords: Competencies, Education, green building, quantity surveying, training.

INTRODUCTION

The significant impact of construction activities which results in delivery of infrastructural products is an emerging source of concern as to its impact on the socio-economic and environmental aspect of human livelihood. This is further established by Chalmers (2014) who stated that the construction Industry and its product affect the environment in negative ways. Nigeria is not left out of the impacts of these unsustainable building practices. With 48.08% score in air pollution and a meager 8.9% of Lagos residents having access to good drinkable water (WHO, 2016), the country has a long way to go in adopting sustainable approaches to its developmental initiatives. The critical and undeniable need to adopt green buildings as a way to mitigate the effect of bad environmental policies is imperative and obvious in its urbanization rate which is projected to increase to 56.8% and 63.6% in 2020 and 2030 respectively; these brings with it challenges as much as opportunities (Fed.Min Environment 2012).

As ascertained by Ameh, Soyingbe and Oyediran (2018), data from World Bank and the National Bureau of Statistics agrees that there is an estimated housing shortfall of over 17million in Nigeria. In as much as the country has lofty goals and vision on development considering its lacuna in the availability of infrastructures, there is need to take a critical look at the educational system of the

¹ How to cite this paper: Onososen, A.O. (2019). Green Building Training of Nigerian Quantity Surveyors in Preparedness for Green Building Practice; *PM World Journal*, Vol. VIII, Issue IX, October.

country if it supports and trains professionals in the built environment to meet up with changing global demand and needs.

For the impact of unsustainable environmental approaches over the years to be minimised, the traditional methods of construction has to be disrupted and improved to pave way for newer environmentally friendly methods (Haapio, & Viitaniemi, 2008). This disruption however can only be driven by competent hands with apt knowledge of construction processes and how to make it sustainable, all these cannot be achieved without training of professionals in the built environment. A critical look at the curriculum of higher institutions in Nigeria is imperative in judging if the country is reskilling its professionals in preparedness for the future needs for green and sustainable buildings.

LITERATURE REVIEW

Introduction

Sustainable construction aimed at ensuring environmental sustainability through green buildings holds immense opportunities for professionals in the industry as it provides a veritable source to improve their knowledge, enlarge the scope of their services and compete favourably globally.

Green building

Green building can be said to be a pragmatic tool designed by the construction industry to achieve the goals of sustainable development. This is achieved by conserving and optimizing the use of resources, such as water, waste, energy and subsidizing the effect to materials and emissions on the environment and improving indoor environmental quality by green design (Kibert, 2008). If the Nigerian construction industry is to meet up with changing times in the global construction industry, urgent steps must be implemented in broadening the knowledge of construction professionals (Onososen & Osanyin, 2019)

It is a process which integrates techniques and processes that reduces buildings energy use and enhances human health (Qian, Chan, & Khalid, 2015). Conventional buildings have been widely recognized to account for 40% of the world's energy consumption (Qian et al, 2015). Green building as opined by Feltes (2007) is not a viable alternative if it is not economically efficient over other conventional construction methods. Vinyangkoon (2012) opined that in green building, reduction of operating and maintenance cost is achieved by incorporating energy efficiency in lightning systems, air quality, and the use of green roofs which recycles runoff water to reduce waste. Sustainability goals and objectives should henceforth be integrated into the interwoven construction processes (Zakariyyah, Soyingbe, John & Ameh 2018).

The adoption and growth of green building in developed countries can be visible in green building standard measures developed, such as Building Research Establishment Environmental Assessment Method (BREEAM), Australian Building Greenhouse Rating tool (ABGR) and the Green Building Council (USGBC) used in the United States. USGBC is a not profit organization that has developed the Leadership in Energy and Environmental Design system called (LEED) system (Robinson, (2007); May and Koski (2007); Sayce (2010); Shimizu, (2010).

Environmental sustainability

Brundtland Report (1987) defines environmentally sustainable development as “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” it is sine qua non to include sustainability goals and principles into design, construction and maintenance (Glover, 2008). With recent clamour for environmental sustainability, it is imperative to examine its growing influence in relation to the Nigerian construction Industry.

Researchers such as Kibert (2004) have introduced seven principles to implement sustainable construction practice, namely:

1. conserving (to minimize resource consumption)
2. Reusing (to maximize the reuse of resources)
3. Renewing/recycling (to use renewable or recyclable resources)
4. Protecting the nature (to protect the natural environment)
5. Using nontoxic materials to create a healthy, non-toxic environment;
6. Economic benefits (to apply life cycle cost analysis)
7. Providing quality products.

Impact of construction activities on the environment

The major environmental issue facing Nigeria can be highlighted as land degradation, air and water pollution (Fed.Min of Environment, (2012); Oladapo, (2007). These adverse effects can be traced to the activities of the construction Industry. This is maintained by the Federal Ministry of Environment (2012) as rapid deforestation resulting from unsustainable use of forest resources for human survival (fuel, wood and energy, housing) holds significant causative factors to land degradation.

During the building process, activities such as site preparation caused through land clearing causes soil erosion that leads to sediment pollution, the use of diesel engines of mechanical plants, demolition of works and use of toxic products pollutes the air, land and water (Ijigah, Jimoh, Aruleba & Ade 2013).

Green Building Training of Nigerian Quantity Surveyors

The campaign for stakeholders in developing countries to adopt the sustainable building approach to developmental projects is not without hindrances; however, the hindrances are not only as a result of lack of technologies and assessment methods as stated by Hakkinen and Belloni (2011) but lack of competency and skills for quantity surveyors to participate in sustainable practices This is affirmed by Ugwu and Haupt (2007); Ebekozien, Duru and Nwaole (2017) who attributed the gap in education as a form of hindrance to the adoption of sustainability. Training and education is a management tool and instrument for checking skill deficiencies and is also an integral part of organization education, learning and change (Oke, Ogunsemi, Aigbavboa & Famakin, 2017). To effectively execute out green buildings, the professionals involved must have adequate knowledge of alternative sustainable options a component can have. A truly designed

sustainable or green building requires access to the best available information on products and tools so as to make sustainable decision (Hakkinen and Belloini, 2011). More formidable danger to the adoption of green practices is the inertia, lukewarm compliance, and misunderstanding of what sustainability is all about by professionals in the industry (Zainul-Abidin, 2008). This could be as a result of the insufficient experience, training or background knowledge in sustainable construction to implement or enable the use of green building solutions (Shi, 2008). Formal higher education for construction students is important in developing the required skills and competencies (Ahn et al., 2011). The foundation or background for professional's basic skills and competencies is developed during formal higher education in Universities or Polytechnics. According to Oke et al (2017) quantity surveying is been taught at both undergraduate and postgraduate level (postgraduate, masters and PhD) in Nigeria. The aim of the programme is to equip students with broad-based education and training at honours degree level with the aim of preparing each student to meeting the challenges involved in ensuring financial probity in the conception, planning and execution of developmental projects. The courses in the curriculum are generally grouped into components (e.g. economics, statistics, research methodology, etc.); construction related; quantity surveying requirements and other built environment courses (Oke et al, 2017).

There are however, requirement before a quantity surveying student is certified by the Nigerian Institute of Quantity surveyors (NIQS), according to the NIQS (2004), a quantity surveyor must have spent at least five (5) years in a carefully balanced programme of practical experience and professional education in one of the schools of quantity surveying either in universities or polytechnics before such can be described as a professional quantity surveyor.

Though, previous studies such as (Ajanlekoko, 2012) and Adebola (2002) argued that the training and level of education of quantity surveyors is adequate, it is however unknown if this is the case for competencies in sustainable building since green building is a relatively novel concept in the Nigeria construction industry.

Due to the lethargic nature of development in Nigeria, the current curriculum has not adopted the need for a focus on green buildings unlike the US where a number of construction programs have been teaching the knowledge and skills of green building by offering a green construction course as a core course or elective or integrating sustainability concepts into the existing curriculum (Ahn et al, 2011).

The teaching of sustainability to students is a precursor to their acquisition of skills and competencies of sustainability. However, for practicing professionals, knowledge sharing in form of training, conferences and workshops to enable them catch up with the changing times as regards sustainable practices in the building industry. This is further maintained by Ahn et al (2011) who discovered that conducting internal research and reading trade publications related to green building were still the most widespread ways for companies to get green building knowledge and skills. More so, the education and training of quantity surveyors lags behind the current and future anticipated needs of practicing quantity surveyors for them to be at the frontier of the knowledge required to improve business opportunities and services offered to clients of the built environment (Ibrahim 2011).

Musa (2015) opined that curriculum content and structure of Quantity surveying students has significant bearing in the performance and competencies of quantity surveying graduates. Nneka(2013) previously proposed a conceptual model of career development comprised of five phases; awareness, exploration, orientation, preparation and continuous advancement in education. Though the first four stages can be impacted from elementary through secondary school, the fifth dimension is limited to individual's aspiration and interest (Nneka, 2013).

RESEARCH METHODOLOGY

In achieving the aims and objectives of this research study, the academic curricula of Universities offering quantity surveying was obtained and examined based on the knowledge and competencies areas as required by the Royal Institution of Chartered surveyors (RICS) pathway guide. Census sampling was used in gathering secondary data.

Institutions Training Quantity Surveyors in Nigeria

Quantity surveying education and training is offered at both the undergraduate level and postgraduate degree level in Nigeria while the first degree is a requirement to practice; the advanced degree is not a requirement. According to Oke et al (2017), the Joint Admission board (JAMB) regulates entry of students in institutions in Nigeria and is responsible for providing guidelines and information regarding higher institutions in the country. Albeit, the Nigerian Universities Commission (NUC) conducts regulatory checks to approve and verify if universities have necessary intellectual facilities, equipment's and staff to offer the required competencies. Also, the Quantity surveyors registration board of Nigeria (QSRBN) performs similar function of approving the conduct or teaching of quantity surveying in Nigeria universities.

Table 1: Institutions Training Quantity Surveyors in Nigeria.

Institutions	No. in Nigeria	No. training Qs	Sample frame
Universities	146	22	22
Polytechnics	112	43	1
Total	258	65	23

Source: JAMB (2018)

As presented in table 2, Population for this study was gotten from the e-brochure of the Joint Admission and Matriculation Board (JAMB) for the 2017/2018 admission guidelines. There are 146 universities and 112 polytechnics in Nigeria. Only 22 universities offer quantity surveying while 43 polytechnics offer quantity surveying courses.

The National Board for Technical Education (NBTE) gives guidelines on the syllabus of polytechnics in Nigeria and therefore endears all polytechnics to use the same syllabus (Oke et al 2019). Consequently, the number of curriculum sampled for the polytechnics was brought down from the 43 polytechnics offering quantity surveying to the syllabus of one polytechnic since they all use the same syllabus.

In carrying out the study, census sampling was adopted. Data gathering through direct observation and visit to classrooms in the universities was difficult to achieve, therefore the academic curriculum of quantity surveying departments of the institution were assessed with focus on their course contents. The data collected was collated and compared with the standard guideline of competencies provided by RICS (2018).

FINDINGS AND DISCUSSION

Quantity surveying curriculum and Green Building Knowledge Areas

The course content of Universities offering quantity surveying was obtained, examined and compared based on the knowledge and competencies areas of green building as given by RICS (2018). The areas of competencies were identified from the RICS pathway guide for quantity surveying practice. The comparison between the competency areas and the curriculum content are presented in table 2 with A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U and V representing the institutions.

Table 2: Level One Competency

Competency areas for GB/Institutions	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
Principles of Sustainability	NA	AA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Principles of material resource efficiency	NA	AA	NA	NA	NA	NA	NA	NA	PA	NA	NA	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Relationship between Property and Environment	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA
Legislation & Taxation in Sustainable construction	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Assessment methods for Sustainable buildings	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Design Considerations in sustainable building	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Principles of design, technology & construction in sustainable building	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sources of renewable energy	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Key: A-V = Higher Institutions; AA= Adequately Available; NA= Not Available; PA= Partially Available

Level one competencies as categorized by the RICS pathway guide are competencies to demonstrate knowledge and understanding of why and how sustainability seeks to balance economic, environmental and social objectives at global, national and local levels in the context of land property and the built environment. While institution B has principles of sustainability in its course content alongside principles of material resource efficiency, other institutions do not possess these courses. More so, while institution B has partial availability for courses such as relationship between property and environment, assessment methods, design considerations, principles of design and sources of renewable energy, other institutions do not have these courses. However, a course on studying the relationship between property and the environment is partially available in all the institutions.

Table 3: Level Two Competency

Competency areas for GB/Institutions	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
Planning guidance, sustainability checklists	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Energy Performance of Buildings	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
Renewable energy options	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
National infrastructure projects and energy conservation	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA
Impact of sustainability issues on design and construction	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Life cycle cost and sustainability issues	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA
Government efforts in environmental impact	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Key: A-V = Higher Institutions; AA= Adequately Available; NA= Not Available; PA= Partially Available

Level two competencies are competencies to provide evidence of the practical application of sustainability appropriate to your area of practice, and the circumstances in which specialist advice is necessary. It was discovered that, all the institutions possess a course on energy performance of buildings, has partial course content on national infrastructure projects and energy conservation and also has partial availability for life cycle cost and sustainability issues. Though life cycle cost is taught, it is not however broadened to accommodate sustainability issues. More so, other courses required for level two skills proficiency such as; planning guidance, sustainability checklists, renewable energy options, impact of sustainability issues on design, construction and government efforts in environmental impact are not available.

Table 4: Level three competency

Competency areas for GB/Institutions	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
Expert advice on financial impact of sustainability	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Expert advice on environmental law and policy	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA	PA
Interpretation of environmental reports	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
Expert advice on sustainable material selection	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sustainable valuation, triple bottom line and environmental considerations	NA	PA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hard and soft valuation issues, health, well-being and productivity.	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA

Key: A-V = Higher Institutions; AA= Adequately Available; NA= Not Available; PA= Partially Available

Competencies in level three are to provide evidence of reasoned advice given to clients and others on policy, law and best practice of sustainability in the area of practice. Institution B has

adequately available course content for interpretation of environmental reports and Hard and Soft valuation issues, health, well-being and productivity while it is only partially available for courses such as expert advice on environmental law and policy, expert advice on sustainable material selection and sustainable valuation. Other institutions also have interpretation of environmental reports in their course content and also hard and soft valuation issues, health, well-being and productivity. However, expert advice on sustainable material selection and sustainable valuation are unavailable while a course on expert advice on environmental law and policy is partially available.

DISCUSSION OF FINDINGS

An assessment of the formal training received by quantity surveyors through the evaluation of course content in the academic curricula of universities offering quantity surveying revealed that there is a lacuna of courses on sustainable or green building. It was revealed that out of the 23 institutions evaluated, only one institution is making attempt at introducing courses on green building. The unavailability of these courses means the institutions lack the wherewithal to offer education and training to prepare recent or would be graduates to the emergence of green building practices. As stated by Onososen and Osanyin (2019), the lack of education and training means a gap in the knowledge and skills of quantity surveyors to compete favourably with their colleagues globally; this is a barrier to the adoption of green building practice in Nigeria.

The findings of the study is in line with the submission of the declaration on sustainability in higher education which affirmed that sufficient attention needs to be paid by African campuses to conducting, disseminating and implementing sustainability research and practice (Adenle & Abdul-Rahman, 2018). Furthermore, Olaseni and Aregbesola (2018) advised educational institutions to improve the standard of learning and syllabi of students as a way to combat the gap in education and training of green building for students. Research and development alongside support from practitioners is imperative to drive filling of industry requirements (Inagawa, 2017).

CONCLUSION

Green building and sustainability courses are yet to be introduced into the curricula of most Nigerian higher institutions of learning offering quantity surveying. While these competencies are expected competencies by RICS, their unavailability in curricula of institutions signifies a backdrop and a barrier to the adoption of green building in Nigeria. The assessment of the training of quantity surveyors in green building/sustainability indicates that the present level of training received by Nigeria quantity surveyors is unsatisfactory in their quest to participate and be involved in green building locally and globally. Though there were very few corresponding courses in the syllabus of quantity surveyors that match the competencies required by RICS, most of the core competencies required was however absent. In view of this, it is recommended that Nigeria institutions offering quantity surveying courses reassess their system of education in terms of sustainable development and conduct green building assessment to gauge the suitability of the training offered with what is required to compete globally. Also, regulatory bodies need to do more in promoting local capacity by reassessing formal training and organizing more informal training options for practicing quantity surveyors through continuous professional development. This will not only prepare would be graduates of quantity surveying but also empower

professionals quantity surveyors with the required skill to compete globally and offer more range of services to clients in fulfillment of the needs of the society.

REFERENCES

- Adebola O. (2000). Quantity Surveying and National Development. The public sector perspective. Paper presented at the 19th Biennial Conference of the Nigerian Institute of Quantity Surveyors 15-18 November, Abuja, Nigeria. 15-23.
- Adenle Y. A. and Abdul-Rahman, (2018) A FRAMEWORK FOR DEVELOPING SMART AND SUSTAINABLE HIGER EDUCATIONAL CAMPUSES IN NIGERIA. Africa Smart City Agenda; Conceptualising, Creating ad CO-Producing. Faculty of Environmental sciences, 2018 conference, University of Lagos, Nigeria, 24th-26th July, 2018.
- Ahn, Y.A Pearce.A.R., and Ku.K., (2011) Paradigm Shift of Green Buildings in the Construction Industry, *International Journal of Sustainable Building Technology and Urban Development*, 2:1, 52-62, DOI:10.5390/SUSB.2011.2.1.052
- Ajanlekoko, J.O. (2012). From Thermometer to Thermostat: The challenging role for the Quantity Surveyors in the 21st Century, *The Quantity Surveyor*. 1(1), 40-41
- Chalmers, P., (2014). Climate Change: Implications for Buildings
- Ebekozien A, Duru D.S.O, and Nwaole A.N.C (2017) EVALUATION OF INNOVATION PRACTICES IN BUILDING INDUSTRY IN NIGERIA. Confluence of Research, Theory and Practice in the Built Environment. Nigerian Institute of Quantity Surveyors: 3rd Research Conference-NIQS RECON3 25th – 27th September 2017
- Feltes V (2000) *Toward Sustainable Building - Green Building Design And Integration In The Built Environment*. A Thesis Submitted Washington State University. School Of Architecture & Construction Management. Master Of Science In Architecture.
- Glover, P.C., and Economides, M. J., (2010). Energy and Climate Wars. Continuum International Publishing Group
- Haapio, A and Viitaniemi. A. (2008). A critical review of building environmental assessment tools / *Environmental Impact Assessment Review* 28, 469–482.
- Ijigah, E.I., Jimoh, R.A., Aruleba, O.B., and Ade, A.B. (2013) "An Assessment of Environmental Impacts of Building Construction Projects" *Civil and Environmental Research* www.iiste.org ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online) Vol 3, No.1, 2013
- Inagawa A.B., (2017) EXPLORING CURRENT AND FUTURE ROLES OF QUANTITY SURVEYORS IN NIGERIAN CONSTRUCTION: SIGNIFICANCE OF EDUCATION, TRAINING AND RESEARCH Confluence of Research, Theory and Practice in the Built Environment. Nigerian Institute of Quantity Surveyors: 3rd Research Conference-NIQS RECON3 25th – 27th September 2017

Jamb (2018) Joint Admissions and Matriculation Board. Guidelines for Admissions to First Degree, National Diploma (ND), National Innovation Diploma (NID) and Nigeria Certificate I Education (NCE) 2017/2018 session. enquiries@jamb.gov.ng

Kibert, C.J., (2008) *Sustainable Construction: Green Building Design and Delivery*, 2 ed, Hoboken, NJ, John Wiley.

May, P. and Koski, C. (2007) State Environmental Policies: Analyzing Green Building Mandates. *Review of Policy Research*, 24, No.1.

Musa, S. M. (2015) *An assessment of the attitude of students towards the Quantity Surveying curriculum*, unpublished B.Sc Project submitted to Quantity Surveying Department, A B U Zaria.

Nneka, E. (2013). *Career Choice: a Basic Issue in Primary and Secondary School Level*, Arabian Journal of Business and Management Review (Nigerian Chapter), 1(2) 18 -28

Oke A.E, Ogunsemi D.R., Aigbavboa C.O, and Famakin F.M (2017) PROCUREMENT MANAGEMENT TRAINING OF NIGERIAN QUANTITY SURVEYORS. Confluence of Research, Theory and Practice in the Built Environment. Nigerian Institute of Quantity Surveyors: 3rd Research Conference-NIQS RECON3 25th – 27th September 2017

Oladapo, A. A. (2007). A quantitative assessment of the cost and time impact of variation orders on construction projects. *Journal of Engineering, Design and Technology*, 5(1), 35-48. <http://dx.doi.org/10.1108/17260530710746597>

Olaseni O, And G. T. Aregbesola(2018). THE CONSTRUCTION STAKEHOLDERS PERSPECTIVE ON CAUSES OF INCESSANT BUILDING COLLAPSE IN LAGOS METROPOLIS FOR AN ECONOMIC SMART CITY. Africa Smart City Agenda; Conceptualising, Creating ad Co-Producing. Faculty of Environmental sciences, 2018 conference, University of Lagos, Nigeria, 24th-26th July, 2018.

Onososen O. A. and Osanyin O, (2019). DRIVERS AND BARRIERS TO THE IMPLEMENTATION OF GREEN BUILDING DEVELOPMENT. Collaboration for Sustainable Development in the Built Environment. International Conference of Environmental Sciences, ICES 2019. 1st International Conference of the Faculty of Environmental Sciences, University of Ilorin, Nigeria, 29th - 30th April 2019.

Qian Q.K, Chan E.H.W, and Khalid A.G. (2015) Challenges in Delivering Green Building Projects: Unearthing the Transaction Costs (TCs). *Sustainability* 2015, 7, 3615-3636; doi:10.3390/su7043615.

RICS (2018) RICS Pathway guide Quantity Surveying and Construction. August 2018. Version 1.0: RICS, Parliament Square, London SW1P 3AD.

Robinson, J. (2005) Property Valuation and Analysis Applied to Environmentally Sustainable

Development. *PRRES*.

Sayce, S. and Sundberg, A. (2010) Is Sustainability Reflected in Commercial Property Prices: A Review of Existing Evidence. *Journal of RICS Sustainability*..

Shimizu K, Hitt MA (2005) what constrains or facilitates divestitures of formerly acquired firms? The effects of organizational inertia. *J Manag* 31(1):50–72

Ugwu, O. O., and Haupt, T. C. (2007). Key performance indicators and assessment methods for infrastructure sustainability—a South African construction industry perspective. *Building and Environment*, 42(2), 665–680. UK, 1987. Available online: <http://www.un-documents.net/ocf-02.htm#I> (accessed on 21 October 2019).

Vinyangkoon A (2012) Commercial green building: the value added gap perspective .
Department of Real Estate Management

Zakariyyah K.I, Soyingbe, A. A., Ajayi, O.O., John, I.B., and Ameh. O.J(2018) *Indigenous Construction Firms' Entrepreneurial Orientation for Sustainable Development*”
proceedings 209-217 13th Annual Research Conference and Fair themed: Resource

Zainul-Abidin, N., (2008). Achieving Sustainability through Value Management: A Passing Opportunity. *International Journal of Construction Management*, 8(2), pp.79-91
Utilization and Sustainable Development, Volume 3(science), held at the University of Lagos, Nigeria. 30th August 2018.

About the Author



Adetayo Olugbenga ONOSOSEN

Akure, Ondo State, Nigeria



Adetayo Onososen is a research-driven, highly dependable, diligent and innovative graduate of Quantity surveying from the Federal University of Technology Akure, Ondo State, Nigeria. He also has a Master of Science in Quantity Surveying from the University of Lagos. He has a strong bias for excellence, execution and exemplary work ethic. He is highly analytical with industry-based experience in construction management/cost control and project management. He is skilled in conducting qualitative and quantitative field research in environmental sciences/technology in construction and sustainable/green buildings. He possesses effective communication and writing skills, strategic leadership, teamwork and dynamic people management skills. Over the years he has garnered keen interests in technology in construction, green buildings and research in the environmental science. He works as a practising quantity surveyor in a firm where a mix of entrepreneurial drive and extreme ownership mindset is encouraged where he is leveraging skills to contribute own quota to overall organization growth.

Adetayo can be contacted on Onososen@gmail.com