



© Universiti Tun Hussein Onn Malaysia Publisher's Office

JTET<http://penerbit.uthm.edu.my/ojs/index.php/jtet>
ISSN 2229-8932 e-ISSN 2600-7932Journal of
Technical
Education and
Training

Integration Factors of Green Skills into Building Construction Trade Programme in Nigeria

Samaila Hamza¹, Aede Hatib Musta'amal @ Jamal^{2*}, Yusri Kamin³¹Faculty of Technology Education, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, 740101, NIGERIA^{2,3}School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Johor Bahru, 81310, MALAYSIA

*Corresponding Author

DOI: <https://doi.org/10.30880/jtet.2020.12.01.001>Received 25th April 2018; Accepted 3rd May 2018; Available online 31st March 2020

Abstract: Technical and vocational education and training (TVET) remains a vital tool for skilling young individuals both in and out of school. However, it appears that there has been a lack of research especially in the building construction sector with respect to green buildings in Nigeria. The main purpose of this research paper is to identify factors should be included in the greening of building construction trade curriculum of technical colleges in north western Nigeria with a view to improving teaching and learning green skills for sustainable development. In this study, simple random sampling was used to select 15 building construction teachers in the north western Nigerian technical colleges. Data for this study were collected using qualitative approach (that is interview). Respondents were requested to answer the interview questions based on the topic under study. The factors (data) identified from the perception of the respondents were collected and analysed by qualitative means based on their level of consideration with regards to improving teaching and learning green skills for sustainable development. In doing so, the data were analysed by transcription, coding, content analysis and thematic with the aid of Nvivo statistical software. Findings indicated that the three main factors that could be included in the integration of green skills into the curriculum of building construction trade include environmental, economic and social factors. Specifically, these factors were disintegrated into climate change, global warming, greenhouse gas emission, economic instability, health and safety issues related to buildings, waste and energy in buildings. This research forms the initial investigation of a more in-depth study of the green skills integration into the Nigerian education curriculum, which aims to achieving environmental, economic and social sustainability.

Keywords: Green skills, building construction trade, environment, society and economy

1. Introduction

In the Nigerian context, like other countries, the greening of building construction curriculum may be influenced by so many factors ranging from climate change due to global warming, economic recession, and green skill-shortage among others. In this respect, renewable technology integration to building construction projects according to Gunhan (2012) will most likely occur within a sustainable project provision. While the benefits of sustainable building construction have been widely highlighted, its implementation has been hindered due to several issues. The existence of such factors was attached to the lack of understanding of sustainability (Kang et al., 2013). In essence, sustainable construction is gaining acceptance as a sign of excellence in the trade, limiting the options in the market for firms who do not convey such skills to a construction site; and hence, energy bills and health/safety concerns are the aspects that raise the need for the adoption of energy-efficient in the building construction sector (McCoy et al., 2012). In line with the foregoing, the purpose of this study is to identify factors to be included in the integration of Green Skills into Building

*Corresponding author: abdulhamidibrahim84@gmail.com

2020 UTHM Publisher. All rights reserved.

penerbit.uthm.edu.my/ojs/index.php/jtet

Construction Trade Programme in Nigeria. The integration when successfully carried out will positively contribute towards the greening Building construction sector which is under TVET thereby attaining environmental protection and social, and economic viability.

2. Related Works

Climate change, the scarcity of resources and the effects of globalisation are some of the drivers of the transition into green paradigm (Mustapha, 2016). Climate change according to IPCC (2015) is a change that occurs in the climate usually being determined via statistical tests by the mean and/or variability changes of its properties, which persists for a lengthy period of decades or longer. More so, Odjugo (2010) pointed out that natural processes and human activities cause climate change. For example, human activities may range from emitting a large number of greenhouse gases into the atmosphere that depletes the ozone layer, to actions that lessen the number of carbons absorbed from the atmosphere.

In this regard, IPCC (2015) noted that anthropological activities that reduce the number of carbon sinks include, alterations in land use and water pollution among others. These actions have been confirmed to be responsible for the on-going explicit climate change or global warming. These findings indicated there is an urgent need for workers in the construction sector to use land properly in buildings. More so, due to the attention given to climate change by world's leaders, there was a large assembly of heads of state (including Nigeria president) in Paris, France in December 2015 attending the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21), to discuss on the ecological problems. The white paper issued on the conclusion of the conference read that there is a global agreement on the limitation of the world's temperature increase to at least two degrees Celsius.

On the other hand, among the factors, that should be included in the integration of green skills in building construction is the state of Nigeria's economy. This is because green skills acquisition will give room for green jobs and these jobs will be used to transform the nation's economy. In essence, the green economy's renaissance according to Allen and Clouth (2012) was long-established by chosen it as one of the two vital themes of the United Nations' 2012 Conference on Sustainable Development (Rio+20). In line with this, the green economy was promoted 'as a means for catalysing renewed national policy development and international cooperation and support for sustainable development. More so, the outcome of the UN 2012 Rio + 20 conference according to Caprotti and Bailey (2014) includes among other things that the UN recognised the potential for green economy approaches to work as critical boundaries between environmental and economic matters to promote sustainable development.

Building on the above UN's conference outcome, building construction could serve as one of the important sectors that require skills for the enhancement of the green economy. This is because buildings cover the three cycles of sustainable development as mentioned in the outcome that is the environment, social and economic. To this end, Benson et al. (2014) pointed out that green economy should be founded on the principles of sustainable development, must respect national sovereignty and address 'inequalities and promote social inclusion, including social protection floors. Benson further emphasised that since Rio+20 Summit in June 2012, the green economy agenda has moved from theory to practice, as such Governments are now producing national plans and regional strategies to reshape and refocus policies, investments and spending towards a range of sectors, such as clean technologies, renewable energies, water services, waste management, green buildings. It is based on the foregoing backgrounds, this paper aimed at identifying factors that should be included in the integration of green skills in building construction curriculum in Nigeria. The study is limited to three elements of sustainability that is; environmental, economic and social as the elements of sustainable development.

3. Methodology

The qualitative research approach was employed in this research and the semi-structured interview was used for the data collection. This is because a semi-structured interview gives the participants' opportunity to state their opinion to the topic under study. According to Abdul Nifa (2013), qualitative research uses the semi-structured interview as it permits the participants to relate to the research matter in their own opinion and insights, which in return may yield enriched information for the researcher. The semi-structured interview refers to a context in which the interviewer has a series of questions that are in the general form of an interview schedule but is able to vary the sequence of the questions (Bell and Bryman, 2007). Purposive sampling technique was used to select 15 building construction teachers in the northwestern Nigerian technical colleges. These teachers were experts in the field of building construction courses having at least: 15 years of working experience in building construction; and a bachelor's degree in building construction.

The interviews were guided by the research aim and consist of two parts: Part A seeks information on the respondent's background and part B was the interview protocol aimed at identifying factors that should be included in the integration of green skills in building construction trade curriculum in Nigeria. Lastly, the results of the data collected from interviews were transcribed, coded and analysed inductively (Maykut and Morehouse, 1994) using content analysis technique (Merriam, 2009) with the aid of Nvivo software. This technique was employed for this study

because it is one of many qualitative methods used to analyse textual data (Forman and Damschroder, 2008) and hence, the data collected for this study is contextual. In the qualitative content analysis, data are categorised using categories that are generated, at least in part, inductively (i.e., derived from the data), and in most cases applied to the data through close reading (Creswell, 2003).

4. Results

Based on the aim of this study, the participants' perceptions recorded during the interview sessions, identified main issues appearing under each of the three factors to be considered in the greening of building construction trade curriculum in Nigerian technical colleges. In all, the participants have a similar characteristic of being teachers, no many differences in their perceptions. In line with the aforementioned, the main outcomes of this research were summarised as; environmental, economic and social parameters are the factors that to be considered the integration of green skills or rather greening the curriculum of building construction trade at technical colleges in Nigeria. In identifying these factors, the participants were asked of their perception on the integration or rather greening the curriculum of building construction trade programme in the Nigerian technical colleges. In strict adherence to the ethical issues as assured to the interviewees in this study, the researcher used a coding system of expert one (TC1) to twenty-one (TC15) to represent interviewees. Their responses were presented in tables 1, 2 and 3 based on the three factors (environmental, social and economic).

4.1 Environmental Factors

For environmental factor, based on the interview questions, opinions of the experts were collected. Thematic analysis was used in analysing the interview and the result was transcribed, coded, and categorized into four subthemes. The participants were asked about their experience, ideas, perspectives or views on environmental factors that could *be considered* in the integration of green skills into the curriculum of building construction programme at Nigeria technical colleges. Based on the qualitative data collected, Table 1 presents the result of the qualitative data analysis. TC1-TC15 represents participants' classifications, while theme 1 – 4 were emerged from the analysis of the in-depth interview after transcription, coding, categorization and theme identification.

Table 1 - Environmental Factors

PARTICIPANT	THEME 1 Environmental Hazard	THEME 2 Land and Material	THEME 3 Energy and Water Quality	THEME 4 Waste and Pollution
TC: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15	Climate change	Land location	Energy conservation in buildings	Waste minimisation
TC: 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14 15	Global warming	Proper Land utilisation	Water quality	Pollution control.
TC: 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15	Green gas emission	Material selection	-	-

From Table 1 above, in theme 1 **Environmental Hazard**: 13 participants out of 15 representing 87% admitted that due to "*Climate change*" there is a need for the integrating green skills into the curriculum of Building Construction Trade; more than half of the participants (80%) stressed that "*Global warming*" should *be considered* the integration; and most of the participants agreed that "*Green gas emission by buildings*" could be the reason for integrating green skills in building construction programme. This aspect of *environmental hazards* were considered by the participants which indicated that environmental hazard could lead to the integration of green skills into the BCT curriculum at technical colleges in Nigeria. In theme 2, **Land and Material** (Table 1): 87% of the experts stressed that "*the selection of suitable Land location*" for the erection of a sustainable building, green skills should be integrated; 12 participants (93%) stressed that "*proper Land utilisation*" should *be considered* in the integration, and most of the participants agreed that "*Material selection*" could be the reason for integrating green skills in building construction programme. This indicated that these aspects of Land and Material were considered by the participants (table 1.1) as factors that *should be considered* in the integration of green skills into the BCT curriculum at technical colleges in Nigeria.

In theme 3, **Energy and Water Quality** (Table 1) 13 out of the 15 experts stressed that for the "*energy conservation in buildings*," green skills should be integrated; the majority (80%) of the participants stressed that "*water quality in buildings*" could be included in the integration; green skills in building construction programme. This indicated that these aspects of energy and water quality were considered by the participants as the factors that need to be considered in integrating green skills into the BCT curriculum at technical colleges in Nigeria. Furthermore, in

theme 4 **Waste and Pollution** (Table 1): Majority of the experts maintained that for the “*waste minimisation*,” green skills should be integrated; 12 (80%) of the participants stressed that “*Pollution control*” in buildings could be considered in the integration of green skills in building construction programme. These aspects of waste and pollution as presented in Table 1.1 were considered by the participants as factors that should be considered in the integration of green skills into the BCT curriculum at technical colleges in Nigeria.

4.2 Social Factors

In this section of social factors that should be considered the integration of green skills in the BCT curriculum, the opinions of the participants were collected based on the interview questions. The participants were asked about their experience, ideas, perspectives or views on social factors that should be considered in the integration of green skills into the curriculum of building construction programme at Nigeria technical colleges. Based on the qualitative data collected, Table 2 presents the result of the qualitative data analysis. TC1-TC15 represents participants’ classification, while themes 1 – 3 emerged from the analysis of the in-depth interview after transcription, coding, categorization and theme identification. In theme 1 from Table 2 **safety and welfare**: 14 (90%) of the participants opined that due to “*safety issues in building*” there is a need for the integration of green skills into the curriculum of BCT; 13 of the experts stressed that “*health and welfare of workers and occupant*” need to be considered in the integration; and most of the participants agreed that for the *user comfort/Satisfaction*” could be the reason for integrating green skills in building construction programme. These aspects of Safety and Welfare were considered by the participants (Table 2) which indicated that safety and welfare could lead to the integration of green skills into the BCT curriculum at technical colleges in Nigeria.

Table 2 - Social Factors

PARTICIPANT	THEME 1 Safety and Welfare	THEME 2 Accessibility and Aesthetic	THEME 3 Nuisance and Social Involvement
TC: 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15,	Safety issues in building	Accessibility	nuisance to neighbours
TC: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15	Health and welfare of workers and occupant	Aesthetic/Visual	-
TC: 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15	User comfort/Satisfaction,	-	Social involvement

In theme 2 from Table 2, **Accessibility and aesthetic**: Most of the experts stressed that for the ease of “*accessibility*” in building, green skills should be integrated; and 86% representing 13 of the participants opined that “*aesthetic/Visual*” could be the reason for integrating green skills in building construction programme. These aspects of Accessibility and aesthetic were considered by the participants (table 1.2) which indicated that Accessibility and aesthetic should be considered in the integration of green skills into the BCT curriculum at technical colleges in Nigeria. In theme 3 (Table 2), **Nuisance and Social Involvement**: Most of the experts stressed that for the avoidance of “*nuisance to neighbours in building*” green skills should be integrated in building construction programme; and the majority (90%) of the participants stressed that “*social involvement*” in buildings should be considered in the integration of green skills in building construction programme. These aspects of Nuisance and Social Involvement were considered by the participants (Table 2) which indicated that Nuisance and Social involvement should be considered in the integration of green skills into the BCT curriculum at technical colleges for the attainment of social sustainability in Nigeria.

4.3 Economic Factors

For the economic reason, based on the interview questions, opinions of the participants were collected. The participants were asked about their experience, ideas, perspectives or views on economic factors that should be considered in the integration of green skills into the curriculum of building construction programme at Nigeria technical colleges. Based on the qualitative data collected, Table 3 presents the result of the qualitative data analysis. TC1-TC15 represents participants’ classification, while theme 1 – 3 were emerged from the analysis of the in-depth interview after transcription, coding, categorization and theme identification. In theme 1 (Use of Natural Materials), 12 of the

participants opined for “Using the available natural materials for buildings,” there is a need for the integration of green skills into the curriculum of BCT. This aspect of use of natural materials were considered by the participants (Table 3). Therefore, this finding indicated that use of natural materials could lead to the integration of green skills into the BCT curriculum at technical colleges in Nigeria.

Table 3 - Economic Factors

PARTICIPANT	THEME 1 Use of Natural Materials	THEME 2 Building Cost	THEME 3 Legislature and Risk Management
TC: 1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 14, and 15	Using the available natural materials for buildings,	Whole life cost of a building,	legislation compliance
TC: 1, 3, 4, 5, 6, 8, 9, 11, 14, and 15	-	Cost efficiency	Risk assessment.

In theme 2 from Table 3, **Building Cost:** 80% of the experts stressed that for the cheap “whole life cost of a building,” green skills should be integrated; and the majority of the participants opined that “Cost efficiency” could be the reason for integrating green skills in building construction programme. These aspects of building cost were considered by the participants (Table 3) which indicated that building cost should be considered in the integration of green skills into the BCT curriculum at technical colleges in Nigeria. In theme 3 of Table 3, **legislature and risk management:** Majority of the experts stressed that for the “legislation compliance” green skills should be integrated in building construction programme; and 16 of the participants stressed that “Risk assessment.” in buildings should be considered in the integration of green skills in building construction programme. These aspects of legislature and risk management were considered by the participants (Table 1.3) as factors that should be considered in the integration of green skills into the BCT curriculum at technical colleges for the attainment of economic sustainability in Nigeria.

From the respondents’ responses summarized as above, factors could further be presented in a framework (Fig. 1):

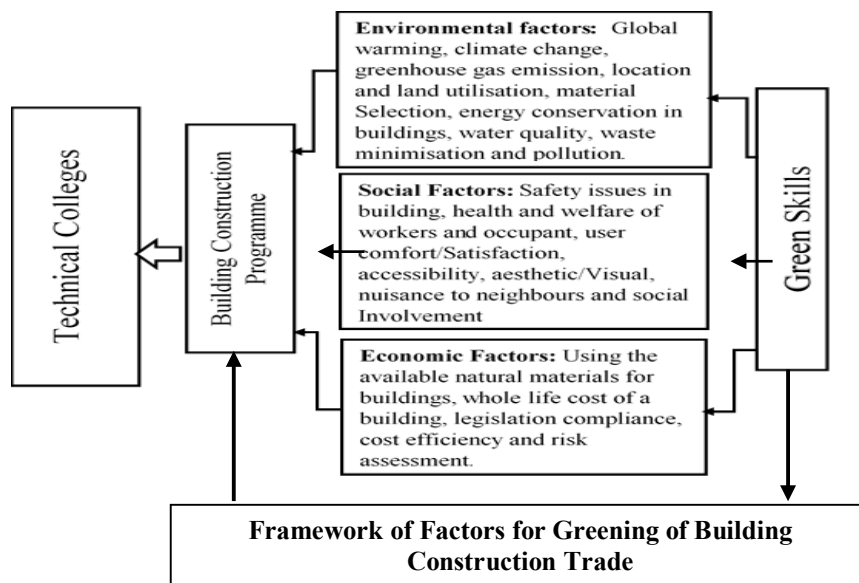


Fig. 1 - Conceptual Framework of Factors for the Greening of Building Construction Trade

The above framework in Fig. 1 illustrates how the identified factors for the greening of building construction trade curriculum could be summarised based on environmental, economic and social factors.

5. Discussion of Findings

The findings of this study revealed that global warming and climate change are part of the factors that that should be included in the integration of green skills into the curriculum of building construction trade students at Nigerians technical colleges. This finding is in line with that pointed out that global warming itself is a result of human activities,

principally greenhouse gases (GHG) released mostly as by products of energy use to the atmosphere; while, climate change has become one of the major challenges for mankind and the natural environment and the world all over has focused debates around this phenomenon. Moreso, according to Dahiru, Dania, and Adejoh (2014) Nigeria appears to be lagging in its pursuit of the sustainability agenda which is a major contributor to global warming. The findings also revealed that greenhouse gas emission and energy conservation as other factors for the inclusion of green skills into the curriculum. This outcome is in line with that of Consoli et al., (2015) that recommended that the spectrum of actions for tackling environmental issues includes options as diverse as reducing greenhouse gas emission by developing renewable energy source; increasing the efficiency of energy usage in transport, building and industrial productions; recycling and reusing materials. Also, OECD (2015) pointed out that construction is both a major part of the economy and, at the same time, has major environmental effects, particularly concerning the disposal of waste, and the potential for energy efficiency measures.

The findings also revealed that educating students about the knowledge of locating and land utilisation and material selection are also factors that could be included in the integration of green skills into building construction trade curriculum. This finding is in cognisance with the opinion of Kamana and Escultura (2011) that sustainable building as an outcome of a design which focuses on increasing the sufficiency of resource use: energy, water, and materials while reducing building impacts on human health and environment during the buildings lifecycle through better location, design, construction, operation, maintenance and removal. This is also, Azis, Memon, Rahman, Nagapan, and Latif (2012) that issues of illegal dumping arise can be contributed by cost and location of the project. More so, in the case of material selection, the finding contradicts the recommendation made by Hand et al. (2013) that the construction industry is now seeing greater demand for green skilled personnel, not only in the area of design and material selection and the trades required to build the projects but also for construction managers, projects managers among others.

The findings also revealed that water quality, waste minimisation and pollution control are also factors that could be included in the greening of building construction trade curriculum with the aim of achieving sustainability. These findings are in line with the opinion of Obia (2016) that these needs consist of our basic requirements as food, clothing, housing and employment. The limits in our basic requirements consist of the materials limitations such as finite resources and declining productivity caused by overexploitation of resources, depleting water quality and quantity, and shrinking biodiversity. More so, it is in line with recommendations made by that economic feasibility of waste minimization in construction projects showed that by adopting waste minimization strategy like recycling and reusing material can save 2.5% of the total budget. And also, According to Markelj et al., (2014), environmental sustainability-focused on environmental footprint, waste minimization and separation, energy demand, energy use and monitoring, water consumption. In the case of pollution control Scanlon (2010) pointed out that the green economy is characterized by substantially increased investment (both public and private) in green sectors, supported by enabling policy reforms and a decrease in CO₂ and pollution levels.

Factors that should be included in the integration of green skills into building construction trade according to the findings of this study also include safety issues in building, health and welfare of workers and occupant user comfort/Satisfaction. This finding is in line with the recommendation made by Fien and Guevara (2013) that whether in cities or the countryside, many construction jobs are in less well-regulated sectors and thus have poor health and safety records and industrial conditions. Gibberd (2008) also recommended that buildings should ensure that development considers human rights and supports improved health, safety and security. Also, McCoy et al., (2012) opined that health or safety concerns are all factors that increase the need for the adoption of energy-efficient and 'green' practices in the building construction field. Additionally, Pavlova (2017) opined that teachers should discuss issues like the use of energy, transport implications, health and safety of workers and that of users. Also, Wang et al. (2013) revealed that construction industry is built on a foundation of skilled craft workers that primarily supplied through various training programs, are essential to the safety of construction sites and the reliability of bridges and roads, factories and power plants, and offices and homes.

Additionally, accessibility and aesthetics are factors that according to the findings of this study that could be included in the integration of green skills. This finding supports Illankoon et al., (2016) that the social dimension of sustainability included thermal comfort, visual comfort, acoustic comfort, ventilation, user control, safety and security, and accessibility for everybody irrespective of gender and health condition. Moreso, it is in line with the opinion of Passer et al., (2015) that the building envelope serves multiple functions apart from heat retention that is tied to structure, safety, and visual appeal or aesthetics. The finding also is in line with Bramley et al., (2009) recommendation that social equity is concerned with accessibility to services, and opportunities, whereas the sustainability of communities is concerned with social interaction, social cohesion and social capital. Findings of Almahmoud and Doloi (2015) also support this finding that the physical needs can only be satisfied by providing hard infrastructures such as accessibility, shelter, water, safety and security, education and job opportunity.

The findings of this research also revealed that factors to be included in green skills integration also include avoidance of nuisance to neighbours and social involvement. This finding coincides with the view of Napier (2012) that material having no value in reuse covers the day's waste, and with the effect of reducing nuisance odour and exploitation by animals, birds and insects. It is also in line with the findings of Khatib (2012) that the construction

industry drains more than 50% of extracted materials, generates 180 million tons of waste every year, and causes site related nuisances such as traffic, noise. Additionally, Ayodele and Alabi (2011) recommended that removal of topsoil an average of 150 mm (6") deep soil is removed on the site of construction; is aimed at removing all the roots of the already cleared trees, bushes and shrubs so that not to become a nuisance to the construction process. In the case of social involvement, Baqadir et al., (2011) pointed out that major components of TVET policy include the development of curriculum content, modes of instruction, quality of instructors, sustaining participation and involvement of potential TVET stakeholders; while employers' involvement is critical in designing skills and qualification standards (Sung, 2010). For Abolore (2012), he revealed that awareness of green building depends on the understanding of the individual actions, the quest for knowledge and absolute involvement and commitment to the principle. The finding also corresponds with UNESCO-UNEP (2016) report that a successful transition to a green economy will be one that builds on two pillars – job creation and youth involvement.

Additionally, one of the outcomes of this study also includes using the available raw/natural materials for buildings. This finding corresponds with the report of UNESCO-UNEP (2016) that green jobs that reduce consumption of energy and raw materials, limit greenhouse gas emissions, minimize waste and pollution; and resources Naturally occurring assets that provide benefits through the provision of raw materials and energy used in economic activity (or that may provide such benefits one day) and that are subject primarily to quantitative depletion through human use. It is also supported by Tan et al. (2011) that the land and space occupied by a building, building materials production and transportation and the waste treatment and disposal generated from construction have a great impact on the ecological environment. This finding also supports the finding of Yu et al., (2014) that the use of renewable products and materials can separate the recycling part from the construction waste; and it can reduce the use of the original material; increase the recycling use of resources and materials.

Furthermore, the findings of this study also include the whole life cost of a building. This finding corresponds with the recommendation made by Azis et al., (2012) that major issues experience in construction projects include construction waste, excessive resources consumption, adverse effect to environment, time overrun and cost overrun; and hence, time overrun cost overrun and waste generation are common issues faced by the construction industry. This finding also is in line with that of Zhang (2015) the cost of green buildings is the most critical factor that affects its development and the cost premium certainly acts as a significant barrier and may even completely filter projects from consideration. Accordingly, Hara et al. (2016) identified, cost performance as an economic dimension. Similarly, for Illankoon, et al., (2016), the economic dimension referred to cost performance of the construction including both initial direct and indirect costs and maintenance costs over the life span and therefore, the lack of consideration of the economic dimension of sustainability was a grave situation for the development of green buildings.

This study also found that legislation compliance is one of the factors that could be put into consideration in integrating green skills into the building construction trade curriculum. This study supports Dahiru et al., (2014) findings that there is no enabling environment in the form of legislation or policy on Green Building practice. The finding also supports the study of Dayue ((2016)) that focused on the available legislation and regulation building at the state level, training framework, present status of green skill education and systematic legislation and regulations established. CEDEFOP (2010a) also revealed that an overarching state-driven green skills policy, but occupational competences and training regulations have been greened – as industrial sectors restructure and respond to extensive environmental legislation. The finding also supported UNESCO-UNEP (2016) that skills in understanding and conducting environmental impact assessments and understanding and interpretation of environmental legislation targets, ecosystem services design and management and land use planning. Waste generation is a growing problem around the world and there is a range of international legislation in place to try and deal with it, as well as voluntary targets aimed at all sectors of society (Adeyemi, Martin, & Kasim, 2014). Additionally, it is a clear fact these findings have a major impact on TVET as it is an important tool for skilling young people both in and out of school as well as in preparing people for productive livelihoods.

Lastly, this research outcome also includes cost efficiency and risk assessment. This finding corresponds that of Martinez-Fernandez et al., (2010) that entrepreneurship specific skills required for creating and running new business ventures and innovative projects in existing firms such as risk assessment and warranting, strategic thinking, self-confidence and the ability to make the best of personal networks. The finding also coincides with that of OECD (2015) highlighted that strategic thinking, positive orientation to change and innovation, ability to network and build strategic alliances, risk assessment, opportunity identification and motivating others around a common goal. Moreso, Tether (2005) found that green skills can be generic or specific regarding functions at work such as managing people, computing, collaborating or dealing with risk and uncertainty or developing a new product or service. Inconsequent, the results of this study displayed and discussed above indicated the need for the integration of the green skills into the curriculum of building construction trade at technical colleges in Nigeria as perceived by the teachers of building construction trade departments at the technical colleges.

6. Conclusions and Recommendations

This study has found that three factors should be included in the integration of green skills into the curriculum of building construction trade for ease in achieving sustainability. These factors fall under the three parameters or rather

elements of sustainable development; and these parameters are environmental, economic and social parameters. Achieving sustainability allows the present generation to have their development without compromising the future generation to get their development too. These identified factors could serve as the main reason for integrating green skills in building construction trade curriculum. The factors that range from global warming, climate change, greenhouse gas emission, safety, health, water quality among others would be curtailed in the case of buildings in Nigeria. Going by the number of factors identified in this longitudinal study, the study recommended for the integration of green skills in building construction trade at technical colleges in Nigeria intending to achieve sustainable development in the building sector.

Acknowledgement

We wish to acknowledge the support provided by the management of Abubakar Tafawa Balewa University Bauchi, Bauchi State, Nigeria, and Universiti Teknologi Malaysia (UTMFR Grant 21H02)

References

- Abdul Nifa, F. (2013). *Development of a framework for partnering through aligning organizational cultures in the Malaysian construction industry*, University of Salford.
- Adeyemi, A., Martin, D., & Kasim, R. (2014). Improvement of existing buildings for sustainability as against maintenance and rebuild.
- Allen, C. and Clouth, S. (2012). A Guidebook to the Green Economy. Issue 1: Green economy, Green growth, and Low-carbon development—history, definitions, and a guide to recent publications. *Division for Sustainable Development, Department of Economic and Social Affairs, United Nations, New York, August*.
- Almahmoud, E. and Doloi, H. K. (2015). Assessment of social sustainability in construction projects using social network analysis. *Facilities*. 33(3/4), 152-176.
- Ayodele, E. O. and Alabi, M. O. (2011). Impact of Bank Recapitalization on the Construction Industry in Nigeria.
- Azis, A. A. A., Memon, A. H., Rahman, I. A., Nagapan, S. and Latif, Q. B. A. I. (2012). Challenges faced by construction industry in accomplishing sustainability goals. *Proceedings of the 2012 Business, Engineering and Industrial Applications (ISBEIA), 2012 IEEE Symposium on: IEEE*, 630-634.
- Baqadir, A., Patrick, F. and Burns, G. (2011). Addressing the skills gap in Saudi Arabia: does vocational education address the needs of private sector employers? *Journal of Vocational Education & Training*. 63(4), 551-561.
- Begum, R. A., Siwar, C., Pereira, J. J. and Jaafar, A. H. (2007). Factors and values of willingness to pay for improved construction waste management—A perspective of Malaysian contractors. *Waste management*. 27(12), 1902-1909.
- Bell, E. and Bryman, A. (2007). The ethics of management research: an exploratory content analysis. *British Journal of Management*. 18(1), 63-77.
- Benson, E., Best, S., del Pozo-Vergnes, E., Garside, B., Mohammed, E. Y., Panhuysen, S., Piras, G., Vorley, B., Walnycki, A. and Wilson, E. (2014). Informal and green? The forgotten voice in the transition to a green economy. IIED Discussion Paper, IIED, London. See: <http://pubs.iied.org/16566IIED>.
- Bramley, G., Dempsey, N., Power, S., Brown, C. and Watkins, D. (2009). Social sustainability and urban form: evidence from five British cities. *Environment and Planning A*. 41(9), 2125-2142.
- Bubou, G. M., Ogungbemi, A., Jonah-Alu, L. and Emeka, E.-E. E. (2010). The Green Economy Paradigm: How Can Nigeria Make the Shift? *Bubou, GM, Ogungbemi, AA, Jonah-Alu, LA & Ejim-Eze, EE (2010) The green economy paradigm: How can Nigeria make the shift*. 27-29.
- Caprotti, F. and Bailey, I. (2014). Making sense of the green economy. *Geografiska Annaler: Series B, Human Geography*. 96(3), 195-200.
- Consoli, D., Marin, G., Marzucchi, A. and Vona, F. (2015). Do green jobs differ from non-green jobs in terms of skills and human capital? SPRU-Science and Technology Policy Research, University of Sussex.
- Creswell, J. W. (2003). *Research Design: qualitative, Quantitative, and Mixed Methods Approaches*. (2nd Ed ed.) Thousand Oaks, CA: Sage.
- Dahiru, D., Dania, A. and Adejoh, A. (2014). An Investigation into the Prospects of Green Building Practice in Nigeria. *Journal of Sustainable Development*. 7(6), 158-167.
- Dayue, F. ((2016)). A survey report on Greening in Higher TVET in China: www.tvet.online.asia *ISSUE 6* (pp. 1-18).

- Fien, J. and Guevara, J. R. (2013). Skills for a Green Economy: Practice, Possibilities, and Prospects *Skills Development for Inclusive and Sustainable Growth in Developing Asia-Pacific* (pp. 255-263). Springer.
- Forman, J. and Damschroder, L. (2008). Qualitative content analysis. *Empirical Research for Bioethics: A Primer*. Oxford, UK: Elsevier Publishing. 39-62.
- Gibberd, J. (2008). 27 Developing a sustainable development approach for buildings and construction processes. *Smart and Sustainable Built Environments*. 300.
- Gunhan, S. (2012). Builders' Role: Innovative Green Technologies' Integration Process in Construction Projects. *Proceedings of the 2012 ICSDC 2011@ Integrating Sustainability Practices in the Construction Industry*: ASCE, 406-413.
- Hand, A., Zuo, J., Rameezdeen, R. and Xia, B. (2013). Green skills for the construction industry. *Proceedings of the 2013 38th Australasian Universities Building Education Association Conference*: The University of Auckland, 1-10.
- Hara, M., Nagao, T., Hanno, S. and Nakamura, J. (2016). New key performance indicators for a smart sustainable city. *Sustainability*. 8(3), 206.
- Illankoon, I. C. S., Tam, V. W. and Le, K. N. (2016). Environmental, Economic, and Social Parameters in International Green Building Rating Tools. *Journal of Professional Issues in Engineering Education and Practice*. 05016010.
- IPCC (2015). Organization. Online: <http://www.ipcc.ch/organization/organization.shtml> (retrieved 15.12.2015).
- Iwayemi, A. (2008). Investment in electricity generation and transmission in Nigeria: issues and options. *International Association for Energy Economics*. 37-42.
- Kamana, C. and Escultura, E. (2011). Building green to attain sustainability. *International Journal of Earth Sciences and Engineering*. 4(4), 725-729.
- Kang, Y., Kim, C., Son, H., Lee, S. and Limsawasd, C. (2013). Comparison of preproject planning for green and conventional buildings. *Journal of Construction Engineering and Management*. 139(11), 04013018.
- Kassim, T. A., Simoneit, B. R. and Williamson, K. J. (2005). Recycling solid wastes as road construction materials: an environmentally sustainable approach *Water pollution* (pp. 59-181). Springer.
- Khatib, H. (2012). IEA world energy outlook 2011—A comment. *Energy policy*. 48, 737-743.
- Markelj, J., Kitek Kuzman, M., Grošel, P. and Zbašnik-Senegačnik, M. (2014). A simplified method for evaluating building sustainability in the early design phase for architects. *Sustainability*. 6(12), 8775-8795.
- Martinez-Fernandez, C., Hinojosa, C. and Miranda, G. (2010). Green jobs and skills: the local labour market implications of addressing climate change. *Working document, OECD*. Available from: www.oecd.org/cfe/leed/44683169.pdf.
- Maykut, P. and Morehouse, R. (1994). Beginning qualitative research: a philosophic and practical approach. The Falmer Press, London.
- McCoy, A. P., O'Brien, P., Novak, V. and Cavell, M. (2012). Toward understanding roles for education and training in improving green jobs skills development. *International Journal of Construction Education and Research*. 8(3), 186-203.
- Merriam, S. B. (2009). *Qualitative Research: a Guide to Design and Implementation*. San Francisco: Jossey-Bass.
- Mustapha, R. B. (2016). Green and Sustainable Development for TVET in Asia. *The International Journal of Technical and Vocational Education*. 11(2).
- Napier, T. (2012). Construction waste management. *National Institute of Building Science*, Available [online]. at: <http://www.wbdg.org/resources/cwmgmt.php> Accessed. 25(05), 2013.
- Obia, A. E. (2016). Emerging Nigerian Megacities and Sustainable Development: Case Study of Lagos and Abuja. *Journal of Sustainable Development*. 9(2), 27.
- Odjugo, P. A.-a. O. (2010). General overview of climate change impacts in Nigeria. *Journal of Human Ecology*. 29(1), 47-55.
- OECD (2015). "Creating jobs for Tunisian youth in the green economy: Anticipating skills and developing entrepreneurship" *OECD Publishing, Paris* (DOI: <http://dx.doi.org.ezproxy.psz.utm.my/10.1787/9789264226470-9-enpp>. 211-240).

- Passer, A., Wall, J., Kreiner, H., Maydl, P. and Höfler, K. (2015). Sustainable buildings, construction products and technologies: linking research and construction practice. *The International Journal of Life Cycle Assessment*. 20(1), 1.
- Pavlova, M. (2009). Conceptualisation of technology education within the paradigm of sustainable development. *International Journal of Technology and Design Education*. 19(2), 109-132.
- Journal of Sustainable Development*, 7(6), 158.
- Pavlova, M. (2017). Green Skills as the Agenda for the Competence Movement in Vocational and Professional Education *Competence-based Vocational and Professional Education* (pp. 931-951): Springer.
- Scanlon, J. (2010). 'The Green Economy and International Environmental Governance', UNEP.
- Seow, T. and Mohamad, A. (2007). Construction Waste Management on Site. *Proceedings of Universiti Perguruan Sultan Idris, Tanjung Malim, Perak*.
- Tan, L., Cai, Y., An, Z., Yi, L., Zhang, H. and Qin, S. (2011). Climate patterns in north central China during the last 1800 yr and their possible driving force. *Climate of the Past*. 7(3), 685.
- Tether, B. S. (2005). Do services innovate (differently)? Insights from the European innobarometer survey. *Industry & Innovation*. 12(2), 153-184.
- UNESCO-UNEP (2016). *youth change Green Skills and Lifestyles Guidebook*. Paris: UNESCO-UNEP.
- Wang, Y. (2008). A quantitative analysis of training outcomes and strategies in the construction industry.
- Wang, Y., Lennerts, K., Shen, G. Q., Bai, Y., Xue, X., Sun, C., . . . Xue, W. (2013). *ICCREM 2013: Construction and Operation in the Context of Sustainability*.
- Yu, Z., Lu, C. and San, B. (2014). Application of green construction technology in construction projects. *Proceedings of the 2014 ICCREM 2014: Smart Construction and Management in the Context of New Technology-Proceedings of the 2014 International Conference on Construction and Real Estate Management: American Society of Civil Engineers (ASCE)*,
- Zhang, X. (2015). Green real estate development in China: State of art and prospect agenda—A review. *Renewable and Sustainable Energy Reviews*. 47, 1-13.