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MULTI-LAYERED APPROACH TO SUSTAINABLE CONSTRUCTION PRACTICE: A SOCIO-CULTURAL PERSPECTIVES

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Abstract
Despite being a party to the formulation and signing of many international conventions and treaties on sustainable construction and development, unsustainable construction practice is still subsisting in Nigeria. This study therefore, examined the relationship between socio-cultural factors and promotion of sustainable construction practice through the social ecological model lens in Nigeria. A questionnaire survey was conducted through stratified random sampling of 675 building contractors, consultants/professionals and clients in South-East Nigeria; from which 426 were retrieved and used for analysis. The data generated through the survey were subjected to descriptive and inferential statistical analyses using SPSS Version 25. The result revealed that the five major socio-cultural factors of public policy, organisational, individual, interpersonal, and community could promote sustainable construction practice. It also revealed that the overall level of implementation of sustainable construction practice is still low. The result further revealed that public policy, organisational and community factors have significant positive relationship with all the dimensions of sustainable construction practice. However, it indicated that individual factors have significant positive correlation with environmental sustainable construction practice only; whereas interpersonal factors have significant positive relationship with environmental sustainable construction practice and significant negative relationship with social sustainable construction practice. The study suggested that the promotion of sustainable construction practice required strong regulatory, institutional and organisational supports, in addition to community shared values and norms and excellent communication network. It also suggested that issues relating to interpersonal factors such as workers-work relationship and workers' cooperation should be treated with absolute caution otherwise; they can impede the processes of implementing sustainable construction practice.

Keywords: Construction Practice, Culture, Human Behaviour, Social Ecological Model, Sustainable Construction

Introduction
The emergence of sustainability agenda in the late 1980s has attracted many attentions towards thinking and acting in a more thoughtful and responsible manner without compromising the future generations (World Commission on Environment and Development WCED, 1987). Voetmann (2015) avowed that sustainability is not only one of the defining themes of the 21st century that has received huge amounts of attention, but also vital to the survival of humanity. There are worldwide sustainability crises as a result of human cultural and cognitive adaptability (Kline et al., 2018), in all facets of human endeavour, including the construction practice. These could be in the form of resources consumption and environmental damage due to

pollution (Reddy, 2016; Thomas et al., 2013; Wu et al., 2019); generation of large quantities of wastes, alteration or destruction of natural ecosystem (Cotgrave, 2013; Kibert, 2016; Pearce et al., 2017; Reddy, 2016); climate change and global warming or erosion of the natural balance of the earth (du Plessis, 2007).

However, sustainable construction is a new approach to achieve sustainability in the construction industry (Koko and Bello, 2020). It represents the construction sector's response to man's concern over increasing consumption pattern in the mist of earth's limited carrying capacity to sustain lives (Dania, 2016). It specifically deals with how the construction projects preserve the environment and have impacts on the social and economic welfare of the people living around them (Willar et al., 2021). A sustainable construction uses less water, optimizes energy efficiency, conserves natural resources, generates less waste, provides healthier spaces for occupants as well as reduces the impact of construction activities on human health and environment during the construction project's lifecycle as against the conventional construction (Kanika et al., 2016; USGBC, 2010). Contrarily, conventional construction practice usually overlooks the interrelationships between a construction facility, its components, surroundings, and users (Atombo et al., 2015).

Hence, sustainable construction practice is the optimal utilization of sustainable materials and technologies in the design, construction and operation of construction projects for the social and economic wellbeing of the people without injury to the environment, now and in the future. Furthermore, in construction industry, sustainability is about following a suitable practice in choosing materials, sources of materials, and construction methodologies, as well as the design philosophy, to improve performance, decrease environmental burden of the project, minimise waste, and become ecologically friendlier; taking into consideration environmental, economic and socio-cultural values (Mohamed and El-Meligy, 2013).

Nevertheless, implementation of sustainable practice within the construction industry is precluded by adverse attitudes of construction practitioners (Brennan and Cotgrave, 2013); thereby constituting barriers to internalisation of sustainability concept into the construction industry practice. On the other hands, attitude is embedded in culture which links sustainability through its many connections (Hosagrahar et al., 2016; United Nations, 2016). As a result, Pretorius and Le Roux (2012) contended that sustainability is no longer a question of 'if', rather a question of 'how?' Hence, a culturally-based sustainability analysis would substantially enhance the understanding of economic behaviour, and ignoring culture can lead to bad policy (Zainuddin et al., 2018). Addressing sustainability problems therefore, requires a large-scale change in human behaviour and institutional, social and cultural forces that shapes human behaviour (Assadourian, 2010; Beddoe et al., 2009; Kinzig et al., 2013). According to Masria et al., (2016), socio-cultural values are keys to cultural sustainability that is evolving in its physical environment.

Furthermore, sustainability measurements are influenced by contextual characteristics including culture (López-Arceiz et al., 2020). For instance, industrialised nations are mostly faced with institutional than technical barriers; whereas in the developing countries, institutions are ruled by long cultural traditions that encourage social segregation and uneven resource distribution (Wallbaum et al., 2010). Effah (2015), Gunatilake (2013) and Thomson and El-Haram (2011) believed that delivering sustainability in practice remains a challenge due to different traditional cultural/structural barriers. In theory however, cultural evolution of sustainable behaviours and institutions are

manifested (Waring et al., 2015; Waring et al., 2017); whereas empirical research validating the association is sparingly existing; and needed for practical implications (Kline et al., 2018).

The aim of this study therefore, is to determine the relationship between socio-cultural factors and promotion of the triple bottom line of sustainable construction practice through socio-ecological lens. This would be achieved by drawing social ecological theory to delineate socio-cultural variables that can promote environmental, economic, and social sustainability practice in the Nigeria construction industry. According to Miska et al. (2018), the impact of culture on sustainability practice may vary depending on the level of analysis at which those practices are considered. Since social ecological models can be scaled down to focus on specific settings and contexts (Golden and Earp, 2012; van Kasteren et al., 2020), a meaningful sustainable construction is inimical without significant cultural and behavioural change (Okoye and Okolie, 2013). This study therefore, focuses on specific behaviours contexts. The specificity and predictive ability of social ecological models makes it suitable theoretical base for this current research (van Kasteren et al., 2020).

Literature Review

Although there is extensive literature on sustainable construction practice, they are broadly and generally acknowledged from the perspective of triple bottom line of environmental, economic and social sustainability (Schoormann et al., 2016). Environmentally sustainable construction practice include; adaptation and use of cool roof concept, retrofitting, use of smart window technology, rainwater harvesting technology and use, addition of trees, plants and gardens to the projects, rainwater harvesting technology and use, reuse of grey water, use of prefabricated elements and components, use of passive systems for cooling and ventilating interior spaces, installation of indoor air quality sensors, separation of waste skips on site, use of master switch to turn off all appliances, use of low or no VOC emitting paints and adhesives, zero-carbon technology in new buildings, use of bio-based products or materials, on-site energy generation technology, bioclimatic technology, habitat creation and restoration, etc. (Balasubramanian and Shukla, 2017; Chang et al., 2018; Gültekin et al., 2018; Ismael and Shealy, 2019; Ismail et al., 2017; Karji et al., 2020; Leje et al., 2020; O'Connell, 2010; Oke et al., 2019; Okoye et al., 2020; Serpell et al., 2013; Thomas and Costa, 2017; Tunji-Olayeni et al., 2020; Yılmaz and Bakış, 2015).

Economically sustainable construction practice includes; standardization and modularization, material and plant choice and selection techniques, integration of net metering in design, profitability improvement system, just-in-time production techniques, future adaptability and reuse, best-value procurement strategy, cost management strategy, economic regeneration, business image enhancement strategy, business opportunity creation, etc. (Chang et al., 2018; Gültekin et al., 2018; Ismail et al., 2017; Karji et al., 2020; Leje et al., 2020; Mousa, 2015; O'Connell, 2010; Oke et al., 2019; Okoye et al., 2020; Yılmaz and Bakış, 2015).

On the other hand, socially, sustainable construction practice includes; means of physical security, safety design integration, access to handicapped persons, social utility function, employment opportunities creation, attractive housing and public realm, non- use of endangered materials, sense of community attachment, opportunity of learning and self-development, access to social infrastructure, etc. (Chang et al., 2018; Gültekin et al., 2018; Jamil and Fathi, 2016; Karji et al., 2020; Leje et al., 2020; O'Connell, 2010; Oke et al., 2019;

Okoye et al., 2020; Thomas et al., 2013; Tunji-Olayeniet al., 2020, Yılmaz and Bakış, 2015).

In developing countries, construction process is structured within the traditional construction framework (Kibert, 2016). Consequently, this makes the implementation of sustainable construction practice very difficult (Willar et al., 2021). Yet, discussions relating to the role of culture in sustainable construction are only developed at theoretical level (Nocca, 2017). Relevant mechanisms through which behavioural and cultural change could initiate sustainable construction practice remain relatively unknown (Brooks et al., 2018), especially in the developing countries. The existing studies lack comprehensive theoretical understanding of how cultural characteristics may influence sustainability (Miska et al., 2018), with little or no emphasis on the construction industry practice in Nigeria. According to Tiwari and Thakur (2021), adoption of sustainability practice depends on the characteristics of sustainability innovation and that of the actors involved. The relationship between culture and sustainability therefore, should probe how socio-cultural factors affect the level and mastery of technological development of the people concern (Urevbu, 1997); because socio-cultural factors have prominently featured as barriers to sustainable construction practice (Ali and Alkayed, 2019; Ametepey et al., 2015).

Studies using socio-cultural perspectives to advanced sustainable construction practice have focused on sustainability assessment criteria (Masria et al., 2015; 2016), the roles and effects of culture on sustainability practice development (Ben Mahjoub and Amara, 2020; Miska et al., 2018; Opoku, 2015), overcoming barriers to sustainable construction (Mensah et al., 2019), and corporate sustainability (Gerner, 2019). In Nigeria, unsustainable construction practice are still prevalent, despite many sustainability innovations in the construction industry (Omopariola et al., 2019; Tunji-Olayeni et al., 2018); with consequential effects such as slum settlement (Okoye et al., 2017a), perennial flooding (Ogbonna et al., 2015), building collapse (Omenihu et al., 2016), pollution (Kibert, 2016), resource waste (Omopariola et al., 2019), gully erosion and landslides (Egboka et al., 2019; Okereke and Emeribeole, 2020; Okorafor et al., 2017) and increasing effect of climate change (Durokifa and Abdul-Wasin, 2016). This could be linked to differences in culture which defines the operational environment of construction practice in Nigeria and the developed nations (Alao and Aina, 2020). Likewise, responses to sustainable construction agenda vary across nations (Okoye et al., 2020;). For example, the more developed countries of Europe, North America and parts of Asia are more proactive in recognising, developing and implementing sustainable construction agendas within their national contexts than the developing countries of Africa, parts of Asia and South America (Lawrence et al., 2016; Zhang et al., 2019).

Consequently, construction practice requires a shift to a more holistic agenda that recognises social culture as critical factor for promoting sustainability in the construction industry (Ibem and Azuh, 2011; Irurah, 2001). Thus, integration of socio-cultural activities of sustainable development into the construction practice would develop links between different domains (e.g. culture, education, tourism, territorial planning, social services, etc.) that would help to build sustainable partnerships with economic and social sectors (Burksiene et al., 2018; Opoku, 2015; Scammon, 2012). This is because cultural change is important for the propagation of sustainable practice Burksiene et al., 2018; Kanene, 2016).

Since existing literature has not holistically dealt with the mechanism through which socio-cultural factors aid sustainable construction practice in Nigeria (Phoya, 2018); Borgerhoff Mulder and Coppolillo (2005) suggested the development of more frameworks that would

integrate socio-cultural mechanisms of change at different levels into construction practice. An understanding of the link between socio-cultural factors and the triple bottom line of sustainable construction requires a multi-layered approach when the complexities of the concepts of culture and sustainability are collectively put into perspective. Moffatt and Kohler (2008) suggested that social ecological model can be more appropriately used to understand the impact of different managerial and social policies at both macro- and micro-levels. According to Graves et al. (2019), the model is sensitive to scale, future-oriented, adopts a systems approach, and centres on social needs. In addition, culture is a key factor in the adaptation and learning of new practices (Dessein et al., 2015). In the light of the foregoing, this study is aimed at addressing the gap of establishing the relationship between socio-cultural factors and sustainable construction practice in Nigeria. Meanwhile, Table 1 shows the literature summary of socio-cultural factors influencing construction practice based on social ecological model.

Table 1: Literature summary of socio-cultural factors influencing construction practice based on social ecological model

S/N	Socio-Cultural Factors	Authors
Individual Factors		
1	Level of education	Okoye, 2016; Röder, 2018; Thompson, 2017; Vidaković et al., 2020
2	Age	Essiet et al., 2017; McLeroy et al., 1988; Okoye et al., 2017b; Sarrafzadegan et al., 2013
3	Orientation	Leje et al., 2020; Liu et al., 2020; Okoye, 2016; Okoye et al., 2017b.
4	Self-efficacy	Essiet et al., 2017; Golden and Earp, 2012; McLeroy et al., 1988; Okoye et al., 2017b; Thompson, 2017
5	Quality of life	Fischer and Amekudzi, 2011; Gazzola and Querci, 2017; Okoye, 2016
6	Gender	Essiet et al., 2017; McLeroy et al., 1988; Okoye et al., 2017b; Sarrafzadegan et al., 2013
7	Socioeconomic status	Essiet et al., 2017; Partelow, 2018; Thompson, 2017
8	Skills	Allegrante et al., 2010; McLeroy et al., 1988; Thompson, 2017; Yi et al., 2016
9	Knowledge	Aghimien et al., 2019a; Aghimien et al., 2019b; Allegrante et al., 2010; Ametepey et al., 2015; Angonese and Lavarda, 2014; Davies and Davies, 2017; Djokoto et al., 2014; Essiet et al., 2017; Golden and Earp, 2012; Lee et al., 2014; Schweiger et al., 2018; Sarrafzadegan et al., 2013; McLeroy et al., 1988; Okoye et al., 2017;b Röder, 2018; Yi et al., 2016; Thompson, 2017
10	Attitudes	Allegrante et al., 2010; Essiet et al., 2017; Golden and Earp, 2012; Sarrafzadegan et al., 2013; McLeroy et al., 1988; Okoye et al., 2017b; Thompson, 2017
11	Perception	Aghimien et al., 2019b; Fauzi et al., 2018; Sarhan et al., 2018; Amarantou et al., 2016; Khan and ur Rehman, 2008
12	Life experience	Abdullahi and Lee, 2017; Allegrante et al., 2010; Gunatilake, 2013; Khan and ur Rehman, 2008; Khourshed, 2011; Thompson, 2017; Vidaković et al., 2020
13	Belief	Abdullahi and Lee, 2017; Henderson and Baffour, 2015; McLeroy et al., 1988
14	Pattern of life	Okoye, 2016; Sodagar and Fieldson, 2008
Interpersonal Factors		
1	Colleagues and co-workers	Essiet et al.,, 2017; Golden and Earp, 2012; Lakhan and Ekúndayò, 2013; Okoye et al., 2017; Thompson, 2017

2	Religious institutions	Allegrante et al., 2010; Golden and Earp, 2012; Lakhan and Ekúndayò, 2013; Okoye et al., 2017
3	Support groups	Allegrante et al., 2010; Essiet et al., 2017; Lakhan and Ekúndayò, 2013; Yi et al., 2016
4	Family-work life	Essiet et al., 2017; Lakhan and Ekúndayò, 2013
5	Workers unions	Lakhan and Ekúndayò, 2013
6	Friends	Allegrante et al., 2010; Essiet et al., 2017; Lakhan and Ekúndayò, 2013; Okoye et al., 2017; Thompson, 2017; Yi et al., 2016
7	Local facilities and services	Allegrante et al., 2010; Andress, 2017; Essiet et al., 2017; Golden and Earp, 2012; Lakhan and Ekúndayò, 2013
8	Peers	Allegrante et al., 2010; Lakhan and Ekúndayò, 2013; Okoye et al., 2017b; Thompson, 2017
9	Workers-work relationship	Golden and Earp, 2012; Lakhan and Ekúndayò, 2013
Organisational Factors		
1	Organisational policies and norms	Allegrante et al., 2010; Golden and Earp, 2012; Gunatilake, 2013; Thompson, 2017; Yi et al., 2016
2	Organisational structure and pattern	Allegrante et al., 2010; Golden and Earp, 2012; Thompson, 2017
3	Social institutions	Allegrante et al., 2010; Andress, 2017; Thompson, 2017; Yi et al., 2016
4	Commercial organisations	Allegrante et al., 2010; Gunatilake, 2013
5	Associations	Allegrante et al., 2010; Kok, Gottlieb, Commers and Smerecnik, 2008
6	Clubs	Allegrante et al., 2010; Kok et al., 2008
7	Social structure	Allegrante et al., 2010; Andress, 2017; Yi et al., 2016
8	Organisational ethos	Allegrante et al., 2010; Golden and Earp, 2012; Gunatilake, 2013; Thompson, 2017
9	Work environment	Alrasheed, 2015; Andress, 2017; Essiet et al., 2017; Golden and Earp, 2012; Macrì et al., 2002; Ybema et al., 2016
10	Workers engagement system	Alrasheed, 2015; Kumarasinghe and Hadiwattege, 2018; OECD 2017
11	Job security	Alrasheed, 2015; Amarantou et al., 2018; Angonese and Lavarda, 2014; Damawan and Azizah, 2020; Essiet et al., 2017;
12	Corporate image	Damawan and Azizah, 2020; Khourshed, 2011; Okoye, 2016
Community Factors		
1	Demography	Allegrante et al., 2010; Essiet et al., 2017; Kok et al., 2008
2	Culture characteristics	Abdullahi and Lee, 2017; Allegrante et al., 2010; Kok et al., 2008; Thompson, 2017
3	Ethnicity	Allegrante et al., 2010; Thompson, 2017
4	Religion	Allegrante et al., 2010; Thompson, 2017
5	Shared values and norms	Allegrante et al., 2010; Golden and Earp, 2012; Kok et al., 2008; Thompson, 2017; Yi et al., 2016
6	Communication pattern	Allegrante et al., 2010; Gunatilake, 2013; Kania et al., 2020; Khanyile et al., 2019; Olanrewaju et al., 2017; Shohet and Frydman, 2003; Zulch, 2014
7	Community organisations	Kok et al., 2008; Ceptureanu et al.,, 2018
8	Neighbourhoods	Andress, 2017; Kok et al., 2008; Yi et al., 2016
9	Institutional attachment	Andress, 2017; Kok et al., 2008; Karji et al., 2020; van Bueren and Priemus, 2002
10	Community network	Andress, 2017; Golden and Earp, 2012; Partelow, 2018; Yi et al., 2016
11	Professional affiliation	Allegrante et al., 2010; Kok et al., 2008; Leiringer, 2020; Tayeh et al., 2020
Public Policy Factors		

1	Formal and informal rules and regulations	Djokoto et al., 2014; Gunduz and Almuajebh, 2020; Hoxha and Shala, 2019; Partelow, 2018; Thompson, 2017
2	Government policies and programmes	Andress, 2017; Golden and Earp, 2012; Partelow, 2018
3	Political systems	Karji et al., 2020; Partelow, 2018
4	Government control/legislative directives	Gunatilake, 2013; Partelow, 2018; Röder, 2018
5	System of governance	Kardos, 2012; Okoye, 2016; Raynsford, 2000; Röder, 2018
6	International conventions and treaties	Okoye, 2016; Seelarbokus, 2014; Zhao, 2005
7	State of economy	Andress, 2017; Macrì et al., 2002; Partelow, 2018
8	Expression of power/authority	Andress, 2017; Esezobor, 2016; Zhou, 2015
9	National, state and local laws	Aghimien et al., 2019a; Ametepey et al., 2015; Davies and Davies, 2017; Djokoto et al., 2014; Gunduz and Almuajebh, 2020; Hoxha and Shala, 2019; Kok et al., 2008; Thompson, 2017
10	Traditional systems	Damawan and Azizah, 2020; Khan et al., 2016; Langstrand and Elg, 2012
11	Codes, standards and guidelines	Ametepey et al., 2015; Andress, 2017; Davies and Davies, 2017; Djokoto et al., 2014; Macrì et al., 2002

Theoretical Framework

Since modern humans live in culturally constructed environment including complex adaptive technologies, practices, and beliefs accumulated, modified, and improved over generations (Stout et al., 2019), there is need to establish a link between culture and sustainability. However, the key ideas or conceptual-theoretical foundations for applications of sustainability are complex (Harrington, 2016). According to Soini and Dessein (2016) achieving sustainability goals depends essentially on human, actions, and behaviour which are, inadvertently, culturally embedded. The growing interest in culture as an aspect of sustainability is still tenuous and nebulous; and has not achieved the desired understanding of culture within the framework of sustainability (Jeannotte, 2017; Soini and Birkeland, 2014). Conrad et al. (2017) expressed that adopting the fact that sustainability challenge is inherently complex global glitches, is an indication of its importance in examining the cultural dimension of sustainable development. Besides, in construction setting, people are physically and socially engaged in daily activities, and interact with environmental, organisational, policy and personal factors to affect their health and wellbeing.

Although many theories, models and frameworks have been espoused for implementation of sustainable construction practice, Moffatt and Kohler (2008) contended that they appear incapable of fully integrating the spatial and physical relationships, and the challenges posed by the concepts of time. Hofstede (1991) argued that it is implausible to apply western theories and methodologies across countries without due reference to cultural differences that make them. Hanel et al. (2018) also argued that people in different nations can differ in the behaviours that are seen as typical as instantiations of values, while holding similar ideas about the abstract meaning of the values and their importance. Furthermore, acknowledgement of other theories such as cognitive ecology, evolutionary psychology, social-ecological psychology and cross-cultural psychology has led to a more complex, dynamic, adaptive multi-level approaches that might offer guidance in bringing individuals into social ecological system models (Manfredo et al., 2014), thus the suitability and applicability of this theory in the current research. Hence, to lay

an empirical foundation to this research, the study is built on the theoretical frameworks of McLeroy et al. (1988) social ecological model.

Social ecological theory

Construction processes and practice involve series of physical activities. However, physical activity behaviour and factors influencing every human practice are very complex (Victorian Curriculum and Assessment Authority, 2010). Although, the causal relationships between construction practice and human behaviour are also complex (Zimring et al., 2005), the likelihood of social, physical and policy environments influencing the ability of individuals participating in any physical activity including construction has been established (Akanni et al., 2015; Ministry of Culture, 2018; Musa et al., 2015). The physical environment includes the geography, architecture and technology within a context, whereas social environment includes cultural, economic and political dynamics working within the locale (Stokols, 1992). On this ground, Elliott and Davis (2018) revealed that ecological framework facilitates the mapping of information about individuals and their perspectives over time in order to understand their varied systemic interconnections.

Although Bronfenbrenner's ecological system theory provided a holistic framework from which many areas of research interest involving relationship between individual and the environment were addressed (Bone, 2015; Bronfenbrenner, 1979; 1994), Kenneth McLeroy's Ecological Model of Health Behaviours and Daniel Stokols's Social Ecology Model of Health Promotion extended the theory by classifying five different levels of influence on cultural behaviour, and identifying the core assumptions which underpin the social ecological model respectively (Glanz et al., 2015). These expanded scholarly works are what culminated into the social ecological model shown in Figure 1.

Theoretically, the social ecological model helps to understand the factors affecting behaviour and also provides guidance for developing successful programs through social environments. Social ecological models emphasised multiple levels of influence and idea that behaviours shape and are shaped by the social environment (Glanz, 2010). The principles of social ecological models are consistent with social cognitive theory concepts. This suggests that creating an environment conducive to change is important to making the adoption of sustainable cultural behaviours easier. However, the fundamental philosophy of a social-ecological model is that society is embedded within, and wholly dependent upon, the biosphere (Graves et al., 2019).

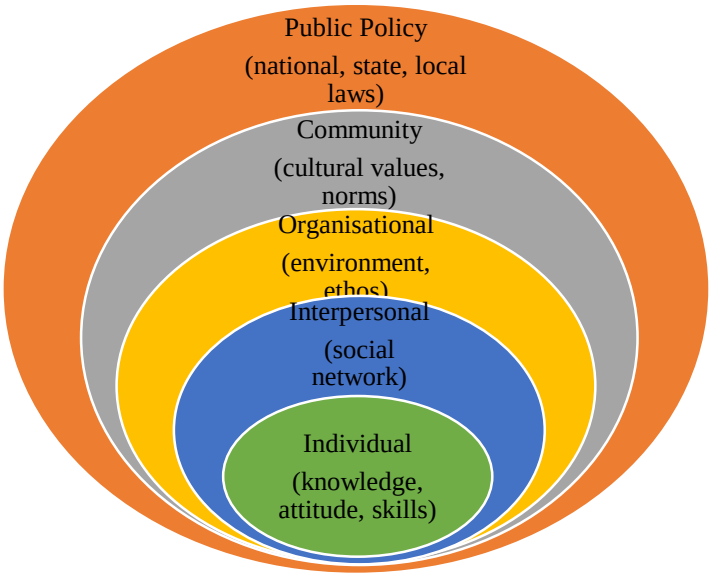


Figure 1. Social ecological model (McLeroy et al., 1988)

Thus, in order to increase and improve construction activity through sustainable practice, efforts need to be focused not only on the behaviour choices of each practitioner but also on factors that influence those choices. The World Health Organisation (1986) reported that behaviours, including physical activity participation, are thought to be

improved when environments and policies support healthy choices, and individuals are motivated and educated to make those choices. The model therefore, shows that individual knowledge is not sufficient for behaviour change; and that increasing knowledge, training skills and creating a supportive environment are all important components of behavioural change (Brown, 2011). Hence, educating people to make healthy choices when environments are not supportive will not be effective in making behavioural change (Okoye, 2016).

Traditionally, and especially in construction site environment, strategies to change workers' behaviours have focused on individual-level factors such as knowledge, beliefs, and skills (Okoye, 2016). As ecological thinking gains currency, intervention strategies have broadened to target factors at other levels of influence such as organisational policies and the built environment (Glanz, 2010). The encumbrances of amorphous nature of the triple bottom line model of sustainable construction that added to the complex nature of human's behaviour and natural environment requires this wide range of multi-layered approach (Fleming, 2013; Waring et al., 2015). Contrarily, the interplay of numerous factors that determines the sustainability behaviours can make these efforts discouraging.

Thus, in applying social ecological theory to sustainable construction practice, the complex interplay between a person and his environment is acknowledged (Shogren, 2013); where behaviours are shaped through a complex interplay of determinants at different levels. For example, construction practice is influenced by personal knowledge and skills at the individual level; social networks, co-workers, customs and traditions at the interpersonal level; professional ethics, ethos and organisational policy at organisational level (Bamgbade et al., 2017); and work environment, values and business relationship at the community level; and government laws and regulations at public policy level (Bamgbade et al., 2017).

Studies have shown that ecological model of intervention is an effective sustainability strategy (Dyer et al., 2004; Richards et al., 2008; Tidball and Krasny, 2010; Waring et al., 2015). The works of Clemson et al. (2004), DeJoy (1996) and Michie et al. (2011) affirmed the application of social ecological model to construction work environment especially in the area of behaviour modification through interaction of physical and social environments. Graves et al. (2019) developed a template using social ecological approach to advance sustainable design that builds on green design and regenerative design. However, these studies failed to show how each of the levels of social ecological model relate to different aspects of sustainable construction practice. Although Mo¡att and Kohler (2008) presented a framework that shows the complex interrelationships between the built environment and ecosystem including time scale, it lacks empirical supports. Nevertheless, these studies have shown the growing application of social ecological model. They have also justified the need for further research to establish a multilevel relationship between socio-cultural factors and the triple bottom line of sustainable construction. This is because, social ecological model is at odds with emergent post-humanist thinking that seeks to de-centre the human condition including sustainability principles (Elliott and Davis, 2018).

Methodology

This study adopted a survey research approach where structured questionnaires were administered to three categories of building construction stakeholders (Government agents representing the clients, contractors and consultants/professionals,) in the South-East States of Nigeria. The questionnaire was designed to measure the socio-cultural factors

influencing sustainable construction practice based on social ecological model in Nigeria. Apart from the general demographic information of the respondents which classified the respondents, their level of knowledge and experience and their level of involvement in construction practice; the questionnaire contained two main sections. Section 1 comprised 57 variables grouped under the five levels of social ecological model, and measuring socio-cultural factors influencing sustainable construction practice. Section 2 comprised 50 variables measuring the level of implementation of sustainable construction practice and grouped under the triple bottom line of environmental economic and social sustainability. The respondents were asked to express their opinion on the significance of socio-cultural factors towards promotion of sustainable construction practice on a 5-point Likert Scale. Where 1 = Very Insignificant, 2 = Insignificant, 3 = Fairly Significant, 4 = Significant, 5 = Very Significant. They were also asked to express their agreement on the level of implementation of sustainable construction practice due to the influence of socio-cultural factors on the same 5-point Likert Scale. Where 1 = Very low, 2 = Low, 3 = Moderate, 4 = High, 5 = Very high.

The population of this study constituted all the building contractors obtained from the tenders' board of the five states of the South East Nigeria in the last five years without repetition. It also constitutes all the registered professionals in architecture, building, civil engineering, building services engineering, and quantity surveying and other relevant professionals in the built environment that are practicing in the study area and obtained from the register of the various professional associations in the states. The population also constituted all the staff of the ministries of work and housing and government agencies in charge of execution of building construction projects in the five states obtained from the administrative section of each ministry.

A total population of 2244 comprising 989 contractors, 728 professionals/consultants and 527 government agents made up of the entire population for this study. However, the nature this study made it that not all the population would be eligible to partake in the survey, rather those with at least basic knowledge of sustainable construction practice. As a result, sample sizes of 277, 252 and 223 respectively were obtained based on Cochran's iterative formula (Cochran, 1977). Since construction industry research usually receive a low response rate of between 20% to 30% (Idrus and Newman, 2002; Takim et aal., 2004; Akintoye and Fitzgerald, 2000) The sample size were increased to 471, 429 and 380 respectively, to accommodate the non-response rate.

Subsequently, a preliminary survey was conducted to identify prospective respondents who have at least basic knowledge and understanding of sustainable construction concept, and to seek their consent/permission for participation in the main questionnaire survey. Prior to this, 1280 respondents representing the total sample size were contacted through their mail contacts and offices contacts using stratified random sampling. After about three months with series of reminders, 792 replies were received, out of which, 675 indicated interest to participate in the survey while 117 declined. The result of the preliminary survey indicated that all the 675 respondents who showed interest to participate in the main survey also indicated that they have basic knowledge of sustainable construction practice. On this basis, 675 respondents who now represent the actual survey sample were selected for survey for this study through stratified random sampling.

Out of a total of 675 questionnaires distributed to the respondents, 429 were retrieved, 3 were invalid due to incompleteness, while 426 were completely filled, returned, and suitable for analysis. This means that the total percentage

of valid response used for analysis was 63.11%. (149 consultants/professionals, 183 contractors and 94 government agents form the ministries and agencies). The improvement in the response rate unlike the popular assumption of low response rate of this kind of survey study, could be as a result of persistent reminders and initial familiarisation with the respondents.

The data generated from questionnaire survey were subjected to descriptive and quantitative analyses. Reliability test, Mean Score Index (MSI), Relative Importance Index (RII) and Standard Deviation were computed. The Reliability of the data collection instrument was determined using Cronbach's Alpha (α). If Cronbach's Alpha > 0.6, it would imply that the instrument is reliable and acceptable (Ekolu and Quainoo, 2019; Tavakol and Dennick, 2011). The RII values were used to rank the factors. Pearson's Product-moment Correlation Coefficient (r) was computed to establish the strength, nature and significance of the relationship between socio-cultural factors and sustainable construction practice. The significance of correlation was determined based on a two-tailed, non-directional test with the degree of freedom (df) of n – 2, tested at 5% significant level. With finite population correction, 95% confidence interval and a margin of error of 5% were assumed to be acceptable for this kind of study (Bartlett et al., 2001; Gilliland and Melfi, 2010; Taherdoost, 2017). The results of the analysis are presented in section 5. The entire computation was done with the aid of' SPSS Version 25 software.

Results

Table 2: Socio-cultural factors for sustainable construction practice

S/N	Socio-Cultural Factors	MSI	RII	Std. Deviation	Sub-Factor Ranking	Major Factor Ranking
Individual Factor (IND) (Cronbach's Alpha = 0.847)						
1	Level of education	4.44	0.89	0.73	1	
2	Age	3.64	0.73	0.92	13	
3	Orientation	3.81	0.76	0.82	7	
4	Self-efficacy	3.71	0.74	0.91	10	
5	Quality of life	3.66	0.73	1.11	11	
6	Gender	3.38	0.66	0.79	14	
7	Socioeconomic status	3.77	0.75	0.87	8	2
8	Skills	4.12	0.82	0.93	3	
9	Knowledge	4.24	0.85	0.83	2	
10	Attitudes	3.92	0.78	0.84	4	
11	Perception	3.83	0.77	0.85	6	
12	Life experience	3.73	0.75	0.97	9	
13	Belief	3.85	0.77	0.83	5	
14	Pattern of life	3.65	0.73	0.95	12	
	Average	**3.84**	**0.77**	**0.88**		
Interpersonal Factors (INT) (Cronbach's Alpha = 0.775)						
1	Colleagues and co-workers	3.12	0.62	1.38	2	
2	Religious institutions	2.83	0.56	1.25	8	
3	Support groups	3.04	0.61	1.20	4	
4	Family-work life	3.02	0.60	1.22	6	
5	Workers unions	3.03	0.61	1.18	5	5
6	Friends	2.58	0.52	1.22	9	
7	Local facilities and services	3.10	0.62	1.40	3	
8	Peers	2.90	0.58	1.33	7	
9	Workers-work relationship	3.47	0.69	1.38	1	
	Average	**3.00**	**0.60**	**1.28**		
Organisational Factors (ORG) (Cronbach's Alpha = 0. 704)						

1	Organisational norms	4.52	0.90	0.62	1	
2	Organisational structure and pattern	3.85	0.77	0.96	7	
3	Social institutions	3.12	0.62	1.01	8	
4	Commercial organisations	3.01	0.60	0.95	9	
5	Associations	2.97	0.59	1.16	10	
6	Clubs	2.43	0.49	1.20	11	
7	Social structure	2.34	0.47	1.17	12	
8	Organisational ethos	4.01	0.80	0.88	5	3
9	Work environment	4.25	0.85	0.82	3	
10	Workers engagement system	4.08	0.81	0.78	4	
11	Job security	3.96	0.79	0.78	6	
12	Corporate image	4.35	0.88	0.67	2	
	Average	**3.58**	**0.72**	**0.92**		
Community Factors (COM) (Cronbach's Alpha = 0. 729)						
1	Demography	2.43	0.49	1.37	9	
2	Culture characteristics	3.64	0.73	1.12	4	
3	Ethnicity	2.39	0.48	1.22	10	
4	Religion	2.45	0.49	1.27	8	
5	Shared values and norms	4.22	0.84	0.64	1	
6	Communication pattern	3.86	0.77	0.69	2	
7	Community organisations	2.60	0.52	1.35	6	4
8	Neighbourhoods	2.24	0.45	1.10	11	
9	Institutional attachment	3.34	0.67	1.20	5	
10	Community network	2.52	0.50	1.37	7	
11	Professional affiliation	3.77	0.75	1.12	3	
	Average	**3.04**	**0.61**	**1.13**		
Public Policy Factors (PUP) (Cronbach's Alpha = 0. 711)						
1	Formal and informal rules and regulations	4.55	0.91	0.54	2	
2	Government policies and programmes	4.41	0.88	0.65	3	
3	Political systems	3.57	0.71	0.99	10	
4	Government control/legislative directives	4.17	0.83	0.64	4	
5	System of governance	3.88	0.78	0.88	9	1
6	National, state and local laws	4.75	0.95	0.45	1	
7	State of economy	4.02	0.80	0.66	7	
8	Expression of power/authority	4.04	0.81	0.66	6	
9	International conventions and treaties	4.00	0.80	1.06	8	
10	Traditional systems	3.44	0.67	1.02	11	
11	Codes, standards and guidelines	4.06	0.81	0.70	5	
	Average	**4.08**	**0.82**	**0.75**		

MSI = Mean Score Index, RII = Relative Importance Index, IND = individual factors, INT = interpersonal factors, ORG = organisational factors, COM = community factors, PUP = public policy factors

Table 2 shows the perceived level of importance of socio-cultural factors towards promotion of sustainable construction practice based on the computed average mean score index and relative importance index. The classification was based on the social ecological model, being a multilevel measurement model through which socio-cultural factors can be assessed. Thus, the factors were grouped into five major factors: individual, interpersonal, organisational, community and public policy factors.

Under, the individual factors, Table 2 revealed that the three most important factors that affect the promotion of sustainable construction practice based on their MSI and RII are level of education (MSI = 4.44; RII = 0.89), knowledge

(MSI=4.24; RII=0.85), and skills (MSI= 4.12; RII= 0.82). This underscores the power of learning either through formal or informal education. It further shows that the person's level of exposure through learning can influence his actions and inactions. In the case of interpersonal factors, workers-work relationship (MSI = 3.47; RII = 0.69), colleagues and co-workers (MSI = 3.12; RII = 0.62), and local facilities and services (MSI = 3.10; RII = 0.62) are the three most important factors promoting sustainable construction practice. In this case, the importance of work environment which include work team and facilities, was featured prominently.

Furthermore, the three most important organisational factors promoting sustainable construction practice are organisational norms (MSI = 4.52; RII = 0.90), corporate image (MSI = 4.35; RII = 0.88), and work environment (MSI = 4.25; RII = 0.85). This implies that the organisational work ethics and the drive to promote corporate image of the organisation greatly influences the desire to construct in a sustainable way. In terms of community factors promoting sustainable construction practice, shared value and norm (MSI = 4.22; RII = 0.84), communication pattern (MSI = 3.86; RII = 0.77), and professional affiliations (MSI = 3.77; RII = 0.75) came atop.

Meanwhile, national, state and local laws (MSI = 4.75; RII = 0.95), formal and informal rules and regulations (MSI = 4.55; RII = 0.91), and government policies and programmes (MSI = 4.41; RII = 0.88) were found to be the three most important public policy factors promoting sustainable construction practice. In this case, the importance of policy and legislative frameworks is highlighted. This implies that the instruments of the government are required for promotion of sustainable construction practice.

Although all the major factors were identified could have influential effect in promoting the practice of construction workers towards sustainability, the result of the overall average MSI and RII of public policy (MSI = 4.08; RII = 0.82), organisational (MSI = 3.58; RII = 0.72), individual (MSI = 3.84; RII = 0.77), interpersonal (MSI = 3.00; RII = 0.60), and community (MSI = 3.04; RII = 0.61), factors suggested that public policy factors could have the most significant influence, followed by the individual factors and organisational factors than others. This implies that construction workers cannot just ordinarily implement the tenets of sustainable construction in their practice, but have to be pushed either through the instrumentalities of the government in terms of enabling laws, regulations and codes; construction organisations in terms of organisational goals and norms or as a result of having knowledge about the benefits of sustainable construction through education and training.

This further suggests that issues bordering on the legal framework, organisational ethics and personal characteristics and psychology shape one's behavioural pattern towards sustainable construction practice. The fact that socio-cultural factors have influence on the behaviours and perception of construction workers towards sustainable construction practice requires that such factors are crucial to the promotion of sustainable construction practice and should be considered while evaluating the prospects of implementing sustainable construction practice in Nigeria.

Table 3: Descriptive result of the level of implementation of sustainable construction practice

S/N	Sustainable Construction Practice	MSI	Std. Deviation
Environmental (ENV SCP) (Cronbach's Alpha = 0. 740)			
1	Use of building information modelling (BIM) technology	2.10	1.086
2	Adaptation and use of cool roof concept	2.16	0.958
3	Lean construction concept	2.22	1.045

4	Retrofitting	2.44	1.179
5	Rainwater harvesting technology and use	**2.92**	1.698
6	Use of smart window technology	2.24	1.023
7	Vegetation preservation and addition of trees, plants and gardens to the projects	2.31	1.109
8	Reuse of grey water	2.27	1.047
9	Separation of waste skips and use of construction waste on construction sites	2.57	1.122
10	Habitat creation and restoration	2.01	0.905
11	Use of low or no VOC emitting paints & adhesives	2.25	1.072
12	Use of renewable/ alternative resources	2.37	1.071
13	Use of passive systems for cooling and ventilating interior spaces	2.42	1.076
14	Installation of indoor air quality sensors	2.33	1.178
15	Use of recycled building materials/ Reuse of demolition wastes	**2.62**	1.164
16	Use of master switch to turn off all appliances	2.29	1.130
17	Use of prefabricated elements and components	2.61	1.270
18	Use of bio-based products or materials	2.47	1.200
19	Zero-carbon technology in new buildings	2.25	1.184
20	Use of graphene coating technology	2.07	1.021
21	On-site energy generation technology	2.17	1.084
22	Bioclimatic technology	2.53	1.184
23	Use of naturally occurring building materials	**2.67**	1.216
	Average	**2.36**	
Economic (ECO SCP) (Cronbach's Alpha = 0. 723)			
1	Standardisation and modularisation	2.42	1.236
2	Material and plant choice and selection techniques	2.61	1.287
3	Life cycle costing and whole life costing	2.68	1.308
4	Cost management strategy	**2.86**	1.244
5	Business image enhancement strategy	2.42	1.156
6	Business opportunity creation	2.42	1.227
7	Future adaptability and reuse	2.41	1.221
8	Just-In-Time production techniques	**2.87**	1.236
9	Profitability improvement technology	**2.77**	1.336
10	Integration of Net metering in design	2.20	1.088
11	Economic regeneration	2.35	1.139
12	Best-value procurement strategy	2.31	1.141
	Average	**2.53**	
Social (SOC SCP) (Cronbach's Alpha = 0. 808)			
1	Safety design integration	2.03	0.973
2	Attractive housing and public realm	2.32	1.012
3	Accidents minimisation techniques	2.57	1.056
4	Visual and thermal comfort	2.64	0.948
5	Use of local materials and labour resources	**2.91**	0.862
6	Quality of life improvement	2.23	0.974
7	Integration of cultural heritage in building	2.12	0.908
8	Social utility function	2.06	0.926
9	Means of physical security	**2.79**	1.360
10	Non- use of endangered materials	2.14	0.908
11	Sense of community attachment	2.00	0.894
12	Occupational health support system	2.02	0.856
13	Access to handicapped persons	**2.70**	1.006
14	Access to social infrastructure	2.08	0.918
15	Opportunity of learning and self-development	1.97	0.875
	Average	**2.31**	
Overall Average		**2.38**	**1.102**

ENV = environmental, ECO = economic, SOC = social, SCP = sustainable construction practice

Table 3 shows the result of the level of implementation of sustainable construction practice being based on the computed average mean score index. The overall result shows that the level of implementation of sustainable construction practice in South-East, Nigeria is generally low with an overall average mean score of 2.38. In specific term, the result shows that greater percentage of the respondents (59.15%) indicated that the level of implementation of sustainable construction practice being in South-East, Nigeria is either low or very low, while 23% reported a moderate level of implementation.

However, on the basis of the triple bottom line, the result shows that unlike environmental (MSI = 2.36) and social (MSI = 2.31) dimensions with low level of implementation, there is moderate level of implementation of economic sustainable construction practice being with an average mean score of (MSI = 2.52), though on a lower side of the scale. This could be as a result of economic gain expected from the implementation of economic sustainable construction practice being and boost for corporate and business image.

Although the general implementation level is low, the three most environmental sustainable construction practice being implemented are rainwater harvesting technology and use (MSI = 2.92), use of naturally occurring building materials (MSI = 2.67) and use of recycled building materials/ reuse of demolition wastes (MSI = 2.52). Top three economic sustainable construction practice being implemented are just-in-time production techniques (MSI = 2.87), cost management strategy (MSI = 2.86) and profitability improvement technology (MSI = 2.77); whereas the three top social sustainable construction practice being implemented are use of local materials and labour resources (MSI = 2.91), means of physical security (MSI = 2.79) and access to handicapped persons (MSI = 2.70).

However, it is not enough to conclude that the socio-cultural factors influence the implementation of sustainable construction practice. To further underpin this fact, Pearson correlation coefficient was computed to determine the nature and significance of the relationship between each socio-cultural factor and each of the dimensions of sustainable construction practice based on the mean score index results. The result is presented in Table 4.

Table 4: Correlation between socio-cultural factors and sustainable construction practice

		IND	INT	ORG	COM	PUP	ENV SCP	ECO SCP	SOC SCP
IND	Pearson Correlation	1							
	Sig. (2-tailed)								
INT	Pearson Correlation	.312**	1						
	Sig. (2-tailed)	.000							
ORG	Pearson Correlation	.308**	.127**	1					
	Sig. (2-tailed)	.000	.009						
COM	Pearson Correlation	.086	.007	.415**	1				
	Sig. (2-tailed)	.075	.888	.000					
PUP	Pearson Correlation	.121*	-.120*	.395**	.308**	1			
	Sig. (2-tailed)	.012	.013	.000	.000				
ENV	Pearson Correlation	.361**	.255**	.745**	.380**	.391**	1		
SCP	Sig. (2-tailed)	.000	.000	.000	.000	.000			
ECO	Pearson Correlation	.050	-.076	.394**	.241**	.106*	-.040	1	
SCP	Sig. (2-tailed)	.305	.119	.000	.000	.029	.412		
SOC	Pearson Correlation	.061	-.174**	.408**	.383**	.321**	.117*	.639**	1
SCP	Sig. (2-tailed)	.208	.000	.000	.000	.000	.016	.000	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The result Table 4 revealed that individual factors have positive correlation with the three dimensions of sustainable construction practice, however, the correlation is only significant in the relationship between individual factors and environmental sustainable construction practice ($p = 0.000 < 0.05$). This implies that personal characteristics of construction stakeholders could significantly promote environmental construction practice. It also suggests that of individual characteristics could influence the construction practitioners on whether to implement the tenets of sustainable construction or not. Specifically, personal attributes such as knowledge, level of education, skills and attitude could increase ones' environmental consciousness and pro-environmental behaviours which are consistent with the tenet of environmental sustainability; and thereby promoting environmental sustainable construction practice.

Table 4 also revealed that interpersonal factors positive correlation with environmental sustainable construction practice, but correlated negatively with economic and social sustainable construction practice. However, the result also showed that the relationship between interpersonal factors and both environmental ($p = 0.000 < 0.05$) and social ($p = 0.000 < 0.05$) sustainable construction practice are significant. This implies that interpersonal factors could significantly promote environmental sustainable construction practice and at the same time hamper social sustainable construction practice. The result suggested that interpersonal factors such good working relationship between workers and management and among workers could be responsible for positive environmental sustainable construction practice; whereas factors such as peer pressure, friends and religious influence and family issues could be impediments to social sustainable construction practice. Thus, the result suggested that interpersonal factors could significantly influence the implementation of sustainable construction practice.

On the other hand, the result Table 4 revealed that organisational factors, community factors and public policy factors are positively and significantly correlated with all the dimensions of sustainable construction practice ($p = 0.000 < 0.05$). This shows that organisational, community and public policy factors are largely associated with the implementation of sustainable construction practice. The result suggested that organisational characteristics such as organisational norms and ethos, work environment, workers' engagement system, job security and the need to protect organisational corporate image could significantly influence the construction stakeholders' efforts toward promoting sustainable construction practice. The result also signifies that community factors such as shared values, norms, cultural characteristics of the society including societal affiliations, and communication pattern can influence the construction stakeholders' efforts towards implementation of sustainable construction practice. The result further suggested that instrumentality of law and government interventions through legislations and expression of power and authority in addition to operational codes and guidelines in the construction industry are fundamental to promotion of sustainable construction practice in Nigeria.

Discussion

Fundamentally, the result of this study revealed that each of the socio-cultural factors plays a vital role in the promotion of sustainable construction. This implies that the socio-cultural environment of construction stakeholders needs to be taken into cognisance when efforts are being made to implement sustainable construction practice in Nigeria. For instance, human perceptions and behaviours are influenced by personal

characteristics, organisational policy, government policies and programmes, prevailing laws, codes and ethics, etc. (Bilz and Nadler, 2014; Roszkowska and Mele, 2021).

Although the result of this study indicated that all the factors are necessary for implementation of sustainable construction practice in one way or the other, it suggested that three factors of public policy, organisational, community factors with significant positive relationship with all the dimensions of sustainable construction practice are pivotal, and should not be treated with laxity. This also implies that the promotion of sustainable construction requires a strong institutional framework and organisational supports; backed with strong personal commitment originating from ones' shared value and norm, good cultural character and excellent communication layout. However, this cannot be completely achieved without a culturally-engulfed society with sufficient knowledge obtained through education and training (UNESCO, 2014). This would then, propels the intrinsic desire and belief on what sustainable construction stands for in a larger Nigerian society. Unfortunately, the result of this study pointed to the reason it seems as if Nigeria is lagging in her efforts towards sustainable construction practice. The absence of operative institutional and legislative frameworks, and organisational policy for sustainable construction practice in Nigeria might be an indication of numerous challenges facing the implementation of sustainable construction practice in Nigeria as shared by Osuizugbo, Oyeyipo, Lahanmi, Morakinyo and Olaniyi (2020).

Interestingly, this study indicated that interpersonal factors are negatively correlated with both economic and social sustainable construction practice. This implies that issues relating to interpersonal factors such as workers-work relationship, workers' cooperation, religious association, workers' union and work-family relationship should be treated with caution and absolute carefulness (Gas-Aixendri and Albareda-Tiana, 2019; Kumarasinghe and Hadiwattege, 2018). The result suggested that issues related to interpersonal factors if not property handled could be counterproductive to the promotion of sustainable construction practice. The study also suggested that the insignificant correlation found between individual factors and economic and social sustainable construction practice is an indication that the amount of efforts towards promotion of environmental sustainable construction practice that has led to many pro-environmental movements is not proportionate to that channelled towards economic and social sustainable construction practice

On this premise, this study averred that socio-cultural factors are robust correlates of sustainable construction practice and how these factors effect construction practice are a matter of individual desire and personal characteristics. Consequently, addressing sustainable construction problems requires a large-scale change in human behaviour, institutional and organisational framework, social and cultural forces that shapes human behaviour. This finding therefore, aligns with the results of (Assadourian, 2010; Beddoe et al., 2009; Kinzig et al., 2013). This study also affirmed the findings of Ali and Alkayed (2019) and Ametepey et al. (2015) who identified socio-cultural factors as one of the major barriers of sustainable construction practice. Finally, this study is rooted in social ecological theory espoused by Bronfenbrenner (1979; 1994) and extended by McLeroy et al. (1988) which holds that both person and environment factors shape individual behaviours and desire to implement changes.

Conclusion

Although Nigeria was a party to the formulation and signing of many international conventions, treaties and agreements on sustainable development and sustainable construction. The circumstances surrounding

construction practice in Nigeria showed that they have not yielded the desired results, thus the persistence of unsustainable construction practice. A lot of research efforts have been made towards finding the reasons for the persistence of the problems and the possible solutions. Most of these studies suggested the application of mechanistic approach through technology and inventions. On this strength, this study examined socio-cultural factors influencing the promotion of sustainable construction practice in Nigeria based on social ecological model.

The study found that the five major socio-cultural factors have varying significant association with the three dimensions of sustainable construction practice. The study established that despite other factors, public policy factors through the instrumentality of government supports and enabling laws, organisational policies and community shared values, norms with good communication network are very significant to the promotion of sustainable construction practice in Nigeria. It further demonstrated that ignoring those factors such as national, state and local laws, organisational norms, work environment, formal and informal rules and regulations and government policies and programmes could be detrimental and counterproductive to the achievement of sustainable construction practice in Nigeria. On a micro level, the study recognised such personal characteristics as level of education, knowledge, skills as being very crucial to the promotion of sustainable construction practice.

In view of this, the study raises concern about the policy frameworks and/or guidelines for promotion of sustainable construction practice in Nigeria owning to the clear evidence of absence of any concerted and operative efforts to implementation of sustainable construction practice in Nigeria. Thus, this study has both practical and policy implications. On the part of the construction practitioners, it is a call for behaviour reawakening and imbibition of culture of sustainability, which must be acquired through education and training. On the other part, it calls for policy rearmament through government interventions and control, legislative frameworks and rejig of enabling laws. Furthermore, the study highlighted the powers of softer factors of culture and sociology in modelling the behaviours of construction practitioners towards sustainable practice. The established relationship specifically implied that sustainable construction practice could be promoted through positive social ecological and cultural change.

Finally, the perceived change in construction practice could only be achieved on a multi-layered platform. Therefore, construction stakeholders' cultural, personal, social and environmental attributes need to be evaluated if any meaningful achievement is to be recorded in the pursuit of sustainable construction. Having seen the influencing powers of personal character and socio-ecological factors in addition to a systematic action from the policy makers; construction organisations and community groups in modelling the behaviour of individuals in a work environment, there is need to optimise those factors that promote sustainable construction practice while exercising restraint on those that impede sustainable construction practice. In addition, this study draws the attention of relevant institutions towards establishing a framework through which the tenets of sustainable construction could be internalised in the construction project lifecycle.

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