COMPARISON STUDY ON GREEN AND SUSTAINABLE BUILDING POLICIES IN DEVELOPED AND DEVELOPING COUNTRIES.

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ABSTRACT

Political authorities in developing countries of Africa have begun to develop plans that will address green and sustainable buildings, a matter and issue on which developed countries have had far-reaching experience. This study analyzed literatures on United States of America and Netherlands green building policies in order to identify important lessons that might be relevant for the development of such policies in two developing African countries namely: Nigeria and South Africa. United States of America and Netherlands were chosen because of their progression and long history of green building policies which could have practical utility to Nigeria and South Africa's green building policies. Through comparative study on green and sustainable building policies in United States of America and Netherlands, the study revealed that developed countries have more elaborate and robust green and sustainable building policies and implementation programmes that could have practical utility for green building developers and investors than developing countries. The study concluded that emerging countries could in addition to learning from the provisions of the United States of America and Netherlands green building policies adopt stronger research agenda for green and sustainable building policy issues and regulations. Based on the findings and conclusions drawn, the following recommendations have among others been proffered. That government intervention at the Federal level in Nigeria and South Africa is necessary to ensure sustainable green building policy formulation and implementation, and that efforts should be made by South Africa and Nigeria in particular to increase sensitization on the benefits of sustainable green building features among developers and investors and the public.

Keywords: Developed and Developing Countries, Policies and Programmes, Green Building, Sustainability.

1. INTRODUCTION:

Over the last decades there have been emphases for African countries to begin to learn and adopt from developed countries strategies and methods for green and sustainable building policies. This call is for a shift in policy from environmental issues to the wider concept of green and sustainable development. This is in recognition that the extent and urgency of environmental problems in Africa will require a concerted and integrated policy across social, environmental and economic sectors (Gibberd, 2012). In developing countries of Africa, the average standard of living is far lower than in developed countries and in many cases basic human needs are lacking (Davies & Nutley 1999). Thus, policy development that aims to address these basic needs while avoiding negative environmental impacts is required. Unlike developing countries, developed countries have tried to develop and maintain long history of

policy and standards that drive green building construction and development (Circo, 2008). This approach is reflected in the wide range of green building assessment methods and guides such as Leadership in Energy and Environmental Design (LEED) in United State of America (USA) and the Netherlands BREEAM-NL Dutch GBC, and the growing number of certified green buildings in these countries (Bernardi *et al,* 2017). For example, the USA and Netherlands are among the first developed countries to initiate and put into practice policy for green building. The USA started to give attention to issues of green building after the oil embargo of 1973, though interest among Americans faded by the 1980s but later picked up in 1991 with the first municipal green building initiative taking root in Austin Texas (Retzlaff, 2005). The Netherlands first began to devote serious attention to green building in 1973. However, its green building policy and implementation program began to receive adequate attention during the mid 1980s and advanced considerably during the mid 1990s (Retzlaff, 2008).

In contrast, interest in green buildings in developing countries such as Nigeria and South Africa started in recent times. In South Africa, green building initiatives could be said to have effectively began in 2007 with the lunch of Green Building Council of South Africa (GBCSA) (Goosen, 2009). As for Nigeria, she has just embarked on the development of policies and plans for green building during the last few years (WSP, 2014). For instance in 2014, it registered the Green Building Council of Nigeria (GBCN) with the World Green Building Council (WGBC) on a probationary membership basis (WSP, 2014). Investigations have also shown that countries and states that adopt green building policies for their buildings have better prospects of delivering high-performance green buildings that reduces environmental footprint, energy use, operational cost, enhance employee productivity, and promote collaborative and innovative workplace (Darren & Tetsuo, 2014). Such countries experience situations where developers and clients voluntarily pursue certification for their real estate projects (Darren & Tetsuo, 2014).

On a wider scope, top building related issues that worry nations most to clamour for effective green building policy is the rising evidence that the building sector is a major consumer of resources and energy around the globe. For instance, the building sector accounts for about 44% of the society's total material use and a large proportion of more than 50% of primary resources in developed countries (Nelms, *et al*., 2005). Whereas in developing countries more than 50% of energy is used in buildings for occupant's comfort (Gebberd 2012: Energy Commission of Nigeria, 2014). More worrisome is the fact that adequate and effective policies are yet to be initiated by policy makers to regulate and cut energy consumption by buildings across countries of Africa. As Gebberd (2012) put it, attention to sustainability and energy efficiency in Africa should gradually shift to policy makers who are considered to represent conduits for achieving energy efficiency and sustainability in building. Though, in determination to reduce the rise in energy use and pursue sustainable infrastructural growth, most African countries like Nigeria and South Africa in particular have initiated programmes that specifically target green building and as a process of mitigating global climate change. Yet, a key factor that is significant but lacking is the absence of a robust policy development and expansion.

While policy development initiatives of countries like USA and Netherland are elaborate and robust South Africa and in particular Nigeria's green building policies are still at infant stages and developing (WSP, 2014). Several studies (Retzlaff, 2009; Dahiru *et al,* 2014; Nduka & Adegboyega, 2014; Onuoha *et al,* 2017) suggest that development of green and sustainable building policies in developed and developing countries is founded on the history of policies and programmes in addition to political systems and cultural context. Because of this significant difference, developed and developing countries could be at different levels of green and sustainable building policies, development and implementation.

This study is predicated on the basis that there is likely to be potential benefits and lessons relevant to developing countries such as Nigeria and South Africa from developed countries if a general explanation of USA and Netherlands green building policies are examined. Thus, the study focuses on the specific theory and historical policy developments and contemporary state of green building policies in the USA and Netherlands, Nigeria and South Africa with substantial emphasis on the evolving idea of green buildings, research and education, policy development and method of building assessment not on specific policy techniques such as zoning and building codes.

2. THE STUDY AREAS -WHY DEVELOPED AND DEVELOPING COUNTRIES?

Studies (Chin-Ho & Chiu 2006; Zhang *et al*, 2011) have shown that green and sustainable policies could be localized as policy makers may pay attention to issues of sustainability that influence their locality. However, recent studies have shown that in many respect there can never be a truly localized policy (McGraw- Hill Construction, 2013: Nguyena & Graya 2016). This is especially now green and sustainable building is becoming less localized to one part of geographical region due to increasing global marketplace motivated by prevailing concerns on world climate change (McGraw- Hill Construction, 2013). There may be locally occurring policies (such as within a city or country) but all policies are often affected to a greater extent by the global or wider policies within the state, between regions and nations (Lawson *et al*, 2009). Given the significant momentum towards increased international sustainable policy integration to check climate change, the study areas – the United States of America, Netherlands, Nigeria and South Africa are active signatories to Kyoto Protocol and members of the United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions (US Department of State, 2015). Though, the study areas are in different climate zones and regions, they however experience common natural disasters such as floods, storms, and wildfires which could have clear implications for green and sustainable buildings.

Besides, the countries practice green building and sustainability. However, investigation shows that developed countries (USA and Netherlands) have tried to develop and maintain long history of policy and standards that drive green and sustainable building construction and development than developing countries (Nigeria and South Africa) (Circo, 2008; Retzlaff, 2009; Onuoha, 2017). The implication is that at the moment there is more policy development and expansion on green and sustainable buildings in US and Netherlands. This is reflected in the growing number of green and sustainable building across the countries (Retzlaff, 2009). It is on this basis that there has been emphasis for collaborative relationship between developed and developing countries in evolving policies towards fostering a more effective international response to green building construction through knowledge sharing and policy transfer.

For example, there are foreign relations within the European Union, transatlantic relations, Arctic issues and United Nations affairs. This includes better integration of sustainable building into the EU's Common Foreign and Security Policy, the Lisbon Agenda, and incorporating climate change and environmental sustainability in the work of a wide range of bodies under the United Nations (Drexhage *et al*, 2006). Secondly, given the increasing political priority to energy security in developed countries, and how the promotion of climate-friendly energy solutions and adequate reliable supplies of energy in tandem with green building policy context could address environmental challenges, developed and developing countries have reinforced their roles of partnership for knowledge sharing in order to enhance the ability and willingness of developing nations to meet the challenges of climate change (Drexhage *et al*, 2006).

On the other hand, South Africa and Nigeria in particular are important actors on the African and global stage for developed countries. Thus, the two African countries are the greatest trading and diplomatic partners of US and Netherlands. For instance, Nigeria has remained a good bride of the United States of America and Netherlands in energy capacity building and oil with Shell Petroleum, a Dutch company as a major player in the nation's oil and gas industry (Oyinloye, 2015). Trade between the Netherlands and Nigeria was N80.9 billion in the second quarter of 2015 (Oyinloye, 2015). Furthermore, the US goods exports to Nigeria in 2014 stood at USD5.9 billion, down 7.3% from the previous year while US imports from Nigeria were USD3.8billion, down 67.2% (US Department of State, 2015). US exports primarily refined petroleum products, used vehicles, cereals, and machinery. Crude oil and petroleum products continued to account for 96% of Nigerian exports to the United States in 2014 (US Department of State, 2015).

Foreign direct investment (FDI) in Nigeria continues to be led by the oil and gas sector. However, there are substantial investment from the United States and Netherland in Nigeria's power, telecommunication, real estate, and agricultural sector (US Department of State, 2015). Whereas South Africa from 1994-2011 signed major bilateral agreements with US ranging from Statement of Intent concerning Cooperation in Sustainable Energy Development and the Mitigation of Greenhouse Gases, to Framework Agreement concerning cooperation in the Scientific, Technological and Environmental Fields (Department of International Relations and Cooperation, South Africa 2018). Furthermore, there exist memorandum of understanding between the Department of Energy of the United States of America on Collaboration in Energy Policy, Science, Technology and Development with the South African government. Also, during the period Netherland entered into bilateral agreement with South Africa on housing cooperation and Arrangement on a Project "Housing for a Healthier Future for South Africa" as part of activities implemented jointly in pursuance of the objectives of the United Nations Framework Convention on Climate Change (Department of International Relations and Cooperation, South Africa 2018). While Nigeria has within the period entered into bilateral agreement on energy and investment with the United States of America (US Department of State, 2015). So, it is in the opinion of this study that this cordial bilateral relationship could elicit a cross-regional study of this nature on green building policy and encourage a fundamental shift from localized information and perception on green and sustainable building policies to a global one.

3. COMPARATIVE RESEARCH AND POLICY IN GREEN BUILDING

Comparative research or analysis is a broad term that includes both quantitative and qualitative comparison of social entities. Social entities may be based on many lines, such as geographical or political ones in the form of cross-national or regional comparisons (Mills *et al*, 2006). Thus, comparative entails research within and across disciplines, states, nations, continents, regions, cities, suburbs and estates (Lawson *et al*, 2009). The inference is that comparative studies may be on different scales and for difference purposes but with the intent of promoting exchange of information, knowledge sharing, catalysed policy development and theoretical debate across states and regions (Lawson *et al*, 2009). Endan, (1984) defined the concept of comparative study on policy analysis as: *"...Studies that typically involve cross-national assessment of similar systems to determine whether the effects on policy are culturally specific or the result of the policy making system''*. According to Endan, (1984), the focus of these studies is systematic evaluation of the contextual and experiential knowledge gained from a given policy so that generalization made can be tested. This is mainly significant now that green and sustainable building is an emerging concept and is becoming less localized to one part of geographical region due to increasing global

marketplace motivated by prevailing concerns on world climate change (McGraw- Hill Construction, 2013: Nurul & Zainul, 2013).

However, to realise what Pugh (1995) called "structural change in sustainable housing", Wolman (1992) and Allen (2003) argued that policies and bases for solving housing and building problems can be adopted for use in another culture. This is in realisation of what Rose (1991) described as "lesson drawing", what Wolman (1992) called "policy transfer" and what Allen (2003) termed "learning exercise". Also, this approach is suited in what Allen (2003) observed as: *"Researching the broader political and cultural context within which housing...policies exist should not be seen as an irrelevant self-indulgence. Rather, it should be seen as an effort of lesson, learning, and exercise''.* Though, comparative studies on green and sustainable building for the purpose of policy transfer have had to confront arguments that "policies are the cultural products of history, time and place (Mills *et al*, 2006). Nonetheless, beyond this position, this study is of the opinion that knowledge of policy instruments and outcomes in one country does inform analysis of issues in another country. For example, the growing cross-regional studies and rapid exchange of information concerning regulations and policies on green and sustainable building is a proof to this.

For example, Bakar-Abu *et al*, (2011) proposed assessment model for housing sustainability in Malaysia using CASBEE, BREEAM, and LEED rating tools while Waidyasekara & De silva, (2012) comparatively rated Malaysian GBI rating systems in terms of water efficiency and conservation using UK, USA, Hong Kong, Australia, Singapore, India, South Africa, and New Zealand green building policies. Again, Bahaudin, *et al* (2014) and Abdullah *et al*, (2015) compared the green and assessment criteria on sustainable rating systems of Malaysia, Singapore, USA, Indonesia, South Korea and Asian countries. This suggests that with appropriate regard for knowledge transferability, comparative research on green and sustainable building can provide a catalyst for policy developments elsewhere. Thus, new policy ideas may arise from the stimulus of information about how things are done elsewhere and exposure to different approaches can challenge insular beliefs about the causes of problems and the effects of policy instruments. Therefore, understanding the differences among green and sustainable building policies of developed and developing world can improve understanding of the processes of green and sustainable buildings. Thus, it is the contention of this study that this cross-country comparison study will be an added advantage especially for Nigeria and South Africa to learn from others' experiences to benchmark themselves.

4. GREEN AND SUSTAINABLE BUILDING POLICIES IN UNITED STATES OF AMERICA

In the USA, investigations show that issue of green and sustainable building began to receive serious attention after the oil embargo of 1973 but never became a policy issue in the country until about ten years later (Retzlaff, 2009). In fact, the first municipal green building initiative in the USA was constructed in 1991, in Austin, Texas. Busch *et al* (2008) and Rosenberg (2001) further added that the policy covered only the evaluation of single family homes. It was later made to cover commercial, multifamily, and public buildings over time. Following this breakthrough of Austin policy on green buildings, other cities and counties in USA began to develop green building policies to include such factors as tax incentives, density bonuses, zoning requirements, government building mandates and comprehensive green building programs (Kibert, 2002; Del, 2004, King & King, 2005, Retzlaff, 2005; Circo, 2008 & Retzlaff, 2009). This is a display of the government of United State of America's commitment in initiating programmes aimed at achieving green economy.

However, it is not obvious how many green and sustainable building policies have been adopted in the USA today even though according to Retzlaff, (2005) & Rainwater, (2007) a survey of 661 of the largest cities in America indicate that 92 of them had green building policies and programs. In fact, a database of green building policy assembled by scholars at the University of Wisconsin in 2009 showed more than 194 programs (Gruder, 2009). Furthermore, a wide range of policies and initiatives aimed at assessing sustainability of buildings in USA have been developed by successive governments to support green building development. A generally used method in this regard is LEED which has multiple assessment systems for the development of different types of buildings including neighborhood designs.

5. GREEN AND SUSTAINABLE BUILDING POLICIES IN NETHERLANDS

In Netherlands, green building began to receive serious political attention in 1973. This was after the imposition of oil embargo against many western countries by the Organization of Petroleum Exporting Countries (OPEC). The consequent volatility in energy market as a result of this embargo forced the Netherland government to re-examine the county's energy consumption policy including buildings. This led to the adoption of the Dutch Energy Policy document in 1974 including the completion of several subsidized green buildings (Melchert, 2007). In fact, green building policy in Netherlands became institutionalized in the 1980s. This was as a result of the report of the Brundtland Commission of 1987 that concentrated on the status of natural environment (Hajer, 1995, Gouldson & Murphy, 1998).

This also led to the approval of the country's first National Environmental Policy Plan (NEPP) in 1989 which gave high priority to the construction industry (VROM, 1989). Further to its commitment to the growth and development of green building, the Dutch government released its second plan focusing on the importance of separating economic growth and pollution in 1993. In 1995, an action plan for sustainable construction was prepared. This plan outlined broad goals and policies for all areas of green buildings, including energy consumption, water use and air quality. It was updated in 1997 and 1999 when the implementation of green building programs were left at the discretion of the municipalities (Bossink, 2002). Furthermore, by 1998 and 2001, the third and fourth plans were put in place. These plans sought to promote the overall prosperity and balance the quality of life and environmental objectives respectively (VROM, 2001; Sunikka, 2001).

However in 1996, the national government became much more involved in green building policies by preparing the national sustainable building packages. Consequently, four packages which addressed the residential and non-residential buildings, infrastructure and urban planning were released. The packages contained extensive and detailed specifications for green buildings from the urban design scale to the building component scale (Melchart, 2007). They were presented in a clear format that classified sustainable measures according to the sets of environmental issues to which they contributed. These National Packages were based on life cycle analysis to appraise the sustainability of each measure and to give it corresponding cost information (Van Bueren & Tenheuvelof, 2005). These packages were typical of the Dutch environmental policy which is that the construction industry was expected to take part in the consultations to develop voluntary steps for sustainable buildings that the industry should follow.

In the Netherlands, the government was expanding sustainable green building programs and at the same time finding ways to address global climate change so as to reduce greenhouse gas emissions. The Dutch government on its own went further in 1995 to enact the Energy Performance Standard that specified the amount of energy that new industrial and

office buildings would be allowed to use. Existing buildings were also required to reduce their energy use by 25% over ten years (Retzlaff, 2009). However, the issuance of NEPP in the 1990s made the local authorities have greater autonomy; thereby making the decision making process in the Netherlands becomes more open and flexible. Consequently, industry groups came to be consulted on many issues and the system of communication and open negotiation on environmental policy matters occurred in almost every industry (Arentsen *et al* 2000). For instance, regulators worked hard to negotiate covenants that could reduce pollution in the construction industry. Keijzer (2000) notes, that the covenants covered 90% of the pollution, waste disposal, recycling and energy use of the industry, construction and energy sector.

By the late 1990s, sustainable building policies in the Netherlands had contained a variety of instruments, strategies including demonstration projects, mandatory policies, voluntary incentives, and covenants with industry groups. But these innovations according to Bontje, (2003) became manifest in 2002 when a rightward leaning coalition assumed control of the government and support waned for the hierarchical top-down approach to planning and environmental policy previously carried out by the Ministry of Housing, Spatial Planning and the Environment

6. NIGERIA GREEN AND SUSTAINABLE BUILDING TREND AND POLICIES

Nigeria is presently developing its policy framework for green building (WSP, 2014). As an initial move towards developing green building, it registered the Green Building Council of Nigeria (GBCN) with the World Green Building Council (WGBC) in 2014 (WSP, 2014; Nduka & Ogunsamni, 2015). GBCN has the responsibility of developing the rating system for the assessment of sustainable buildings in Nigeria, but it is at the moment in the process of developing policy system for green buildings. Thus, Nigeria has not yet developed any green building rating tool that could be used for office, retail, multi-unit residential, public and educational building projects in Nigeria. However, at the moment, the Nigerian government has allowed the Green Building Council of South Africa (GBCSA) to certify green buildings for her. The certification is called Green Star South Africa-Nigeria (Green Star SA-Nigeria).

It is not clear whether Nigeria has the intention of adopting further policies to promote green building due to some observable deficiencies in Green Star SA – Nigeria such as in the areas of weighting standards specifically on energy efficiency, management and innovations (Nduka & Ogunsamni, 2015). The Green Star SA rating tool (Green Star SA-Nigeria) is based on nine major categories namely management, indoor environmental quality, energy, transport, water, materials, land use ecology, emissions and innovations. Currently, the Green building Council of Nigeria (GBCN) has agreed with Green Building Council of South Africa (GBCSA) on adopting the Green Star SA rating tool pending such a time GBCN developed its rating tool. At the moment, Nigerian professionals are being trained as "Green Star SA-Nigeria assessors'' who presently join the GBCSA Star SA accredited professionals to assess and certify green buildings in Nigeria (WSP, 2014). The GBCN in consultation with industry professionals and academics have made modifications and recommendations on Green Star SA-Nigeria specific to Nigerian context. This is with regard to legislation, policies and sustainability practices. However, the impact is yet to be felt by Nigerians (Nduka & Ogunsamni, 2015). This is because an average Nigerian including professionals in the built environment is not fully aware or still less sure of green building and its associated benefits. Though, Nigeria has not made significant policy on environmental rating scheme, and by implication has not shown serious leadership role to pursue green building policies and programs that have impact on real estate construction industry, it has however registered

about 317,039 gross square of green buildings ((United State of America's Green Building Council, 2015). Nevertheless, Nigeria has made efforts at ensuring environmental sustainability by establishing various agencies and policies aimed at encouraging sustainability. This include: National Policy on the Environment (NPE), Environmental Protection Agency Act (1988), National Council on the Environment (NCE), National Policy on Climate Change and Response Strategy, the National Environmental Standards and Regulations Enforcement Agency (NESREA) (Nwokoro & Onukwube, 2011).

7. SOUTH AFRICA GREEN AND SUSTAINABLE BUILDING TREND AND POLICIES

As part of the concerted efforts towards strengthening the campaign and promotion of green and sustainable building initiatives, the South African government in 2007 launched the Green Building Council of South Africa (GBCSA). The Green Building Council of South Africa became the thirteenth full member of the World Green Building Council in September 2008. The launch and registration of GBCSA at the World Green Building Council is a display of government commitment in initiating programmes aimed at achieving green economy in South Africa. Key objectives of GBCSA program include promoting green building practices in the commercial property industry, facilitating the implementation of green building practice by acting as a recourse centre, enabling the objective measurement of green building practices by developing and operating a green building rating system, and improving the knowledge and skills base of green building in the industry by enabling and offering training and education (Goosen, 2009).

The GBCSA launched the Green Star Rating tool in South Africa in November 2008. The tool was adopted from the Australian Green Star system because it was the easiest to customise to the South African context (Goosen, 2009). The Green Star SA – Office v1 is a comprehensive rating system for evaluating environmental design and performance of South African buildings. The rating tool enables stakeholders in the industry to determine the environmental impact of their developments and receive recognition for their design contribution. Green Star SA is a voluntary green building rating system comprising of eight categories including energy, water, materials, emissions etc. It recognizes and rewards initiatives that reduce the environmental impact of development.

Unlike United States of America and Netherlands, it is difficult to make a fair judgement on the progress or success of the GBCSA especially in the areas of policy development networks and expansion, and critical research program. For example, studies by Gibberd, (2005); Goosen (2009) have shown that barriers to the implementation of Green and sustainable building principles in South Africa is lack of understanding and awareness of green star principles and limited understanding of the concept among industry professionals (Goosen, 2009). While the above few literature on green building are narrow focused with less emphasis on developing green building policies and skills in South Africa, a little number of private construction companies and architects have less sustainable construction skills (Creamer Media Engineering New 2013). Furthermore, the Green Star SA rating system is not designed to become regulation, though individual organisations or government departments are encouraged to require it for their own buildings (Goosen, 2009). This suggests that while regulation sets minimum standards, Green Star SA intends to recognise leadership at the upper end of the green scale. Though, each Green Star SA rating reflects a different market sector (office, retail, multi-unit residential etc), the first tool that has been effectively developed is Green Star SA-Office which was published in July 2008. Its version 1 (Green Star SA – Office v1) was subsequently released in November 2008 (Goosen, 2009). Thus, it is not clear if GBCSA has released the tools for other building types, for example retail, hotel, multi-unit residential, conference centres, industrial etc.

Nonetheless, in South Africa a wide range of policy and initiatives has been developed by government to support this approach. These include: The Integrated Sustainable Rural Development Strategy, the State of the Environment Reports, Driving Competitiveness, an integrated Industrial Strategy For Sustainable Employment and Growth, the New Partnership for Africa's Development, the White Paper on Integrated Pollution and Waste Management, the White Paper on Environmental Management Policy and the South Africa Human Development Report (10) (Gibberd, 2001). Furthermore, the South African Bureau of Standards (SABS) has developed the South African National Standards (SANS) 204 series of standards to provide a framework for energy-efficient buildings. The standard will result in minimum requirements for buildings as opposed to best practice. However, it is believed that SANS 204 would result in energy efficiencies of around 40% in commercial buildings. SANS 204 is presently only a voluntary standard but is expected to become mandatory for all new buildings in the next two or three years once it has been incorporated into the National Building Regulations.

Furthermore, the Sustainable Building Assessment Tool (SBAT) has been developed to rectify major sustainable building and construction problems in South Africa (Gibberd, 2008). SBAT does this by measuring sustainability performance in the built environment against 15 social, economic and environmental criteria (Gibberd, 2008; Vanwyk, 2008). The social criteria include: occupant comfort, inclusive environments, access to facilities, participation, control, education, health and safety. The economic criteria include local economy, efficiency, adaptability, ongoing costs, and capital costs. The environmental criteria include water, energy, waste, site, materials and components. Performance in these areas is measured out of 5 and presented on a radar diagram. Importantly, SBAT is aimed at assessing not only the performance of buildings in terms of sustainability but also assesses the extent of the building's contribution to supporting and developing more sustainable systems around it (Vanwyk, 2008). What is worrisome is that SBAT at this stage cannot provide a comprehensive assessment of the extent to which buildings can support sustainability (Gibberd, 2001). Thus, its aim has been to provide an indicative guide to the performance of buildings in terms of sustainability through the collection and interpretation of a number of simple performance indicators. It is based on the premise that experts believe that sustainable policy development network is urgently required to support sustainability in the building and construction industry, even if it is not yet fully understood (Gibberd, 2001).

8. METHODOLOGY

This study adopted comparative method of analysis. Comparative method of analysis examines pattern of similarities and differences across a moderate number of cases. Like qualitative analysis, comparative studies consider how the different parts of each case are relevant to the investigation or fit together in order to draw lessons and shortcomings so as to make conclusion (Mills *et al.,* 2006). There are rising bodies of cross-national and regional comparative studies, including the cross-regional similarities and differences in investigations between developed and developing countries on sustainability in building construction, housing, real estate investment performance and real estate practice (Alabi, 2012; Bawa, 2013; Olusegun *et al.,* 2015; Onuoha, 2017). Thus, this study using the review of literature approach examined the differences between two developed countries (United States of America and Netherlands), and two developing countries (Nigeria and South Africa) The justification for the choice of the United States of America and Netherlands is because of their progression and long history of green building policies which could have practical utility to Nigeria and South Africa green building policies. Besides, both countries have temperate climate except in few states in US that are tropical. The countries practice green

building and sustainability. Again, Netherlands is a member of European Union (EU) and has worked closely with the USA. The government of United States of America and the European Union have existing agreement on the coordination of energy-efficiency labelling program for office equipment (Brussels, 2013). The objective of the agreement is to coordinate energy-efficiency labelling programs for office equipment and reassess the potential for maximizing energy savings and sentimental benefits by stimulating the supply of and demand for energy-efficient products (Brussels, 2013). At the international organization index, Netherlands work closely with the United States of America as members of World Trade Organization (WTO) and Organization for Economic Cooperation and Development (OECD) (US Department of State, 2016).

On Nigeria and South Africa, the two countries were chosen because they are among the few countries in Africa that practice green building and sustainability though South Africa takes the lead. For example, in the meantime, Nigeria uses the South African Green Star SA for green building certification and rating (WSP, 2014). Furthermore, Nigeria has long diplomatic relations with South Africa and has signed various bilateral agreements with South Africa. These agreements range from agreement to train Nigerian green building assessors in South Africa (WSP, 2014) to the establishment of a Bi-National Commission of Cooperation to agreement on Educational Co-operation and Research (Department of International Relations and Cooperation, South Africa 2018)

9. FINDINGS AND DISCUSSIONS

Through the analysis of literatures from the study areas, this study identified four broad themes in green and sustainable building policies between developed and developing countries. Both literatures from developed and developing countries emphasize these four subject matters to a larger extent, although there is much larger literature on green and sustainable building policy in developed countries than developing countries. The four major findings from the literature are subsequently discussed.

9.1 Early Green Building Development

The study found that development of green building policies in developed countries such as USA and Netherlands and developing countries like Nigeria and South Africa is founded on history of policies and programmes. Though, the countries are highly dependent on historical policy changes, however USA and Netherlands green building policies have been built over years than Nigeria and South Africa. USA and Netherlands began to encourage green buildings several years before Nigeria and South Africa. Besides, green building policies in USA and Netherlands have central government influence but more decentralized as each state has a role to play in green building development. On the part of South Africa and in particular Nigeria, interest in green buildings started in recent times and the country today does not have same long strong policy of action like the USA and Netherlands. Thus, the emergence of green buildings in South Africa and in particular Nigeria is much later. The implication is that there is less growing number of green buildings today in South Africa and Nigeria (Alabi, 2012), relative to USA and Netherlands.

Although, political authorities in Nigeria and South Africa have developed plans and policies for green and sustainable buildings, but this has not resulted to critical expansion in the number of green and sustainable buildings. For example, the LEED certification update shows that only one green building: the Heritage Place has received final certification in Nigeria with square footage of 97,187 (Gray, 2015). As at the moment, Nigerian green building policy systems are built more on national influence from the Federal Government with less participation from the states. Along these lines, Nigeria in particular ought to gain

from the movement of green building arrangements in United States and Netherlands which is built upon history of policy and cultural shifts. While South Africa could leverage on United States and Netherlands long policy history to improve on her green building policy to make it strong enough to impact significantly on green building development. For example, policies that are strongly market focused and have strong tool to promoting green and sustainable offices designations are ideal. Thus, green building issues in South Africa and Nigeria, like many other policy matters, have to be built upon a path-dependent history of changes both in public attitudes and policy formulation.

9.2 System and Standard for Green Building Assessment and Certification

Although some literatures in the study areas (Gibberd, 2001; Retzlaff, 2009; Melchart, 2007; Nduka & Ogunsamni, 2015) have advocated on improved systems and standard of green building assessment and certification, there has been a greater focus of this in United States and Netherlands than in South Africa and Nigeria over a decade. For example, there are evidences that United States and Netherlands have improved from assessment to effective implementation compared with South Africa and Nigeria. Perhaps, this is because the United States and Netherlands have pursued more elaborate green building policies such as developing of rating tool which has become a sustainable building standard in both countries. Thus, there is less emphasis on developing a tool and methods of green building assessment and implementation than on achieving results. While in contrast, South Africa is in the implementation stage, Nigeria is in the process of developing her own rating tool. Therefore, much of Nigeria's attention as at the moment is geared towards developing assessment systems rather than implementation.

Though, Nigeria uses the South Africa's Green Star rating criteria at the moment, the Green Star point values to key sustainable issues in green building is low relative to LEED measures and benchmarks. All the same, since United States and Netherlands have greater experience in green building relative to South Africa and Nigeria, South Africa and Nigeria can in addition to the adoption of LEED's rating tool analyse the technical details of the various building assessment systems in United States and Netherlands such as their approach to various environmental issues and spatial scales, their underlying values, and how they determine criteria and points. This will help South African and Nigerian professionals examine certain key issues of sustainability and reduce the difficulties in achieving the required quantification. For example, green building is at embryonic stage in Nigeria and as such, could create the problem of quantifying the benefits inherent in walkable neighbourhoods, diverse communities. All these are sources of credits to LEED for new developments which could be exploited by Nigerian industry professionals.

9.3 Inevitability of Strong Research Programmes and Education

The findings from the literature review identified the need for improved strong research and education policies for green buildings in South Africa and Nigeria in particular. Though, there could be cross-national differences in emphasis, studies by Retzlaff, (2009) and Melchart, (2007) suggests that United States and Netherland have shown more commitment in educating developers and city inhabitants about green buildings than Nigeria and South Africa. For example, while the USA and Netherlands scholarships and grants to institutions focus more on research and education to promote innovation of green buildings and green building policies (Chio, 2010; Retzlaff, 2009;Trencher *et al*, 2013), Nigeria is yet to fully integrate the education and researches on green building into her educational curriculum (WSP, 2014). Again, whereas some of the researches on green buildings in the United States of America and Netherlands have taken place through demonstration projects

designed to showcase new advances in building technologies (Chio, 2010; Retzlaff, 2009; Trencher *et al*, 3013), South Africa and Nigeria in particular have shown less interest in green technology and innovations (Gibberd, 2001; Onuoha, 2017). As a result, there has been an implementation deficit in Nigeria and obvious lapses in South Africa green and sustainable policies.

From the forgoing, it is obvious that there are clear difference in green building education and research between the two developed and developing countries. Whereas developed countries have more elaborate educational and research programmes targeted towards green building, developing countries are yet to fully initiate and implement sustainable green building educational policies and researches in their educational systems. The inference from the above literatures is that education and researches on green building is less in South Africa and low in Nigeria when compared with developed countries. For example, there are growing number of researches and literatures in United States of America and Netherlands than in Nigeria that focus on educating stakeholders about green building (Onuoha, 2017). Nigeria's literatures presently focus more on awareness of the new knowledge of green building. But unlike developed countries, the Nigerian government and experts in the building industry have not given much attention to research and education; as such there has been the problem of awareness (Nduka & Ogunsamni, 2015; Onuoha, 2017). Thus, Nigeria can learn from the USA and Netherlands experience in research and education of green buildings.

9.4 Policy/Programme Development and Effectiveness

At the moment, a significant green building initiative factor that is lacking in South Africa and Nigeria in particular but not in USA and Netherlands is effective policy development and expansion (Retzlaff, 2009). Though, Nigeria and South Africa in particular have recorded successes in green building policy initiative and development, both countries especially Nigeria has not initiated elaborate green building policies that are effective enough to stimulate and maintain standards, ensure quality, and regulate green building market forces. Again, green building policies especially in the area of policy provision for green tax incentives in South Africa and particularly in Nigeria, is still beset with notable criticisms comparable to United States and Netherlands. This could be because the policies are not strongly market driven and adequately enticing to attract investors, especially in the areas of qualifying persons, qualifying costs, standardization of rating tools, incentives, stamp duty exclusion, and absence of clarity. There are cases where green taxes are more pro-supply with little or no process for sensitizing the demand side to enable both investors has a balanced perception of green building investment.

Nigeria uses the South Africa Green Star rating tool which has however not significantly spurred up green building investments in Nigeria. The use of Green Star in Nigeria rating should be considered as temporary as its continued use does not demonstrate serious commitment to green building on the part of Nigeria. Again, due to more enabling green building policies in United States and Netherlands, greater number of industry professionals has more green building skills than their counterparts in Nigeria and South Africa. While few literatures on green buildings (Gibberd, (2005); Goosen (2009)) are narrow focused with less emphasis on the development of green building policies and skills in South Africa and Nigeria in particular, a little number of private construction companies and architects have less sustainable construction skills (Gibberd, 2001; Onuoha, 2017) Thus, this study sees this inadequacy in green building industry as a barrier to the development and implementation of sustainable building policies and programmes in Nigeria and South Africa. Thus, Nigeria and South Africa can learn from United States and Netherlands where green

building policies were developed by a network of professionals already active in the field of green building, a situation that has contributed to learning and innovation over time. This will help establish cordial relationship among industry professionals on discussions on policy initiation and implementation. This would be easier when the parties already know themselves.

10. CONCLUSION AND RECOMMENDATION

Regardless of the many differences in policy, social and economic backgrounds between the study areas, this study has demonstrated some similarities in green building policy research. For example, irrespective of the point values, the South African Green Star and Green Star SA-Nigeria policy rating tools covered the key sustainability criteria and measurement items, the same way United States and Netherlands do. The key sustainability criteria include Energy efficiency, indoor environmental quality, sustainable site planning and management, materials and resources, water efficiency and innovation. However, owing to long history of green building activities in United States and Netherlands, many differences exist from which South Africa and in particular Nigeria can draw important lessons.

First, United States and Netherlands experience has shown that conscious efforts should be made by South Africa and Nigeria in particular to increase sensitization of green building features among developers and investors and the public on the benefits of sustainable construction practice. For example, constructing or retrofitting a building to green building requires policy awareness of materials and innovation in building technology and design before new products and techniques go into the market. Secondly, the South African and Nigerian governments can show leadership in green building by adopting some LEED research agenda for green building policy issues, and regulations. Also, some LEED policies and incentives especially in the area of green technology that are strong enough to sensitize green building could be similarly adopted. Furthermore, United States and Netherlands experience suggests that Nigeria needs to develop her own rating tools as the use of South Africa Green Star in the interim may not sufficiently improve her green building practices while South Africa should improve on her rating criteria for better green building practices.

On the other hand, through green technology transfer or green Foreign Direct Investment (FDI), integrated work across geographical distances and easier information exchange could be encouraged between the study areas. For instance, environmentally friendly industry technology and practices that directly contribute to environmental progress can be transferred while more innovative means to design and construct green buildings as well as the skills to do so, can be shared across country borders. Apart from the foregoing, the leadership and emphasis given to issues of green building and sustainability in the United States and Netherlands at the government level is something that South African and Nigerian authorities can learn from. Notwithstanding the differences that could exist in political context, government intervention at the Federal level in Nigeria and South Africa is useful. For instance, a Federal legislative policy on green building such as grants, loans, rebates and tax incentive could improve state and local government's acceptance of green building in both countries. Again, from the two developed countries experience, the government of South Africa and Nigeria could help states and local authorities in their countries that are stressed already, to determine the best ways to develop environmental friendly buildings while research and education programmes could help encourage innovation.

Similar to other studies (Chio, 2010; Onuoha, 2017) a major limitation of this study is lack of discussion on the effect of green building policy in relation to costs of investment in green building. One of the barriers to green building policy initiation and implementation in South Africa and Nigeria in particular include uncertainties about cost. The span for

recovering the cost of investment in green buildings in South Africa and Nigeria could be prohibitively long and the investment is usually shouldered by developers who often do not enjoy the cost savings while sustainable products are assessed largely based on cost implications.

This study is of the opinion that further studies on issues of cost in relation to green building policy in and among the countries should be conducted. This will help the government and policy makers in the countries to effectively address practical issues arising from green building development and investment. Though, United States and Netherlands wide-ranging experience in initiating green building policies has longer history of interest, it also suggests that the countries have passed through the hard process of trial and error lesson learning and knowledge sharing from other developed countries. This is essential for any evolving policy system in South Africa and Nigeria. By looking to Europe, South Africa and Nigeria policy-makers could articulate and formulate less difficult and innovative green building policy systems.

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