MODEL OF DEMAND AND SUPPLY FACTORS AFFECTING GREEN COMMERCIAL PROPERTIES

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... To God Almighty, My Wife: Mavisclara Onyinyechi Amarachi Onuoha, My Kids: Kelvin Goodluck Chidiuto Onuoha, Gerald Goodluck Chibugwum Onuoha, Joachim Chidire Onuoha, Brain Chimauchem Onuoha, and Bernice Chimamanda Onuoha.

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ABSTRACT

In many countries including Malaysia and Nigeria, green building investment is still beset with uncertainties about the anticipated profits and benefits. Existing studies on green building seem much segmented and somewhat narrow focused, as such miss the inherent complexities in demand and supply. The existing studies seem to ignore the fact that green commercial building lie within the marketplace that is subjected to inter-dependent forces of demand and supply factors. The aim of this study is to establish a model of demand and supply factors affecting green commercial properties with focus on Malaysia and Nigeria. Structural Equation Modelling (SEM) methods were used to model the factors that have causal relationships with demand and supply of green commercial properties. Discriminant analysis method was used to determine if there are significant differences in perception between Malaysia and Nigeria real estate market participants on factors that influence the demand and supply, and if differences are observed, the highest discriminant value will be identified. The analysis was based on 496 valid questionnaires administered to real estate developers. The research findings revealed that factors affecting green commercial property demand and supply is an eight-causal factor structure model. The study revealed that green building supply is significantly dependent on green building demand. Economic and financial factors including personal and altruistic environmental factors had most influential effect on green building demand while available green skills and monetary green tax incentives exhibited the most causal effect on the supply side. The model was confirmed for convergent validity, discriminant validity, item reliability and construct reliability. On discriminant analysis, study revealed that overall, there were significant discriminant function that differentiated the two countries on their perception of factors that drive green building demand and supply. The variables with most discriminant power in accounting for the differences in perception were measures of economic and financial motivations for the demand side and life cycle cost saving motivation measures for the supply side. It is hoped the findings will have practical utility for green commercial property consumers, suppliers and investors who are seeking clearer explanations for commitment in green building, and green building policy makers in both Malaysia and Nigeria who are seeking workable strategies to incentivize green building demand and supply.

ABSTRAK

Dalam kebanyakan negara termasuk Malaysia dan Nigeria, pelaburan bangunan hijau masih dibelenggu dengan ketidakpastian jangkaan keuntungan dan faedah. Kajian sedia ada mengenai bangunan hijau kelihatan lebih bersegmen dan sempit fokusnya, sehingga terlepas kerumitan yang wujud dalam permintaan dan penawaran. Kajian sedia ada ini seolah-olah mengabaikan hakikat bahawa bangunan komersial hijau wujud dalam pasaran yang tertakluk kepada kuasa saling bergantung kepada faktor permintaan dan penawaran. Matlamat kajian ini adalah untuk membangunkan sebuah model faktor-faktor permintaan dan penawaran yang mempengaruhi harta tanah komersil hijau dengan fokus terhadap Malaysia dan Nigeria. Kaedah model persamaan struktur (SEM) digunakan untuk menentukan faktor-faktor yang mempunyai pergantungan sebab dengan permintaan dan penawaran harta tanah komersil hijau. Analisis diskriminan digunakan untuk mengenalpasti jika terdapat perbezaan persepsi antara peserta pasaran harta tanah Malaysia dan Nigeria terhadap faktor yang mempengaruhi permintaan dan penawaran, yang mana jika terdapat perbezaan, nilai diskriminan yang tertinggi akan dikenalpasti. Analisis kajian adalah berdasarkan 496 soal selidik yang sah yang diberikan kepada pemaju harta tanah. Dapatan kajian menunjukkan bahawa faktor yang mempengaruhi permintaan dan penawaran harta tanah komersil hijau adalah satu model struktur yang mempunyai lapan faktor pergantungan sebab. Kajian ini mendedahkan bahawa penawaran bangunan hijau adalah lebih bergantung kepada permintaan bangunan hijau. Faktor-faktor ekonomi dan kewangan termasuk faktor-faktor peribadi dan persekitaran altrustik mempunyai kesan yang paling berpengaruh kepada permintaan bangunan hijau manakala kemahiran hijau sedia ada serta insentif kewangan cukai hijau mempamerkan kesan saling bergantungan dari segi penawaran. Model ini telah disahkan untuk kesahihan tumpu, kesahan diskriminan, kebolehpercayaan item dan konstruk kebolehpercayaan. Bagi analisis diskriminan, kajian menunjukkan secara keseluruhan, terdapat fungsi diskriminan ketara yang membezakan persepsi kedua-dua negara terhadap faktor-faktor yang mendorong permintaan bangunan hijau dan penawaran. Pembolehubah dengan kuasa diskriminan yang paling tinggi menyumbang kepada perbezaan persepsi adalah langkah motivasi ekonomi dan kewangan bagi permintaan dan langkah motivasi penjimatan kos kitaran untuk penawaran. Adalah diharapkan hasil kajian akan mempunyai kegunaan praktikal untuk pengguna hartanah komersil hijau, pembekal dan pelabur yang sedang mencari penjelasan yang lebih jelas untuk komitmen dalam bangunan hijau dan pembuat dasar bangunan hijau di Malaysia dan Nigeria yang sedang mencari strategi yang boleh digunakan untuk memberi insentif kepada permintaan dan penawaran bangunan hijau.

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LIST OF ABBREVIATIONS

AGFI	-	Adjusted Goodness of Fit
AGS	-	Available Green Skills
AMOS	-	Analysis of Moment Structure
ASEAN	-	Association of Southeast Asian Nations
AVE	-	Average Variance Extracted
BCA	-	Building and Construction Authority
BIPV	-	Building Integrated Photovoltaic
BREEAM	-	Building Research Establishment Environmental Assessment Methods
CBE	-	Centre for Built Environment
CBRE	-	Coldwell Banker Richard Ellis
CCRM	-	Corporate Conscience and Responsibility Motivations
CDFA	-	Council of Development Finance Agencies
CFI	-	Comparative Fit Index
CGT	-	Capital Gains Tax
CHBA	-	Canadian Home Builders' Association
CIDB	-	Construction Industry Development Board
CIMP	-	Construction Industry Master Plan

CSR	-	Corporate Social Responsibility
CT	-	Conventions Theory
DA	-	Discriminant Analysis
DERRM	-	Developers' Expected Rate of Return Motivations
ECN	-	Energy Commission of Nigeria
ECOWAS	-	Economic Community of West African Countries
EFA	-	Exploratory Factor Analysis
EFM	-	Economic and Financial Motivations
EPA	-	Environmental Protection Agency
GBCN	-	Green Building Council of Nigeria
GBCSA	-	Green Building Council of South Africa
GBD	-	Green Building Demand
GBI	-	Green Building Index
GBRS	-	Green Building Rating System
GBS	-	Green Building Supply
GDP	-	Gross Domestic Product
GFI	-	Goodness of Fit Indices
GGGC	-	Governors' Green Government Council
GIPGCM	-	Government Interest, Policies and Green Certification Motivations
GM	-	Green Mark
GS	-	Green Star
GST	-	Goods and Service Tax

GTFS	-	Green Technology Financing Scheme
HKGBC	-	Hong Kong Green Building Council
HVAC	-	Heating, Ventilation and Air Conditioning
IBS	-	Industrialized Building System
IEA	-	International Energy Agency
IEQ	-	Indoor Environmental Quality
IEQ	-	Internal Environmental Quality
ILO	-	International Labour Organization
IMF	-	International Monetary Fund
IPCC	-	International Panel on Climate Change
ITA	-	Investment Tax Allowance
LCA	-	Life Cycle Assessment
LCC	-	Life Cycle Cost
LCCSM	-	Life Cycle Cost Savings Motivation
LEED	-	Leadership in Energy and Environmental Design
MBSM	-	Market Benefit Strategy Motivations
MGBC	-	Malaysia Green Building Confederation
MGTI	-	Monetary Green Tax Incentives
MI	-	Modification Indices
MIDA	-	Malaysian Investment Development Authority
MOHEM	-	Ministry of Higher Education Malaysia
NAIOP	-	National Association of Industrial and Office Properties

NBS	-	National Bureau of Statistics
NFI	-	Normed Fit Index
NGTCM	-	National Green Technology Council Malaysia
NIBS	-	National Institute of Building Science
NNFI	-	Non-normed Fit Index
NNPC	-	Nigerian National Population Commission
NPCC-RS	-	National Climate Change and Response Strategy
NPV	-	Net Present Value
NRNC	-	Non-Residential New Construction
OECD	-	Organization for Economic Development Cooperation
PAEM	-	Personal and Altruistic Environmental Motivations
PBC	-	Perceived Behavioural Control
PREA	-	Pension Real Estate Association
PwC	-	PricewaterHouseCoopers
REDAN	-	Real Estate Developers' Association of Nigeria
REHDA	-	Real Estate and Housing Developers' Association Malaysia
REIT	-	Real Estate Investment Trust
RMSEA	-	Root Mean Square Error of Approximation
ROI	-	Return on Investment
RPGT	-	Real Property Gains Tax
SCT	-	Social Cognitive Theory
SD	-	Stamp Duties

SEM	-	Structural Equation Modelling
SMSUD	-	Shanghai Manual of Sustainable Urban Development
SPSS	-	Statistical Package for Social Science
TLI	-	Tucker Lewis Index
TPB	-	Theory of Planned Behaviour
UNEP	-	United Nations Environmental Protection
UNEPFI	-	United Nations Environment Programme Finance Initiatives
UNFCCC	-	United Nations Framework Convention on Climate Change
US GBC	-	United States Green Building Council
US-EIA	-	United States Energy Information Administration
US-EPA	-	United States Environmental Protection Agency
US-SCEPW	-	United States Senate Committee on Environment and Public Works
VAT	-	Value Added Tax
VBN	-	Value Belief Norm
WGBC	-	World Green Building Council
WSP	-	WSP-Group Africa Property Limited Parsons Brinkerhoff

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Real estate green property market consists of three main asset categories: residential, commercial and special purpose buildings (Kats et al, 2003; Breglia, 2012). Green commercial properties which is the focus of this study consist mainly of offices, shops and retail (Chequt et al, 2013; Olszewski, 2013). In many countries including Malaysia and Nigeria, green housing which is built for the purpose of letting it to tenants is considered as part of green commercial real estate market (Chequt et al, 2013; Olszewski, 2013). One of the key characteristics of green commercial property is that it lies within the marketplace that is subject to inter-dependent forces of demand and supply factors (Olszewski, 2013). Thus, the market is often controlled by the behaviour patterns and motivation of active buyers/users, investors and developers in the market (Ingrid, 2006). However, the main difference between the participants lies in the length of participation and motivation as well as the benefits being pursued (Henneberry and Rowley 2002; Ingrid, 2006).

For example, potential occupants of green commercial properties may be driven by the benefit and motive to reduce energy use, operational cost, enevironmental footprints and enhanced productivity to demand for green commercial buildings (Aliagaha et al, 2013a; Isa et al, 2013). On the other hand, the leading aim of the real esate development team who engages in green commercial property supply could be to attract buyers and tenants either for profit maximization or social gains (Nurul and Zainul, 2013). Again, it could be driven by construction cost savings and price sgnals of other certified green buildings (Chegut et al, 2013). Further to this, Olszewski (2013) observed that income, price and cost could be at relationship with other factors such as legislation and policies to influence buyers and developers behaviour and motivation to demand and supply green commercial properties. The implication is

that there is likely to be positive relationship between green building demand and supply factors in a marketplce. This is because as the supply of commercial buildings certified to be green increases, the demand for such buildings is affected by more private sector attention to energy efficient buildings (Chegut et al, 2013). Given this scenario, Aliagha et al, (2013a) observed that model of demand and supply factors of green building will comprise of interrelated factors such as energy efficiency and environmental sustainability which has not been fully explored.

A green building (also known as green construction or sustainable building) whether residential or commercial refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle (Kriss, 2014). It is one whose development and lifetime operation offers the healthiest conceivable environment while guaranteeing the most productive and least disruptive use of land, water, energy and resources (GGGC, 2010). According to IMF working paper (2011) a green building is an investment necessary to reduce greenhouse gas and air pollutant emanation, without basically reducing the creation and utilization of non-energy goods. While there are many different definitions of green building, it is generally accepted as the planning, design, construction, and operations of buildings with foremost considerations on energy use, water use, indoor environmental quality, material section and the building's effects on its site (Kriss, 2014).

Nurul and Zainul (2013) had argued that for green building to guarantee the above benefits, it requires real estate participants with right knowledge and motivation to invest in green building. Motivation is the force that drive individuals to buy, use, demand or supply a good or service (Gibler and Nelson, 1998). In this case it explains the benefits and factors that motivate buyers and investors to invest in green commercial properties (Nurul and Zainul, 2013). Because real estate property is a unique business, supply and demand in real estate market are often said to be localized as investors may pay attention to factors that influence their local market (Kimmons, 2012). However, not when what motivates them is not within their control (Gibler and Nelson, 1988). For example, the global change in climate may inevitably influence green building demand and supply (Aliagha et al, 2013a). Moreover, international evidence shows a strong correlation between different types of real estate in different countries. Market factors which are uncorrelated in normal times might be strongly correlated in times of economic distress (Olszewski, 2013).

Besides, internal commercial real estate market condition in one local real estate market could easily spread over to other markets (Olszewski, 2013). For

example, in 1989-1996 the collapse of Japanese real estate market had significant deteriorating effects on the US commercial real estate market. Japanese investors and banks, which had large shares in US market were forced to reduce lending to US commercial real estate market (Peek and Rosengren, 2000; Olszwski, 2013). Again, the cross border studies of the real estate market dynamics of twelve European countries show that it is possible to consider different real estate property market as one market (Wigren and Wilhelmsson, 2007; Norhaya et al, 2010). This is particularly important now that cross-regional studies indicate that green building investment 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).

The focus of this study is Malaysia and Nigeria. Malaysia and Nigeria are in the same tropical zone (Abduliahman et al, 2013). Both countries are in the same latitude characterized by hot and humid climate. Thus, tropical countries such as Malaysia and Nigeria will be adopting green features suitable for green property markets that would help in reducing high temperature. On this bases, they share certain similarities in environmental features which could have clear implications for green building demand and supply. Again, Malaysia and Nigeria operate a free market where the private sector dominates the property sector. As Bawa (2013) put it, Malaysia and Nigeria have adopted comparable components of private sector dominated property delivery systems. This suggests that their property markets and the behaviour of the market participants in both countries may not differ much. Besides, the construction sector contribution to Malaysia and Nigeria GDPs is largely the same. Malaysia construction sector contribution to GDP is averaging 3.5% (Sariah et al, 2014). While in Nigeria it is in the region of 3% (Isa et al, 2013).

The above similarities however does not suggest that there may not be differences that could shape their markets and affect the perception of green commercial property market participants in both countries. For example, Malaysia has pursued green building policies that have impacted on her real estate commercial property market more than Nigeria. Malaysia for example, has set up the Green Building Confederation (MGBC) and the National Green Technology Policy (NGTP) to drive green building activities. Also, the government of Malaysia has turned its four iconic buildings into green buildings (Aliagha et al, 2013a). Furthermore, Malaysia has developed its rating system known as Green Building Index (GBI) for assessing the environmental design and performance of Malaysian buildings. Besides, Malaysian government has introduced series of green tax incentives to promote green

building investment and adoption among public and private sectors in Malaysia. (Aliagha et al., 2013a).

On the other hand, Nigeria is presently developing its policy framework for green buildings. As an initial move towards developing green building, Nigeria has in 2014 enlisted the Green Building Council of Nigeria (GBCN) with the World Green Building Council (WGBC) (WSP, 2014; Nduka and Ogunsamni, 2015). Nigeria has not yet developed 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 in Nigeria using the Green Star SA - Nigeria (WSP, 2014). This asymmetries in green building policies, development and implementation between the two countries seem to put Malaysia in a lead against Nigeria. The implication is that green commercial property market participants in Malaysia may have better perception of the market and the factors that drive green commercial property demand and supply than their Nigerian counterparts.

For instance, studies have revealed that the demand and supply of green building is moderate in Malaysia (Abidin et al, 2012) while others say it is below average (Milad et al, 2013; Nazirah, 2009; Nazirah, 2010) whereas in Nigeria it is very low (Dahiru et al, 2014; Nduka and Ogunsamni 2015). This is perhaps because green commercial property market in recent times have been characterized by insufficient knowledge of the motivational drivers and uncertainty on the likely returns and benefits associated with green commercial properties among the stakeholders (Kats et al, 2003; Nurul and Zainul, 2013; Aliagha et al, 2013). Again, international comparison of green property market structure suggests that one characteristic for a matured property market is one driven by investors, developers and clients who are well-informed of the market factors that drive green property investment (DArcy and Keogh, 1998). Malaysia and Nigeria can be said to be at different levels of maturity in green building.

For example, since 2009 and 2014 when Malaysia and Nigeria green building started receiving serious attention respectively, the private sector has assumed the role of predomianant supplier and consumption of green commercial properties. For instance, in 2010, the commercial property sector represented 35-40% of the buildings constructed in Malaysia (Okinawa, 2010), but has not significantly improved in green building certification (Isa et al, 2013). In parallel with this, in 2013 a total of 228 commercial buildings applied for GBI green certification and only 5 buildings received their final certification (Green Building Index, 2013; Isa et al, 2013). In 2015, a total

of 361 applied, only 24 secured their final certification (Green Building Index, 2015). Till date, a total of 402 commercial buildings have applied for certification under the non-residential new construction (NRNC) category, only 31 have secured their final certification (Green Building Index, 2016). While Nigeria has registered 317,039sqm of green buildings (US GBC, 2015) and certified only 1 commercial building (Gray, 2015). The above scenario suggests that there is not yet a critical expansion in the qauantity of certified green commercial buildings in Malaysia and in particular Nigeria.

Experts have argued that the situation may have risen because the real estate development team who controls the chunk of green building market is either not aware or is less certain of the satisfactory returns and motivational factors of green commercial buildings (Nazirah, 2009; Nurul and Zainul, 2013). In particular, in MIS Asia, CS Tan had warned developers to pause and think about green building market before they begin to invest (MIS Asia, 2009) while Chen et al. (2014) contended that developers have always seen the development and practice of green commercial building from business sector perception with less consideration to ecological issues. Besides, Eichholtz et al. (2009a) noticed that both developers and institutional financial investors are still uncertain and hazy about how to go into green building investment, as the economic and financial motivational factors for it are still based on subjective evidences. Given this scenario, Aliagha et al, (2013a) explained that the demand and supply factors of green buildings could be modelled to provide better explanations and show the relationships and interrelated factors that drive green commercial building.

Also, Norhaya et al. (2010; 2014) observed that the nature and behaviour of property market could be illustrated in an interlinked indcators in models that send signals to buyers and sellers about market dynamic forces. According to Norhaya et al, (2014), property market modelling is an attempt to understand behaviours of the property where models present theoretical underpinning of the property market factors. The implication is that models can be used to assess factors from the interaction of demand and supply to show a relationship that represent the attributes of demand and supply factors that buyers and sellers in a property market consider before transaction (Norhaya et al, 2014). Yet what has not been achieved by previous studies is to empirically explore and model the underlying and inter-dependency of the demand and supply factors affecting green commercial properties. Models are used to impose some order on how variables are potentially interrelated (Shammout, 2007). Thus, the models in this study are used to determine the relationship between demand and supply factors affecting green commercial properties, ascertain the factors that have the

most influential effect on demand and supply of green commercial properties. While the discriminant analysis model is used to establish if there are significant differences in perception between Malaysia and Nigeria on the factors that motivate the demand and supply of green commercial properties.

This is in line with Norhaya et al, (201; 2014) contention that property market factors could be examined and established through models both in specific country and across various markets and that there is practically no limit to the use of models in property market analysis. Given the strength of this statement, this study empirically examined cross-regional perception of property market participants in Malaysia and Nigeria on factors affecting green commercial properties using discriminant analysis model. Existing studies on green building appeared to have concentrated on green residential buildings (Christopher, 2007), government and institutional green buildings (Shahamir and Zakara, 2014). Studies focusing on green commercial properties (Wade et al., 2003) are mostly identified with energy productivity without particular consideration regarding the related interdependent elements that underlie the demand and supply of green commercial properties. It is therefore against these backdrops that this study identified and modelled those motivational factors and variables that could drive green commercial properties. In other words the study developed a model that provides causal explanations for demand and supply factors affecting green commercial properties with focus on Malaysia and Nigeria.

1.2 Problem Statement

Given that green and sustianble buildings are gradually emerging in developing countries and given that stakeholders in the real estate industry are less certain of the returns associated with green building (Nazirah, 2009; Nurul and Zainul, 2013), studies have attempted to highlight various factors that could motivate green building demand and supply (Kats et al, 2003; Alev and Baabak, 2010; Aliagha et al, 2013a; Chequt et al, 2013; Isa et al, 2013; Norhaya, 2013). However, these studies have not provided an in-depth investigation on the wide-ranging demand and supply factors affecting green buildings in general and commercial properties in particular. As Lutzkendorf and Lorenz (2007) put it, factors influencing the demand and supply of green building have remained less researched and more research is required on the beneficial characteristics of green buildings. Also, recent studies suggest that there is not yet a general consensus among green building scholars on the factors that could

best capture the motive of buyers and real estate participants in green commercial property demand and supply (Nurul and Zainul, 2013; Aliagha et al, 2013a).

The implication is that the real estate market participants are less certain of the strategic factors that could best deliver high performance commercial properties. For instance, as observed earlier MIS Asia CS Tan (2009) had cautioned real estate developers to pause and reflect on green building market motivators before they begin to invest. The inference is that the factors that mostly influence the demand and supply of green commercial properties have not been fully explored. This is further complicated by the volatility of the green property market and the behaviour patterns of active investors and developers in the market (Ingrid, 2006). Also, lack of understanding of green building market fundamentals, institutional framework and dearth of information has affected investors concept of green building demand and supply (Isa et al, 2013; Joshi and Rahman, 2015). As such, it is difficult for buyers, investors and developers to have solid grip of emerging green commercial property market and the factors that drive their participation.

As a consequence, vicious circle of blame has continued to occur among the green real estate development team while buyers have continued to be influenced by the belief that green commercial properties are not easily affordable. For example, developers, contractors and consultants are complaining that clients do not ask for sustainability (Baldock, 2000). The design team such as architects have continued in their old ways of design approach and are reluctant to embrace the modern strategies. Buyers on the other hand are worried that green buildings are costly and take a longer time to complete (Bordass, 2000). As such, they expect the developers and investors to be at the forefront and vanguard in improving their services (Business Vantage, 2002). The subsequent effect of this is continued increase in conventional and traditional buildings with its attendant environmental problems.

Malaysia and Nigeria which is the focus of this study is still dominated by conventional buildings. As Alabi (2012) and Rostami et al (2015) put it, construction work in Malaysia and Nigeria is still characterized by conventional methods which are not sustainable. As noted earlier, Malaysia and Nigeria are in the same latitude characterized by hot and humid climate which could have clear implication for green building. Thus, Malaysia and Nigeria will be adopting policies and programmes suitable for green building demands and supplies that would help in reducing high temperature. Again, the two countries are ranked among twenty major emerging economics that opertates similar property market delivery system where the private

sector dominates the property market (Bawa, 2013; Nikkei-Veritas, 2014). On this bases, Malaysia and Nigeria may share similar problems of green commercial property market factors. Besides, both countries practice green building and sustainablility (Alabi, 2012). In other words, their green building markets are characterized by potential buyers and participants who may be motivated by certain factors and expectations on green building demand and supply.

Regardless of this, their market size by number of registered and certified green buildings differ. For example, in Malaysia, a total of 768 green buildings have applied for GBI certification, 374 have been certified as of 15th November, 2016 (Green Building Index, 2016). While in Nigeria, a total of 317, 039gsm of green buildings have been registered (US GBC, 2015). However, on green commercial properties which is the focus of this study, Malaysia and in particular Nigeria has not invested significantly. At the moment, demand for and supply of green commercial buildings particularly in Nigeria still represent only a small percentage in the building industry. Put differently, green commercial property investment in Malaysia at the moment is below average but very low in Nigeria (Dual Citizen LLC, 2014). For example, in Malaysia about 62.5% of green office buildings have been supplied while 12.5% are under construction (Isa et al, 2015). Furthermore, as noted earlier, a total of 228 commercial buildings applied for the GBI green certification in 2013 and only 5 buildings received their final certification (Green Building Index, 2013; Isa et al 2013). In 2015, a total of 361 applied and 24 secured their final certification (Green Building Index, 2015). Till date, a total of 402 commercial buildings have applied for certification in Malaysia under the non-residential new construction (NRNC) category, only 31 have secured their final certification.(Green Building Index, 2016).

Nigeria is yet to make significant policy on green rating scheme that could be used for office, retail, multi-unit residential, public and educational building projects in Nigeria. (WSP 2014; Nduka and Ogunsamni, 2015). Even with significant growth rate of 12.09% in the building and construction sector (Isa et al, 2013), the LEED certification update shows that only 1 commercial building-Heritage Place has received final certification in Nigeria with square footage of 97,187 (Gray, 2015; Oliyide, 2014; Northcourt, 2015). Though the market performance of the two countries on the achievement of a green economy differs, Malaysia performance could not be said to have resulted into critical expansion in the number of certified green commercial properties compared with other countries like Singapore and China. For example, at the moment, Malaysia aggregate number of certified and registered green building is put at 5,785, 244gqm while Nigeria has registered 317, 039 behind other counries like

China with 22, 959,342sqm (US GBC, 2015).

This situation appears to demonstrate that Nigeria is lagging behind Malaysia in performance while Malaysia is falling behind other countries in green building despite the huge potential market that exists in both countries. The implication is that there are multiple factors that could affect the demand and supply of green commercial buildings in both countries which real estate participants have not fully explored. Dahiru et al, (2014) and Isa et al (2015) have argued that factors affecting the demand and supply of green buildings in Malaysia and in particular Nigeria have been researched with less attention and further studies are required on the advantageous features of green buildings. While attempts have been made within and outside the study areas to discuss these multiple factors (Alev and Baabak, 2010; Ooi Jen Mei et al, 2012; Isa et al, 2013; Aliagha et al, 2013a; Nurul and Zainul, 2013), a number of critical research gaps remain.

One of these gaps is lack of empirical investigation into the impact of the relationships of the factors on green commercial properties. Green commercial properties is becoming an area of interest in relationship with demand and supply factors. Chequt et al, (2013) had argued that a relationship in green building demand cannot be thought to effectively exist without supply. Thus, the need for empirical evidence of the relationship between demand and suppy factors as key indicators to green commercial property investment has been suggested in past researches. For example, Aliagha et al, (2013a) and Mohamad et al, (2015) provided an important avenue for further research when they argued that model of green commercial building demand and supply will comprise of interrelated factors vis-a avis environmental sustainability, increased productivity, cost savings, energy efficiency, tax incentives, developers returns, branding and prestige etc.

Wade et al, (2003) and Chequt et al, (2013) also conclude that although many scholars have attempted to explain the interrelated factors and benefits of green commercial buildings, none of the studies has paid explicit attention to model the factors to determine the factors with most influential effect in influencing the demand and supply of green commercial properties. In other words, the studies did not empirically examine the inter-dependency of demand and supply factors in relation with green commercial properties. Thus, creating a huge knowledge gap in all facet of green building investment. Since one of the major failures of the past literature is their inability to ascertain if the factors are correlated in relationship with green commercial properties and ascertain which factors have the most influential effects on

green commercial property demand and supply, it becomes imperative for this study to fill the gap.

As observed earlier, given that the study areas Malaysia and Nigeria operate the same property market delivery system where the private sector dominates investment in real estate properties (Alabi, 2012; Bawa, 2013). Besides, given that green building investment is becoming less localized in one geographical region and state due to increasing global marketplace driven by world climate change (McGraw-Hill Construction, 2013). Again, because Malaysia and Nigeria falls within the same geographical latitude characterized by hot and humid climate which could have obvious impact on green building features and materials, this study attempts to determine perception of Malaysia and Nigerian real estate market participants on the demand and supply factors affecting green commercial properties.

Determining the perception of real estate professionals on sustainability factors according to Alabi (2012) will explain the overall effects of the factors on green building investment. Although among the authors, Alabi is the only researcher to have specifically examined the perception of the real estate professionals on sustainability features between Malaysia and Nigeria, in doing so, he did not link it to green commercial properties neither did he discuss nor model both the demand and supply factors affecting green commercial properties. As argued by Kuye (2000) in real estate investment, demand is not isolated from supply. This suggests that the perception of real estate participants in Malaysia and Nigeria on the demand and supply factors affecting green commercial properties is a gap in the literature that needs to be explored. Thus, it is the contention of this study that such cross-country comparison study will be an added advantage to both countries to learn from others' experiences and benchmark themselves. Accordingly, the following aim, questions and objectives have been identified out of the problem of this research.

1.3 Aim of the Study

The aim of this study is to establish model of demand and supply factors affecting green commercial properties with focus on Malaysia and Nigeria.

1.4 Research Questions

a) What are the demand and supply factors that affect green commercial properties?

b) Are there significant relationship between green building demand and green building supply of commercial properties?

c) Are there significant relationship between green commercial building demand and its factors?

d) Are there significant relationship between green commercial building supply and its factors?

e) Are there significant differences in perception between Malaysia and Nigeria consumers and investors on the factors that motivate the demand and supply of green commercial properties?

1.5 Objectives of the Study

In order to achieve the aim of this study and guided by the research problems, this research pursued the following objectives:

a) To identify demand and supply factors that affect green commercial properties.

b) To determine the relationship between green building demand and green building supply of commercial properties.

c) To ascertain the relationship between green commercial building demand and its factors.

d) To acertain the relationship between green commercial building supply and its factors.

e) To determine if there are significant differences in perception between Malaysia and Nigeria consumers and investors on the factors that motivate the demand and supply of green commercial properties.

1.6 Research Hypotheses

Based on the research questions, the study verified the following hypotheses. For details see chapter two which explains the conceptual framework from where the hypotheses were derived.

Table 1.1: Research Hypotheses of the study

No of Hypotheses	Hypotheses
H1:	Green building supply is significantly dependent on green building demand. RQb
H2a:	Personal and altruistic environmental motivations significantly influence green building demand. RQc
H2b:	Green building demand is significantly dependent on corporate conscience responsibility motivations. RQc
H2c:	Green building demand is significantly dependent on economic and financial motivations. RQc
H3:	Green building demand is significantly influenced by monetary green tax incentives. RQc
H4a:	Green building supply is significantly dependent on life cycle cost saving motivations. RQd
H4b:	Developers expected rate of return motivations significantly influence green building supply. RQd
H4c:	Government policies and green certification motivations significantly influence green building supply. RQd
H4d:	Market strategy benefit motivations significantly influence green building supply. RQd
H5a:	Green building supply is significantly dependent on monetary green tax incentives. RQd
H5b:	Available green skills significantly influence green building supply. RQd
H6:	There are no significant differences in perception between Malaysia and Nigeria consumers and investors on the factors that motivate the demand and supply of green commercial properties. RQe

1.7 Significance of the Study

In spite of the commitment of Nigeria and Malaysia in particular in green building as well as the size and potential nature of green commercial property investment market of both countries, Malaysia and in particular Nigeria seems to be lagging behind in the international green investment performance index. This could

be due to insufficient investigation to determine why property market participants are not sufficiently committed to green commercial property supply and demand. An investigation of the motivating factors of green commercial buildings in Malaysia and Nigeria could have positive effect on the market and improve their performance status globally. These factors have remained less researched, thus the justification and significance of this study which is considered timely. As a result, the study will be of immense significance in the following ways:

a) The study will reveal and enrich empirical studies on green building in the study areas, by feeding the government and the local policy makers on green property investment with strong empirical data to re-position their market for global competitiveness.

b) Giving the very significant environmental, economic and social benefits that will accrue from this study, professionals such as Estate surveyors and valuers, developers, and Architects as well as government, business enterprises and the public will be more greener in initiatives and investment

c) The dearth of funds and tax incentives has been identified as one of the major reasons why there is inadequate green housing and lack of demand and supply of green buildings. Even the available funds and tax incentives seem not to be properly channelled to the growth of green properties for fear of market uncertainties (Onyike, 2009). It is therefore imperative that models or strategies be developed to justify the importance of green drivers and why funds and tax incentives should be made available to enhance demand and supply of green commercial properties.

d) The study will redirect research interest on the property investment market by both academics and industry-based researchers by providing basic empirical evidences on factors driving the paradigm shift for green investment and practices. It will also serve as a future reference index for further academic work and research.

e) One of the reasons for cross-regional or state studies is knowledge exchange, lesson learning, information sharing and developing (Bawa, 2013; Olusegun et al., 2015). Therefore this study will possibly establish rich empirical and hypothetical lessons and knowledge transfer and awareness on green building and practice between the two countries. Cross-country comparison study of this nature will be an added advantage to Malaysia and Nigeria to learn from each other experiences on green building investment and benchmark themselves.

1.8 Scope of the Study

In addition to green commercial properties, green real estate property market consists of residential and industrial, and special purpose properties. While this study recognizes these diverse dimensions as equally important potential areas of green properties that require investigations, it however did not cover these areas. Therefore, the scope of this study is limited to green commercial properties. Green commercial properties or buildings, also known as sustainable or high performance buildings are properties built using environmentally friendly and resource efficient processes and certified by recognized certifiying institutions (Chequt et al, 2013). Kroll (2011) defined green commercial real estate to include properties that integrates water, energy and resource efficiency into commercial real estate planning, design, finance and construction. This is for the purpose of achieving economic value and benefits as well as social and environmental benefits (Nurul and Zainul, 2013). By Kats et al, (2003) explanation, the term green commercial property (also called green commercial real estate) include sustainable buildings or land intended to generate a profit, either from capital gain or rental income. Though, this study considers this definition as critical to this thesis, however, it considers Kroll (2011) and Chequt et al, (2013) explanations of green commercial properties more useful.

Green commercial properties by their nature comprise of officies, shops, retails, industrial space, including hotels (Kroll, 2011). This classfications sometimes overlap and could be further sub-classified within the various property markets (Kroll, 2011; Olszewski, 2013). For example, within the green commercial property market, there is a property market for offices, shops or retail and industrial (Kats et al, 2003; Dugeri, 2011; Chequt et al, 2013). However, one common factor bonding this classes of properties is that they are described as commercial properties irrespective of if they are new construction or modified existing green commercial building stock (Kroll, 2011). Besides, they are within the marketplace that is subject to the forces of demand and supply factors (Chequt et al, 2013). Though, comparable with conventional property market, green property market (commercial or residential) is guided by the laws of demand and supply where the amount of quantity demanded and supplied at a ceratin price and time play significant role. However, this study did not cover this area. In other words the market estimates of quantity of green commercial properties demanded and supplied in the study areas are not within the scope of this study. Nevertheless, they were briefly mentioned. Thus, the scope of this study is restricted to identifying, discussing, and modelling the demand and supply factors affecting green commercial properties (offices, retail, industrial and multi-family residential sector).

In order to achieve this, this study targeted the real estate development team and partcipants who are involve and knowledgeable in green building. So, data collection and unit of analysis of this study were limited to real estate developers, investors, architects, estate surveyors and valuers, builders/contractors and, town planners. Though, for the demand side of this study, the unit of analysis ought to be buyers and users of green commercial buildings (Piyapong et al, 2011; Mohd et al, 2013; Mohamad et al, 2015; Tawfik et al, 2015). That is normal. In any case, what is regularly ignored and not known are the views of the real estate development team on the demand side. Their opinions are likewise essential as they are regularly in direct contact and negotiations with potential purchasers and buyers. In this manner, they could have expert perception and opinion on the motivating demand factors. Moreover, studies have used the opinions of the building team such as developers to examine and investigate residential green building investment (Ibrahim et al, 2014; Yee et al, 2015; Elias and Lin, 2015). It is against this reasoning that this study based the unit of analysis of this study largely on the views of the real estate development team instead of buyers and occupants.

On the other hand, proeprty market behaviour is remarkably similar from place to place (Malpezzi, 1999). Also, depending on the type and quality of property under investigation, it may command a local market as in the case of lock-up street shops, a national and international market in the case of a retail or offices (Dugeri, 2011). As such transfer of knowledge and methods across countries is ideal (Bawa, 2013). This is what Rose (1991) described as lesson drawing, what Wolman (1992) called policy transfer and what Allen (2003) termed learning exercise. Against this logic, this study covered two countries Malaysia and Nigeria. However, data collection were restricted to their capital cities - Kuala-Lumpur in Malaysia and Abuja and Lagos in Nigeria. The choice of Kuala-Lumpur, Abuja and Lagos is because green commercial buildings are predominantly located in these cities and they largely host the targeted respondents for this study. Besides, Kuala Lumpur and Abuja and Lagos are major commercial hubs of Malaysia and Nigeria respectively.

1.9 The Study Areas- Malaysia, Nigeria

1.9.1 Geography and Background

Malaysia latitude and longitude are 2 30' North scope and 112 30' East longitude. Malaysia coastlines are in the Southeast Asia. Its total area is 330,000 square kilometres (sq mi) and is consisting of the Mainland and Borneo Island (Dipiazza, 2006). Peninsula Malaysia has an area outskirt with Thailand in the North. In the South, a thoroughfare joins it to the Singapore. Towards the West, over the straits of Malacca lies the Indonesian Island of Sumatra. Nigeria is in West Africa and has a geographic coordinate that shows 10 00' N North scope and 8 00' E East longitude with its coastlines laying in the south, on the Gulf of Guinea on the Atlantic Ocean. Nigeria has land outskirt with Benin Republic in the West, Chad and Cameroon in the East, and Niger in the North. Malaysia and Nigeria are in the same tropical zone (Abduliahman et al., 2013). On this base, they share certain similarities in environmental features which could have clear implications for green building. Green building design and construction in Malaysia and Nigeria could be said to be specifically suited for tropical regions. In that capacity green building skills requirements are those appropriate for tropical areas and climates similar to Malaysia and Nigeria.

Figure 1.1: Map of Malaysia (Source: https://maps.google.com/)

Figure 1.2: Map of Nigeria (Source: https://maps.google.com/)

1.9.2 Economic Structure

Malaysia and Nigeria are capitalist countries, though experts have argued that both countries operate a mixed economy giving government participation in the economy. However, Malaysia and Nigeria operates a free market where their housing and property delivery system is private sector driven. Put differently, Malaysia and Nigeria have adopted comparable components of private sector domianted housing delivery systems (Bawa, 2013). Though, on macroeconomics, Malaysia has more diversified economy with service and manufacturing sectors accounting for 54% and 25% of GDP respectively. Malaysias GDP in 2012, 2013 and 2014 were USD314.4 billion, USD 323.3 billion, and USD 338.1 billion respectively. This, in the same order represents annual GDP growth rate of 4.2%, 5% and 6.6%. The income per capita for 2012, 2013 and 2014 were USD6790.4 USD6997.7 and USD7304.1 correspondingly (World Bank 2016). Nigeria is one of the fastest developing countries in Africa. Service is the largest sector of the economy, accounting for about 50% of total GDP. Agriculture, which was in the past the biggest sector, now weights around 23%. While crude petroleum and natural gas remain export, it constitutes only 11% of total GDP. Nigerias GDP in 2012, 2013 and 2014 were USD461billion USD515 billion, USD568 billion respectively. The annual GDP growth rates for the years were 4.3%, 5.4% and 6.3%. The income per capita was USD3065, USD3319 and USD3567 (World Bank 2016) respectively.

Malaysia just like Nigeria is a resource rich country. Similar to Nigeria, Malaysia is a net exporter of oil and the second biggest exporter of Liquefied Natural

Gas (LNG) globally behind Qatar. On the aspect of economic trade and business, Malaysia and Nigeria are nearly the same since whatever is produced in Malaysia, the market exists in Nigeria (Bawa, 2013). Both countries diplomatic ties started since 1965 and both are members of Commonwealth of Nations and Developing-8 (D-8) an Organization for Economic Development Cooperation among eight (8) countries: Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey (Aleyomi and Abu, 2015). Though at present, Malaysia is a non-member country. On the other hand, Malaysia just like Nigeria belong to other bodies that share similar economic and social aims and objectives dedicated towards promoting economic integration, social progress and cultural development in their regions. Malaysia is a member of Association of Southeast Asian Nations (ASEAN) while Nigeria belongs to Economic Community of West African States (ECOWAS). Both bodies have similarities in both social and economic objectives.

In addition, Malaysia like Nigeria has the mission of accomplishing her economic and social programme as envisioned in her policy strategy, vision 2020 agenda of which sustainability in housing is incorporated (Rafikul, 2011; Eneh, 2011). Malaysia economic ties with Nigeria have resulted to training of over 50 Nigerian Youths under the Post Amnesty Capacity Building Programme of Nigerian Federal Government in Malaysia (Adekalu et al, 2013). This ties have equally been extended to the education sector where over 9,000 Nigerian students are studying in various Malaysian Universities (Ministry of Higher Education Malaysia MOHE, 2010; Abdullahi et al, 2014). Some of these students are today professional engineers, architects, estate surveyors and valuers, developers, investors and builders who are involved in green building construction and development.

1.9.3 Political and Governance Structure

Malaysia and Nigeria have same frontier history. Both countries were erstwhile British colonies. Independence of Malaysia and Nigeria were nearly at the same period. Malaysia got her freedom in 1957 while Nigeria became a sovereign nation in 1960, just three years behind Malaysia. Just like Malaysia, without exception, Nigeria as a British colony came to independence with a parliamentary system based on the West Minster model (Bawa, 2013). The structure was reformed in 1963, having a President with ceremonial powers and Prime Minister as head of government. Akin to Nigeria, the Federal government of Malaysia comprises of three arms, namely, the executive; legislative and judiciary (Case, 2007). The federal constitution determines

the powers of the governments, but under terms of the federation, Sabah and Sarawak retain certain constitutional prerogatives (Case, 2001; Gomez, 2007). The executive is led by the Prime Minister and his cabinet members /ministers who are the highest policy making persons in the country (Ahmad et al, 2003; Chin, 2011).

In addition, the judiciary is independent of the executive arm of government with a system based on English common law. As noted earlier, Nigeria operates a three tier-federal structure. However before 1967 there were four entities administered and independent local administrations, namely, East, Midwest, Northern and Western regions, and central government. The national governance in Nigeria, just like Malaysia and many other countries consists of cabinet ministries, the independent agencies and public corporations. A ministry comprises of departments and the number of such varies and depends on the functions for which the ministry is responsible. The cabinet ministries are headed by ministers appointed by the president (Bawa, 2013). On the administrative machinery, Nigeria has three level systems akin to Malaysia Federal, State and Local government. The Federal government is in charge of matters set out in what is known as federal list which comprises defence, transport and education. On the other hand, state governments alone are responsible within their areas for matters set out in the state list, which includes land and religion (Ahmad et al., 2003).

In addition, other matters such as local government and town planning are the concurrent duties of the federal and states. This study argues that since land is by law under the prerogative of the states, housing should also be the responsibility of the states. In the same way, the governance in Malaysia and Nigeria is carried out by the government agencies at three main levels. They include the ministries, departments and statutory bodies. In the ministries, ministers are in charge and are responsible for articulating, preparing, overseeing and organising government policies relating to its responsibilities. On the other hand it is the duty of government departments to execute government policies. While the statutory bodies are responsible for implementing certain tasks in comparable with the national objectives based on specific own governing laws and rules.

1.9.4 Socio-demographic Structure

Malaysia and Nigeria have common socio-cultural background (Abayomi et al, 2014). This common social relationship has been mutually tied that as of today, Malaysia has its High Commission in Abuja while Nigeria has its High Commission in Kuala Lumpur. Both countries are heterogeneous states that are religiously and ethnically plural with three major ethnic groups namely, the Malays, the Chines and the Indians in Malaysia while the Yorubas, the Igbos and the Hausas in Nigeria (Bawa, 2013; Abayomi et al, 2014; Michael and Mohamad, 2015). As argued by Freedman (2006) and Nair (2007) some of what is called races in Malaysia today is large and exemplary multi-ethnic model. However, due to the absence of open and persistent political unrest, it may not be conspicuous (Bawa, 2013). The 1996 population census shows that Malaysia has a total of 21.2 million people. Nevertheless, the World Bank (2008) put Malaysia population at 27 million with about 65% umiputera denoting sons of the soil. This includes of Malays and smaller indigenous groups. Chinese constitute 26% of the population while Indians represent 8% (Weiss, 2007; Bawa, 2013).

On the other hand, Nigeria is the most populous country in Africa. According to World Bank (2011) report, Nigeria population in 2010 is put at 158 million with an average growth rate of 2.4% between 2000- 2010. However, the 2006 population census released by Nigerian National Population Commission (NNPC) pegged the population at 140,003,542 with an annual growth rate of 3.2% (Onyike, 2009). Due to population dynamics, economic growth, legislative designation of new urban centres and increase in densities of rural trading centres, urbanization rates in Malaysia and Nigeria has increased significantly. For example, Malaysia urban population is put at 74.7% of the total population with 4.66% rate of urbanization annual rate of change (2010-2015) (CIA, 2015). However, the World Bank (2015) pegged the rate of urban growth in Malaysia at 4.0% per a year on average. On the other hand, Nigerian urban population is placed at 47.8% of the total population with 4.66% rate of urbanization - annual rate of change (2010-2015) (CIA, 2015). While the World Bank (2015) put the annual urban growth of Nigeria at 4.5%.

The core social implication issues of high rate of population and urbanization in Malaysia and Nigeria is access to affordable housing and decent buildings devoid of environmental adverse effects of which green buildings (see Figure 1.3 aand 1.4) guarantee. Though Malaysia in particular and Nigeria have made some remarkable achievements in green building during the past five decades, they have not however made substantial improvement in area of green commercial buildings compared to

their counterparts in developed nations. Cross - regional and state comparative studies indicate that green building investment trend is gradually becoming less localized and limited in one part of the geographical region or economic state due to increasing competitive global marketplace occasioned by prevailing concerns on world climate change (McGraw-Hill Construction, 2013). Furthermore, studies show potentially rich empirical and theoretical benefits from knowledge transfer and knowledge sharing in comparative regional studies (Bawa, 2013; Olusegun et al., 2015).

This study suggests a two-way approach of empirical perception from the comparison. Though this study recognizes that geographical, political and economic backgrounds of both countries may create few and diverse paths towards cross-regional knowledge and cooperation in green building market and sustainability. It is however, pertinent to note that cross-regional study of this nature could re-define knowledge in general areas of international green building investment opportunities and knowledge transfer among developers and investors. At a more profound level, it will allow for benchmarking and a paradigm shift from ”push” to ”pull” factors that could refine institutionalized and localized approaches to perception and awareness of green building construction and investment. Against this logic, some comparative and cross-regional studies on housing, perception of professionals on sustainability in building construction, and real estate investment performance and practice between Malaysia and Nigeria have been conducted (Alabi, 2012; Bawa, 2013; Abayomi et al., 2014; Olusegun et al., 2015 see Tables 1.3 and 1.4).

Figure 1.3: Diamond Building, the eight-story Green Building in Putrajaya Malaysia.
Source: Lim Japheth (2013)

Figure 1.4: Ultra-modern, LEED certified eco-friendly building in Nigeria (Heritage Place) Lugard Avenue Kingsway Road Ikoyi Lagos (15,736sqM office space) **Source:** http://heritageplaceikoyi.com/

1.10 Justification of the Study- Why Malaysia and Nigeria?

As noted earlier, studies have shown that real estate property market is localized as investors may pay attention to issues that influence their local market (Berry and McGreal, 2003; Kimmons, 2012). However, recent studies have shown that in many respect there never can be truly local real estate market (Ventolo and Williams 2013). There may be locally occurring transactions (such as within a city or country), but all transactions are affected to a greater extent by the wider market forces within the state, between regions and nations (Ventolo and Williams, 2013). Also, latest study by (Olszewski, 2013) has revealed a strong correlation between different types of real estate markets among different countries. For example, market factors which are uncorrelated in normal times might be strongly correlated in times of economic distress in many countries (Olszewski, 2013). Furthermore, given the significant momentum towards increased international economic integration, Geoffrey and Eamonn DArcy (1994) had argued that the real estate market performance and behavior could be viewed as the combined product of various national, regional and global economies. However, this is justified on the grounds that demand and supply are the key elements of property market activity (Keogh, 1991).

Moreover, Malpezzi (1999) and more recent work of Dugeri (2011) observed that property market behaviour is remarkably similar from place to place. According to Dugeri (2011) property market has no central spot and as such it can be internationalized with entry of foreign investors who seek to make profit and benefits.

Though, the institutions and constraints particularly the amount of income available for property demand and supply by real estate market participants certainly may vary, this differences should not however obscure the regularities in behavior (Malpezzi, 1999). Besides, Doling (1997) and the recent work of Lawson et al, (2009) have argued that all knowledge and disciplines are comparative. Specifically, Lawson et al, (2009) posited that comparative entails research within and across disciplines, states, nations, continents, regions, cities, suburbs and estates. This suggests that comparative studies may be on different scales and for difference purposes. This is mainly significant now that green 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 and Zainul, 2013). Table 1.2 shows some selected cross-regional studies on green building features.

Table 1.2: Selected Cross-Regional Studies on Green Building Features. **Source:** Authors work 2016

Author	Focus / Methods	Findings
Bakar Abu-Hassan et al, (2011)	Sustainable Housing Practice in Malaysia Housing development: Towards establishing sustainability index. CASBEE, BREEAM, LEED and GBI. Quantitative.	Proposed assessment model for housing sustainability in Malaysia called Malaysias Comprehensive Assessment System for Sustainable Housing (CASSH) as obtainable in advanced countries.
Waidyasekara, K.G.A.S., and De Silva, M.L (2012)	Comparative study on GB Rating Systems: In terms of water efficiency and conservation: UK, US, Hong Kong, Australia, Singapore, India, South Africa, Malaysia, New Zealand, Sir-Lanka and Abu-Dhabi. Qualitative.	GBRS of all the countries addressed water conservation methods. However, credentials given to the construction phase is mainly addressed by GRIHA and BREEAM (India and UK.).
Muhammad A.F., and Nurhayati A.M. (2013	Green Building assessment tools: Evaluating different Tools for green roof system: BREEAM and LEED- UK; US; Green Mark-Singapore; CASBEE Japan and GBI Malaysia. Qualitative.	BREAAM is the earliest tool and account for the most points for green roof system followed by Singapores Green Mark, LEED and GBI. GBI is the newest among the tools under study.
Bahaudin et al, (2014)	Comparison of the GBs Criteria Focus on Malaysia, Singapore, USA, Indonesia and South Korea. Qualitative	Energy Efficiency, Water Efficiency and Indoor Environment Quality are the most vital elements considered in the green building criteria development by the councils under consideration
Abdullah et al, (2015)	Assessment Criteria on Sustainable Rating Tools used in Asian Countries. Qualitative	Significant Assessment Criteria for the Green Assessment tools was found high in the area of energy efficiency among the countries assessed

As noted earlier, Malaysia and Nigeria is the focus of this study. Both countries are in different regions but operate open property market economy that are globally linked (Bawa, 2013; Usilappan, 2016). As Bawa (2013) puts it Malaysia and Nigeria operates a comparable property market delivery system where the private sector dominates property delivery systems. In other words, their real estate property market is characterized by potential buyers and participants who may likely be driven by similar demand and supply factors. There is free entry and free exist in both

markets. It equally suggest that Malaysia and Nigeria property market behaviour may not differ much. Further to this, is that internal commercial real estate property market model of any of the two countries could easily be adopted over to the other market. For example, the Central Bank of Nigeria CBN between 2010 and 2011 adopted the Malaysian Cagamas model to rescue her financial and property market from total collapse during the global financial crisis of 2007 and 2008. Through Asset Management Corporation of Nigeria (AMCON) the distress property development companies and financial institutions assets and properties were acquired, their capital base re-shored with funds and repackaged for sale to the public (Olusegun et al, 2015; Onuoha et al, 2016).

On green building, though Malaysia has a relatively improved green commercial property market as well as high demand and supply of green commercial properties, the factors that drive the market participants remain similar and comparable with Nigeria. For example, as reported by Chequt et al, (2013) irrespective of geographical factors, one of the direct economic benefits of green commercial property demand in any real estate property market is the quest for energy efficiency and sustainability. Also, studies from Malaysia and Nigeria have shown that energy efficiency and C02 reduction are among the factors that drive the demand for green commercial properties (Alabi, 2012; Mohamad et al, 2015; Isa et al, 2015; Nduka and Ogunsanmi, 2015). Furthermore, studies have revealed that factors such as building certification facilitates the inter-mediation process between building developers, investors and buyers in the context of what constitutes quality or energy efficient buildings in any country (Chequt et al, 2013; Aliagah et al, 2013a).

Besides, construction cost, price signals of other certified buildings, government policies, developers expected returns, tax incentive still influence the supply of green commercial buildings in many countries including Malaysia and Nigeria (Nurul and Zainul, 2013; Isa et al, 2013; Nduka and Ogunsamni, 2015). Though, a major factor that can create significant difference in market variations among countries is the quantity of green building demanded and supplied in line with the fundamental laws of demand and supply (Chequt et al, 2013). But this is outside the scope of this study. Different from this, and as observed earlier Malaysia and Nigeria are in the same latitude characterized by hot and humid climate. As a result, both countries are likely to adopt green features suitable for green property markets that would help in reducing high temperature. This similarity has given rise to cross-regional studies between Malaysia and Nigeria on real estate, housing and sustainability in building construction as shown in Tables 1.3 and 1.4 below.

Regardless of the similarities, Malaysia and Nigeria are not in the same level of green building investment, development and implementation. For example, at the moment, a total of 402 green commercial buildings have applied for certification in Malaysia under the non -residential new construction (NRNC) category, only 31 have secured their final certification.(Green Building Index, 2016) while in Nigeria only 1 green commercial building has received final certification (Gray, 2015). As indicated before, studies show that in Malaysia about 62.5% of green office buildings have been completed and occupied while 12.5% are under construction (Isa et al, 2015). Besides, the Dual Citizen LLC (2014) study on the performance of countries in green economy ranked Malaysia higher than Nigeria. Thus, this study is based on the premise that this differences could affect the orientations and perception of the market participants on factors that drive green commercial properties.

On the other hand, commercial property sector is a key sector in the mitigation of harmful environmental impacts in both Malaysia and Nigeria but has remained poorly researched. Local literature on green commercial building investment in the study areas are inadequate with little or no empirical support (Isa et al, 2013). As such most literature for this study were drawn from external publications. However, as observed earlier, existing studies on green building seem to focus more on government and institutional green buildings (Yahya et al, 2013; Shahamir and Zakara, 2014), Green Infrastructure (MacFarlane et al, 2005; Ian, 2010), energy efficiency (NgBan and Zainal, 2013), green technology (Popp et al, 2011), benefits of green buildings (Kats et al, 2003; Alev and Baabak, 2010) and residential green buildings (Christopher, 2007; Mohamad et al, 2015). Investment in green building requires the demand side and supply side.

The demand side is determined by potential occupants and buyers while supply side is mainly controlled by the real estate development team. This study focuses on the analysis of both demand and supply side factors of commercial properties as no study has so far attempted to examine the causal relationships and inter-dependence of demand and supply factors in relation to green commercial buildings. This has created a very huge knowledge gap in all facets of green building and construction. On this bases, this study contends that if green building is considered as the core footprint of environmental, social and economic and financial benefits as recognized by experts, it will be basically more in the area of green commercial properties. As such, more research focuses on empirical evidence of demand and supply factors are needed.

Table 1.3: Related Studies on Green Building and Properties between Malaysia and Nigeria [1] **Source:** Authors work 2016

S/N	Author / Year & Type of Study	Research Title/Focus	Methodology	Findings
1	Bawa, C. A. (2013) PhD dissertation Department of Estate Management University of Malaya	Low-income Housing Policy: A Comparative Study of Malaysia and Nigeria	Quantitative and Qualitative Approach	In Nigeria greater majority of low income group LIG are unable to acquire housing while Malaysian context shows an inclusive trajectory in housing its LIG.,Housing allocation goes to target beneficiaries of LIG in Malaysia while in Nigeria majority of low-cost beneficiaries are excluded in LIG.,In Malaysia renters are on the increase. About 48% are renters. In Nigeria more than 50% and 48% are renters and owner-occupiers respectively, 60% of housing owners/occupiers secure housing units from private developers while more than 55% obtain housing units from private developers. Housing finance is more available to LIG in Malaysia than in Nigeria. Institutional structures and agency responses play an important role in the shaping and determining outcomes of the low-income housing policies in both countries.
2	Mustapha, B (2011) MSC dissertation. Department of Construction Contract Management Universiti Teknologi Malaysia	Comparison between the standard forms of Building contract used in Nigeria and Malaysia.	Qualitative method. Interviews	Over 11, 800 capital projects are abandoned in Nigeria than in Malaysia due non-payment or delays in payment of contract fees.,Joint Contract Tribunal (JCT) 2009 standard is used in Nigeria for both public and private projects while Pertubuhan Akitek Malaysia (PAM) 2006 is in use in Malaysia for private projects whereas JKR, 203A is used for government projects. Payment for issuance of interim certificate at interval in Nigeria is 28 days in joint contract tribunal (JCT) standard while in Malaysia it is 21 days in Pertubuhan Akitek (PAM).,Parties involved in contracts in Nigeria are less knowledgeable about construction laws compared to their counterparts in Malaysia.,Budget for construction projects are not adequate in Nigeria compared to project budget in Malaysia.
3	Alejo, A (2012) MSC Dissertation. Department of Construction Contract Management Universiti Teknologi Malaysia	Comparative Study of Defects Liability Period Practice between Malaysia and Nigeria. Case studies: Universiti Teknologi Malaysia and Federal University of Technology Akure, Nigeria as case studies	Qualitative and quantitative analysis	Defects liability period in Malaysia is 12 while Nigeria is 6 months. Defects that manifest in buildings after the defects liability period in Malaysia is 1.00% whereas in Nigeria it is put at 27.67%.,Total rate of defects during defects liability period in Malaysia is 23.5% while in Nigeria it is 8.99%., Occurrence of defect after defects liability period in Nigeria is higher compared to Malaysia.,Defect liability period practice in Nigeria is not reasonable enough to allow defects (latent and patent) to manifest compared to Malaysia.
4	Olusegun, O.O; Rosil, S and Daud, M. N (2015) - Journal	Comparison of REIT Dividend Performance in Nigeria and Malaysia	Risk Adjustment Return Analysis	Risk adjusted performance of Nigeria REIT is lower than Malaysia REIT. Average annual return - Malaysia 7.5%, Nigeria 4.8%. Annual Risk - Malaysia 1.74%, Nigeria 0.82%. Risk free yield - Malaysia 10.35%, Nigeria 3.2%. Risk-return ratio- Malaysia 0.17%, Nigeria 0.23 and Sharpe ratio Malaysia 2.47, Nigeria -6.77%., REIT characteristics of Malaysia property investment market indicates that about 75% (50 in real estate assets and 25% in related securities while in Nigeria at least 75% on real estate assets for close end and 70% on real estate assets for open end.

Table 1.4: Related Studies on Green Building and Properties between Malaysia and Nigeria [2] **Source:** Authors work 2016

S/N	Author / Year & Type of Study	Research Title/Focus	Methodology	Findings
1	Abayomi, I; Olayinka, O & Rotimi, A. (2014) - Journal	Regulation of Real Estate Agency Practice in Malaysia: An investigation for Nigeria.	Document Review	Significant compliance with Real Estate Agency Act and laws among practitioners in Malaysia are high than in Nigeria. Though Nigeria Estate Agency law is comprehensive, Malaysia Estate Agency is more detailed and all-inclusive to ensure that clients are served by qualified agents.,Real Estate Agency Practice in Malaysia is better organised than in Nigeria especially in standards, order and absence of quackery
2	Abimbola, W & Olusegun, M (2010) - Journal	An Investigation into Nigeria Property Construction Companies Perception on Critical Risk.,-Result compared with studies conducted in US, Hong Kong and Malaysia	Descriptive Statistics / survey approach design	Significant difference with perception between contracting organization in US, Hong Kong, Malaysia and Nigeria on what constitutes critical risk.,Property development companies in Nigeria perceived natural hazards (Act of God) as the most critical risk to the performance of property construction companies while countries like US and Malaysia perceive it as the least of many critical risk.,Specifically, contractors competence and contract delay and resolution are ranked 7 and 10 in Malaysia respectively compared to Nigeria where it is ranked 3 and 8 respectively.,Well-structured insurance companies and government support to deal promptly with any adverse situation in building construction in Malaysia while constrictors in their capacity are left to deal with such situation in Nigeria.
3	Alabi, A.A (2012) -Journal	Comparative Study of Environmental Sustainability in Building Construction in Nigeria and Malaysia.	Quantitative averaging statistical analysis and qualitative approach	Building and Construction works are still being executed in conventional and traditional ways in Malaysia and Nigeria which are not sustainable and environmentally friendly. Low awareness of sustainability concept in Nigeria while in Malaysia, it is moderate.,Nigeria level of sustainability implementation is 23.1% low compared to Malaysia that records 15% low.
4	Bawa, C. A and Abdaziz Wan Nor, A. W (2011) - Journal	The role of Private Sector Participation in achieving anticipated outcomes for low-income group: A comparative analysis of housing sector between Malaysia and Nigeria	Multiple case, structured and semi-structured questionnaire, interviews and document review	Housing delivery in Malaysia and Nigeria are private sector dominated.,There is gap between housing demand and the private sector response in Malaysia and Nigeria and the adequacy and affordability of houses developed for the low income group LIG. Private sector response to housing demands of low income group LIG is high in Malaysia than in Nigeria.,In Malaysia, the development of low-cost housing is facilitated by the cross subsidy policy while about 76% and 20% of Nigerians obtain their housing finances from financial institutions and government loans respectively
5	Zalanga, S. I., (2000) PhD dissertation	The postcolonial state and the, development agenda: A comparative, study of the role of ruling elites in,the development policy formulation,and implementation in Malaysia, and Nigeria	Qualitative by,comparative, historical,analysis, method	Development choices and implementation strategies in Malaysia and Nigeria are determined by multiple factors. Type of ruling elite in Malaysia and Nigeria. Mediate these factors by shaping the development goals and implementation of strategies.

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APPENDIX A

PUBLICATIONS ASSOCIATED WITH THIS THESIS / PAPERS CO-PUBLISHED DURING THE PRIOD OF THIS STUDY

Onuoha, I. J., Aliagha G. U., Norhaya K., and Kalu J. U. (2014). Application of Social Cognitive Theory on Motivations and Expectations of Developers' and Investors' to Commit to Green Building Construction and Supply. *Journal of Advanced Material Research,* 1073 (1076), 2890 -2898. Trans Tech Publishers, Switzerland (*Scopus, 2014*). http://www.scientific.net/AMR.1073-1076.2890.

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