ENVIRONMENTAL SUSTAINABILITY IN REAL ESTATE DEVELOPMENT IN GHANA

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A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Science in Real Estate

Department of Real Estate
Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia

MAY 2019

DEDICATION

ALL PRAISE BE TO ALLAH

Who admonished mankind about the need to ensure environmental sustainability in

The Qur'an - Al-Hijr 15:19 – 21.

Allah (swt) says:

And the earth we have spread out; set thereon mountains firm and immovable; and produced therein all kinds of things in due balance.

And We have provided therein means of subsistence, for you and for those for whose sustenance you are not responsible.

And there is not a thing but with Us are its depositories and We do not send it down except according to a known measure.

ACKNOWLEDGEMENT

My deepest appreciation goes to my beloved family and friends without whom life would be empty and dry. To my parents, Baba and Mma, I owe every good deed I do to your guidance and support. To my dearest 'butterfly', Rahamatu Alhassan, my life has been greatly fruitful ever since you flew into my 'garden'. Your heart-warming company did not only give us the joy of our lives, the adorable Muqarrab, we had the opportunity at last to pursue this further study several miles away from home. The momentary physical barrier was a major concern, nevertheless, you encouraged and supported me through and through. To all my siblings, in-laws, neighbours, friends, thank you for always being there for me.

Moreover, this academic achievement would have been a rough cliff mountain to climb without the fatherly support of AP. Dr. Ibrahim Sipan whose vast experience was made available to me without a request. Prof., I learnt so much from you and wish to continue learning more by Allah's permission. Also, a big thank you to AP. Dr. Dzurllkanian @ Zulkarnain Daud for your support and endorsement of this study.

Similarly, my warmest gratitude goes to Sr. Dr. Kamalahasan Achu, our able PG. Coordinator. Sir, your guidance and support when I was not sure about who to count on regarding this project is a debt of appreciation I shall keep paying. Likewise, I am indebted to AP. Dr. Ahmad Ariffian Bin Bujang (Rtd.) and Dr. Hariati binti Abdullah Hashim for your contributions to my proposal during research methodology lectures. To all my research assistants and Ghana real estate developers who voluntarily supported me to collect primary data for this study, I am forever grateful.

Furthermore, Mr. Oti Amankwah and Mr. Andrews Agbesi Gadzekpo (PhD in Facilities Management students of UTM and staff of Kumasi Technical University - KsTU, Ghana), your brotherliness towards me was a manifestation of *"And my God will supply every need of yours according to His riches in glory in Christ Jesus" (Phil. 4:19)*. To UTM Islamic Welfare Unit, you came in handy when I was in dire need of your support, so I say jazakallahu khairan. I am also, most grateful to KsTU for the partial funding provided without which pursuance of this further study could have been very difficult.

Finally, thank you to my course mates (Real Estate and, Asset and Facilities Management) and PhD friends in UTM. To all the teaching and non-teaching staff of UTM especially the Faculty of Built Environment and Surveying, terima kasih.

ABSTRACT

Conventional real estate development (CRED) is a physical development approach for real estate that causes excessive depletion of environmental resources while contributing to carbon emissions in Ghana. Examining Ghanaian real estate developers' adoption of environmental sustainability strategies (ESS) to reduce depletion of environmental resources and carbon emissions, a content analysis of empirical studies on environmental sustainability in real estate development (ESRED) was conducted. Attributes of ESS namely sustainable site planning and management (SSPM), construction materials and resources efficiency (CMRE), energy efficiency (EE), and water efficiency (WE) were identified from the empirical studies. Some developers were purposively sampled, and primary data was collected through survey questionnaires to determine the major attributes of ESS adopted in Ghana and the main stakeholders influencing their adoption to improve environmental sustainability levels of real estate projects. The survey results were analysed using SPSS v23 statistical techniques such descriptive statistics (frequencies, mean, crosstab with correlation and chi-square) and dimension reduction (exploratory factor analysis). It was discovered that out of 42 attributes of ESS for RED identified from empirical studies, less than 30% of the ESS attributes were adopted as major attributes in Ghana, only 11.91% were adopted through all the stages of the development process (pre-construction, construction and post construction) while the professional team made up of architects, site engineers, contractors, project /facility managers etc were the major stakeholder group influencing their adoption. Nonetheless, the influence of the professional team over the developers to adopt the major attributes of ESS was not very strong except procurement of in-demand construction materials only as attribute of CMRE. Though, the professional team's influence over developers' adoption of the other major attributes of ESS were either statistically significant or insignificant with weak or moderate relationships, none of the relationships was negative. As a result of the lack of strong influence from the stakeholders over the developers to adopt ESS for RED in Ghana, environmental sustainability level of the country's real estate projects was low. Hence, the situation could be improved when many stakeholders begin to influence developers to adopt sustainable read estate development (SRED) approaches after conscientizing the public about the negative consequences of CRED on the environment which is the only habitat for the whole of humanity and its destruction implies extinction of all living things. In addition to supplementing academic literature on environmental sustainability practices in Ghana, the findings from this study would help developers identify general environmental sustainability approaches within the industry and areas for improvement, guide local government authorities who are responsible for planning and approving permits for physical developments within their jurisdictions to influence developers to adopt ESS that are least implemented while become a useful reference materials for real estate professionals who need to know about general environmental sustainability levels of real estate projects to render professional advices on environmental issues appropriately.

ABSTRAK

Pembangunan hartanah konvensional (CRED) adalah pendekatan pembangunan fizikal untuk hartanah yang menyebabkan kekurangan sumber alam sekitar yang berlebihan dan menyumbang kepada pelepasan karbon di Ghana. Menguji penggunaan strategi kelestarian alam sekitar (ESS) bagi pemaju hartanah Ghana untuk mengurangkan kekurangan sumber alam sekitar dan pelepasan karbon, analisis kandungan kajian empirikal mengenai kelestarian alam sekitar dalam pembangunan hartanah (ESRED) telah dijalankan. Atribut ESS iaitu perancangan dan pengurusan tapak yang mampan (SSPM), bahan binaan dan kecekapan sumber (CMRE), kecekapan tenaga (EE), dan kecekapan air (WE) telah dikenal pasti dari kajian empirikal. Sesetengah pemaju secara purposive sampled, dan data utama dikumpulkan melalui soal selidik tinjauan untuk menentukan ciri-ciri utama ESS yang diterima pakai di Ghana dan pihak berkepentingan utama yang mempengaruhi penerimaan mereka untuk meningkatkan tahap kemampanan alam sekitar projek-projek hartanah. Hasil kajian dianalisis dengan menggunakan statistik statistik SPSS v23 seperti statistik deskriptif (frekuensi, min, crosstab dengan korelasi dan chi-kuadrat) dan pengurangan dimensi (analisis faktor penerokaan). Telah ditemui bahawa daripada 42 sifat ESS untuk RED yang dikenalpasti dari kajian empirikal, kurang daripada 30% sifat ESS diadopsi sebagai ciri utama di Ghana, hanya 11.91% yang diterima pakai melalui semua peringkat proses pembangunan (pra-pembinaan , pembinaan dan pembinaan pos) manakala pasukan profesional yang terdiri daripada arkitek, jurutera tapak, kontraktor, pengurus projek / kemudahan dan lain-lain adalah kumpulan pemangku kepentingan utama yang mempengaruhi penggunaannya. Walau bagaimanapun, pengaruh pasukan profesional ke atas pemaju untuk menerima pakai sifat-sifat utama ESS tidak begitu kuat kecuali perolehan bahan binaan dalam permintaan hanya sebagai atribut CMRE. Walaupun, pengaruh pasukan profesional terhadap penggunaan pemaju utama ciri-ciri utama ESS sama ada secara statistik signifikan atau tidak penting dengan hubungan lemah atau sederhana, tiada hubungan yang negatif. Hasil daripada kekurangan pengaruh yang kuat dari pihak berkepentingan ke atas pemaju untuk mengguna pakai ESS untuk RED di Ghana, tahap kemapanan alam sekitar projek-projek hartanah negara adalah rendah. Oleh itu, keadaan dapat ditingkatkan apabila banyak pihak berkepentingan mula mempengaruhi pemaju untuk mengamalkan pendekatan pembangunan harta tanah (SRED) yang mampan setelah menyedari masyarakat tentang akibat negatif CRED terhadap alam sekitar yang merupakan satu-satunya habitat untuk seluruh kemanusiaan dan kemusnahannya membayangkan kepupusan semua makhluk hidup. Di samping menambah kesusasteraan akademik mengenai amalan kemampanan alam sekitar di Ghana, penemuan dari kajian ini akan membantu para pemaju mengenal pasti pendekatan kemampanan alam sekitar dalam industri dan bidang penambahbaikan, membimbing pihak berkuasa kerajaan tempatan yang bertanggungjawab merancang dan meluluskan permit untuk perkembangan fizikal dalam bidang kuasa mereka untuk mempengaruhi pemaju untuk menerima pakai ESS yang kurang dilaksanakan sementara menjadi bahan rujukan yang berguna untuk profesional hartanah yang perlu tahu tentang tahap kemapanan alam sekitar umum projek-projek hartanah untuk memberi nasihat profesional mengenai isu-isu alam sekitar dengan sewajarnya.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF BOXES AND PLATES OF PHOTOS

LIST OF ABBREVIATIONS

3D	-	Three Dimensions
BEAM	-	Building Environmental Assessment Method
BREEAM	-	Building Research Establishment Environmental Assessment Method
CEO	-	Chief Executive Officer
CEPAS	-	Comprehensive Environmental Performance Assessment Scheme
CMRE	-	Construction Materials and Resources Efficiency
CO2	-	Carbon Dioxide
CPD	-	Construction and Physical Development
CREA	-	Conventional Real Estate Assets
CRED	-	Conventional Real Estate Development
EBOM	-	Existing Building Operation and Maintenance
EE	-	Energy Efficiency
EPA	-	Environmental Protection Agency
ES	-	Environmental Sustainability
ESD	-	Environmentally Sustainable Development
ESGs	-	Environmental Sustainability Goals
ESIs	-	Environmental Sustainability Issues
ESREA	-	Environmentally Sustainable Real Estate Assets
ESRED	-	Environmentally Sustainable Real Estate Development
ESS	-	Environmentally Sustainability Strategies
EU	-	European Union
GBI	-	Green Building Index
GDP	-	Gross Domestic Product
GGBC	-	Ghana Green Building Council
GHG	-	Green House Gas
GHL	-	Ghana Home Loans
GNA	-	Ghana News Agency
GREDA	-	Ghana Real Estate Developers Association

GSA	-	Ghana Standards Authority
IFC	-	International Finance Corporation
IPCC	-	Intergovernmental Panel on Climate Change
KPIs	-	Key Performance Indicators
KATH	-	Komfo Anokye Teaching Hospital
KMO	-	Kaiser Mayer-Oklin
LEED	-	Leadership in Energy and Environment Design
MDGs	-	Millennium Development Goals
MMDAs	-	Metropolitan, Municipal and District Assemblies
NDPC	-	National Development Planning Commission
e-NGOs	-	Environmental-Non-Governmental Organizations
OECD	-	Organisation for Economic Co-operation and Development
OM	-	Operations and Management
PC	-	Principal Components
RED	-	Real Estate Development
SDGs	-	Sustainable Development Goals
SRED	-	Sustainable Real Estate Development
SSPM	-	Sustainable Site Planning and Management
SPD	-	Site Planning and Design
SPSS	-	Statistical Package for Social Scientists
TBL	-	Triple Bottom Line
UN	-	United Nations
UNCSD	-	United Nations Conference on Sustainable Development
UNDESA	-	United Nations Department of Economic and Social Affairs
UNEP	-	United Nations Environment Programme
UNFCCC	-	United Nations Framework Convention on Climate Change
UK	-	United Kingdom
USA	-	United States of America
USD	-	United States Dollar
USGBC	-	United States Green Building Council
WE	-	Water Efficiency

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Background Statement

The need for collective obligation to protect the environment has become an important variable in most discussions on sustainable development goals (SDGs) which seek to promote sustainable socio-economic development through safeguarding the environment (González-Benito and González-Benito, 2006). This is due to excessive consumption of environmental resources for socio-economic purposes and the consequential carbon emissions and pollution which are agreed upon as major global environmental issues posing the biggest environmental issue facing the present generation (Borgese, 2008). Morelli (2011) explained that environmental sustainability is the state of balance, sturdiness, and interrelationships that enables society to meet her needs without exceeding its renewable capacity to continue to replenish the services required to meet such needs nor by human actions waning biological diversity. Hence, unsustainable consumption of earthly resources causes deforestation, land degradation, water and air pollution, carbon emissions, and shortage of potable water resources, and so, poses serious threat to sustainability of the environment. These threats mainly originate from physical development activities which encompass any modification to land or the environment by human beings (Amoateng, Cobbinah and Owusu-Adade, 2013).

Generically, the environment is made up of land and all its constituents such as forest and vegetation cover, waterbodies, space, air or wind and, energy. Therefore, real estate development as a form of physical development is one major aspect of human activities that causes serious threats to environment sustainability in developing countries (Keeping and Shiers, 2004; Hussin, Rahman and Memon, 2013; Kheni and Akoogo 2015). Hence, increasing demand for real estate assets in terms of housing and related amenities such as transport, water and energy supply, sanitation and

communication for socio-economic development leads to higher consumption of environmental resources (Ofori, 2012; Kheni and Akoogo 2015). Real estate development, therefore, together with the broader construction industry affect the environment. As a result of the negative environmental impacts of human activities, the UN established Sustainable Development Goals (SDGs - Goal 6 and 7) seeking to minimise the negative impacts of human activities on environmental resources such as water, energy and forest or vegetation cover through SDG 8 to promote efficient use of global resources to prevent environmental degradation (UNSD, 2019).

Sustainability relates to the environment but has three dimensions (3D) and generally refers to balancing the needs of the present without compromising on the needs of future generations (Redclift, 2005; Emas, 2015; Nikolova, 2016). Accordingly, efforts to achieve environmental sustainability would remain a mirage should real estate development which is a major component of physical development that drives all other aspects of socio-economic developmental activities under the urban planning and development umbrella was to be overlooked (Keeping and Shiers, 2004; Borgese, 2008). Therefore, as the main feature of urban planning, real estate development is somewhat knotted in urban planning process, the environment, land use and public welfare or policy issues such as environmental sustainability (Ratcliffe, Stubbs and Keeping, 2009). An effective urban planning system that encourages efficient land use through development of 'compact' cities with integration of various types of real estate and public infrastructure and amenities would significantly minimize environmental impacts of physical developments such as real estate development (Ratcliffe, Stubbs and Keeping, 2009).

As a result, the design, construction and management of 'space-time units' otherwise known as real estate development (Graaskamp 1992; Bulloch and Sullivan, 2009; Nelson, 2014) has been acknowledged to be one major sector of the global economy where prudent use of environmental resources such as land, water, energy and forest products would greatly reduce depletion of environmental resources while minimising pollution and carbon emissions to ensure environmental sustainability. In this regard, Keeping and Shiers, (2004) recognised that the real estate development sector requires more efforts from industry players and other stakeholders to minimize land, materials resources, energy and water consumption, site ecological impact,

building maintenance and repairs works, use of harmful chemicals and waste through the construction phase while maximizing reuse of existing buildings and improving indoor environments. The adoption of environmental sustainability strategies (ESS) for land, water, energy and material resources in real estate development would, therefore, significantly contribute to safeguarding the socio-economic needs of the present generation without compromising on that of future generations.

Meanwhile, in most developing countries, the implementation of ESS for real estate development is very low although most developed countries are enforcing adoption of these ESS as a result of greater stakeholders' influence (Du Plessis, 2007; Nelson, 2007; Satchapappichit, Hashim and Hussin, 2015). Despite the paradigm shift in real estate development from traditional approach towards environmentally friendly approaches in most parts of the world regardless of the cost implications such as higher land development costs, higher construction material costs, higher labour costs, greater time to market (DeLisle et al, 2013), it appears developers in Ghana still heavily rely on conventional development approaches. The adoption of ESS for real estate development in Ghana is apparently unknown due to lack of relevant literature on the subject. Less than a decade ago, Ghana Green Building Council (GGBC) which launched eco-community national framework to set out guiding principles for development of green rating tool to inspire planning, designing, construction, operating and maintaining environmentally sustainable communities (Modern Ghana, 2012) has not made any significant impact. Likewise, IFC[1] (2017) which sought to promote green building initiatives through GGBC to the country's Environmental Protection Agency (EPA), Ghana Real Estate Developers Association (GREDA), Ghana Home Loans (GHL) and Appolonia City (a large real estate development on outskirts) has made little progress. Though these are major institutional efforts to promote the adoption of environmental sustainability in real estate development among Ghanaian developers, the nonexistence of specific policy framework or guidelines for environmentally sustainable development for real estate industry means

[1] *International Finance Corporation, World Bank Group*

that, if there were no other environmentally concerned stakeholders, developers could be pursuing their economic objectives at high cost to the environment.

1.2 Problem Statement

Real estate industry plays a vital role in socio-economic development of nations because the real estate of a nation depicts its wealth, level of prosperity and the extent of ongoing physical developmental activities in its economy. However, real estate development despite facilitating national economic development is a major consumer of environmental resources, generator of waste and pollution which together cause negative impacts on the built and natural environment (Hussin, Rahman and Memon, 2013). Thus, in spite of its many socio-economic benefits, real estate development remains the major challenge to environmental sustainability in most countries, both developed and developing (Ratcliffe, Stubbs and Keeping, 2009; UNEP, 2012).

In US for instance, the Environmental Protection Agency (EPA) revealed that residential real estate projects accounted for 43% construction and demolition wastes and the National Association of Home Builders Research Center also noted that about 8,000 lbs. of construction wastes are generated from development of a simple 2,000 square foot home (Borgese, 2008; Senick, Gonchar and Akhtar, 2011). The enormous consumption and disposal of resources and materials as result of real estate development is, therefore, unsustainable insofar as the rate of depletion of environmental resources far exceeds their renewable capacity. Also, Hussin et al (2013) reported that real estate development generates an average waste of 6,680kg per house of which 4480kg is construction debris while 2,380kg is solid waste of different types. These wastes occur due to factors not limited to design variations, poor material quality, contractors' errors, improper planning and site management, procurement errors, materials not meeting specifications (Wahab and Lawal, 2011; Siti and Noor, 2008; Lu et al, 2011; Hussin, Rahman and Memon, 2013). Therefore, the real estate development sector continues to greatly contribute to excessive consumption of environment resources for creation of built environments while increasingly causing pollution and carbon emission through the materials extraction

processes and during their assemblage to erect buildings (Borgese, 2008; Senick, Gonchar and Akhtar, 2011; Amoateng, Cobbinah and Owusu-Adade, 2013; Kheni and Akoogo, 2015).

Similarly, conventional real estate development (CRED) approach whereby real estate is regarded as an asset that only remains useful until it has no value, is demolished and disposed of for new one to be constructed in its place is a major cause of deforestation, soil degradation, water and air pollution, and shortage of potable water resources (Borgese, 2008). Disposable real estate development beside its enormous resources' consumption during construction, and its subsequent disposal as wastes puts pressure on landfill and dumping sites. Yet this environmental inefficient approach to real estate development is common in developing countries. Meanwhile, associated with conventional real estate lifecycle are poorly constructed real estate projects by developers who do not intend to occupy such real estate (Keeping and Shiers, 2004; Borgese, 2008). This practice within the industry makes real estate development a critical issue affecting environmental sustainability.

Hence, as the main product from town and country planning, real estate development projects have greater impact beyond their immediate sites due to the need for social infrastructure and amenities to facilitate their development, operation and management (Hussin, Rahman and Memon, 2013; Senick, Gonchar and Akhtar, 2011). Therefore, undertaking real estate development without due consideration to conservation of energy, water, and other material resources and the environmental impact of their utilisation causes rapid depletion of environmental resources, carbon emissions and acceleration of global warming (Keeping and Shiers, 2004; Borgese, 2008; Hussin, Rahman and Memon, 2013). This further highlights the acknowledgment that physical development in the form of creating built environment is the most environmentally destructive activity because of its high consumption of environmental resources and associated pollution and carbon emissions. The negative impact is high when developers consider real estate development especially the construction stage as a temporary activity lasting for a short period and, then do not adopt strategies to minimize the negative consequences of their physical development projects on the environment (Hussin, Rahman and Memon, 2013).

Meanwhile, although adoption of ESS requires real estate developers to reconcile economic objectives in terms of space and money considerations with corporate social responsibility in order to contribute to safeguarding the environment through prudent use of environment resources, the economic objectives for real estate development are determined by demand and supply i.e. the real estate market (DeLisle, Grissom and Högberg, 2013) whereas the environmental objectives depend on the orientation and influence of stakeholders of the development process towards enforcement of voluntary or regulatory environmental policies as well as the developer's responsiveness (corporate social responsibility policies) towards the environment as a habitat for community. Left alone, most developers would instinctively lean towards the CRED approach for various economic reasons. In developing countries such as Ghana, issues including lack of environmental sustainability guidelines are indicative of the extent of the barriers to environmental sustainability practices in real estate development. As a result, Ghana was among most of the countries which failed to achieve Millennium Development Goals (MDGs) goal 7 which specified the need for all members states of the international community to achieve environmental sustainability by the year 2015 (UNCSD, 2012; Mensah, 2015; Sengupta, 2015).

Although, Goals 6 and 7 of the 17 SDGs replaced the unachieved MDGs on environmental sustainability are aimed at minimising the negative impacts of human activities on environmental resources such as water, energy and forest or vegetation cover through SDGs – Goal 8 to promote efficient consumption of global environmental resources control the inverse relationship of economic growth and environmental degradation (Sachs, 2012; Turkson 2011; Sengupta, 2015 Mensah, 2015), these SDGs require more efforts in research and innovation backed by collaboration between industries and stakeholders especially in the construction sectors of the global economy. According to Satchapappichit, Hashim and Hussin (2015), stakeholders are key influencers for improving environmental performance of businesses. Hence, the higher the environmental awareness of stakeholders because of global environmental crises such climate change, the greater their demand for environmentally compatible business practices which is manifested in their preferences for environmentally friendly products (Satchapappichit, Hashim and Hussin, 2015). Through policy making and enforcement, government as a moderator

of policies for industries have obvious influence on environmental performance of businesses through regulation of products designs and production processes to stimulate producers to adopt some minimum environmental management practices (Samari, 2012; Bamgbade, Kamaruddeen and Nawi, 2015). However, there is very low level of awareness of, demand and government support for environmentally sustainable real estate development in Ghana (Kwakye, 2010; Djokoto et al, 2014; Kheni and Akoogo, 2015).

Hence, despite a paradigm shift towards environmental sustainability for real estate development to facilitate the attainment of SDGs (Du Plessis, 2007; Nelson, 2007) leading to the emergence of sustainable cities (Mensah, 2015; Abidin, 2009; Kibert, 2013), real estate development in Ghana continues to stand out as a major cause of destruction to the environment (Kwakye, 2010; Amoateng, Cobbinah and Owusu-Adade, 2013; Kheni and Akoogo, 2015).

1.3 Research Gap

According to UN (2015), its nations should seek to promote environmental sustainability through platforms like the United Nations Framework Convention on Climate Change (UNFCCC) to ensure necessary collaboration between developed and developing countries to reduce carbon emissions to meet the globally agreed targets. This has become a priority of the international community as most developing countries including Ghana failed to achieve the MDGs especially MDG 7 which required the attainment of environmental sustainability by the end of year 2015 (Ghana News Agency, GNA, 2019 and Mensah; 2015). Ghana, for instance, had no standard national guidelines for physical development until last quarter of 2018 when through the Parliament of the Republic of Ghana, Ghana Standards Authority (GSA) formulated a national building code. Nonetheless, there are no specific guidelines for environmentally sustainable development (ESD) despite its numerous benefits such as resources conservation, clean air and water (Keeping and Shiers, 2004) for socio-economic wellbeing of humanity which explains why the UN (2015) recommended

that physical developments especially infrastructure need to be environmentally friendly to prevent negative impacts on the environment.

Consequently, as a major example of physical infrastructure worldwide due to high growing demand for real estate assets in terms of housing and related amenities such as transport, water and energy supply, sanitation and communication for socio-economic development (Kheni and Akoogo 2015), real estate assets development should be environmentally efficient to minimise negative impacts (UN, 2015). Hence, environmentally sustainable real estate development is becoming a choice rather than an option and sustainable cities are being developed in some parts of the world (Mensah, 2015; Abidin, 2009; Kibert, 2013) because of the benefits of environmentally sustainable real estate development: land use efficiency; clean air; zero waste; efficient use of construction materials; energy conservation; cost efficiency and enhancement of corporate image which apparently drive most countries to regularise their physical development regimes to promote environmental sustainability (Abidin, 2009). However, this paradigm shift is yet to take place in most developing countries including Ghana which could not achieve particularly MDG 7 (environmental sustainability) by the end of year 2015 (Ghana News Agency, GNA, 2015). To accelerate progress towards the achievement of environmental sustainability, the UN (2015) recognized that clear policies on interconnections between environmental objectives, and between human development objectives and that of the environment should be considered to identify targets and indicators which capture these interlinkages in a coherent manner that allows better monitoring of progress. In spite of the foregoing, most environmental sustainability initiatives, strategies and processes focusing on global strategic objectives such as environmental sustainability are discreet at the micro-levels of society where environmental sustainability objectives are to be implemented (Akadiri, Chinyio and Olomolaiye, 2012).

In Ghana, for instance, though real estate development is improving significantly from conventional approach toward sustainable development approaches, this strategic change in the sector is driven by developers' voluntary adoption of best practices from abroad rather than being stimulated by stakeholders such as governments through national building guidelines as is the case in some developed and

developing countries. DuPlessis (2007) reported that barriers to sustainable development in developing countries were problems which should be addressed holistically to facilitate ESD since the environment dimension of sustainability is the focal pillar for achieving sustainable socio-economic development. But with unresolved obstacles to ESD such as resources, marketing, financial, socio-cultural constraints (Ofori, 2012; Djokoto et al, 2014; Mensah et al, 2016), the continuous depletion of environmental resources would get worse and the already irreversible consequences of unguided physical developments in developing countries would compound (IPCC, 2013).

Hence, the shortage of scholarly evidence on developers' adoption of ESS for real estate development in Ghana and stakeholders' influence on their adoption to minimise excessive consumption of environmental resources and the unintended pollution and carbon emissions to ensure environmental sustainability remains unexamined. In the context of the above, this research investigated the attributes of ESS for real estate development in Ghana and determined the major stakeholders influencing their adoption.

1.4 Research Questions

1) What are the main environmental sustainability strategies that developers adopt for real estate development to ensure environmental sustainability in Ghana?
    a) *Which major attributes of environmental sustainability strategies do developers adopt in Ghana?*
    b) *Which stages of the development process do developers in Ghana adopt the major attributes?*
2) Who are the major stakeholders influencing developers to adopt the main environmental sustainability strategies for real estate development in Ghana?
3) What is the relationship between the main attributes environmental sustainability strategies adopted and the major stakeholders influencing their adoption in Ghana?

1.5 Research Objectives

The aim of the research is to examine the main attributes of environmental strategies for real estate development and find out the major stakeholders influencing their adoption to ensure environmental sustainability in Ghana. To achieve this aim, the researcher seeks to:

1) determine the major attributes of environmental sustainability strategies adopted by developers for real estate development in Ghana;
2) ascertain the stages of the development process that the major attributes of environmental sustainability strategies are adopted by developers in Ghana
3) identify the major stakeholders influencing developers to adopt the major attributes of environmental sustainability strategies for real estate development in Ghana;
4) examine the correlation between the major attributes of environmental sustainability strategies adopted and stakeholders influencing their adoption in Ghana

1.6 Research Scope

This study focused on attributes of ESS for real estate development and the major stakeholders influencing their adoption through the development process to minimise consumption of environmental resources, pollution and CO_2 emissions to improve the environmental performance of the built and natural environment. The development process herein refers to the three (3) major phases: pre-construction (site planning and design); construction (physical development of structures) and; post construction (operation and management). Abidin (2010) asserted that the built environment refers to all activities within the construction project itself while the natural environment denotes the biosphere. Therefore, in this study, ESS relate to the approaches towards conservation of environmental resources for future generations by minimizing environmental impacts of extraction and use of environmental resources for real estate development.

From figure 1.1 below, despite, the 3D of sustainability which are commonly called the Triple Bottom Line (TBL) and centre on issues about people, planet and profit (Mouzughi, Bryde and Al-Shaer, 2014; Hurley, 2013: Fisk, 2010), this study inclined towards the environment sustainability dimension by determining ESS and the key stakeholders influencing their adoption for real estate development in Ghana without seeking to verify their interrelationship or otherwise with the economic and social dimensions. Only members of Ghana Real Estate Developers Association (GREDA) within Accra-Tema metropolitan area were purposively sampled for the study.

Figure 1.1: Sustainability Venn diagram[2]

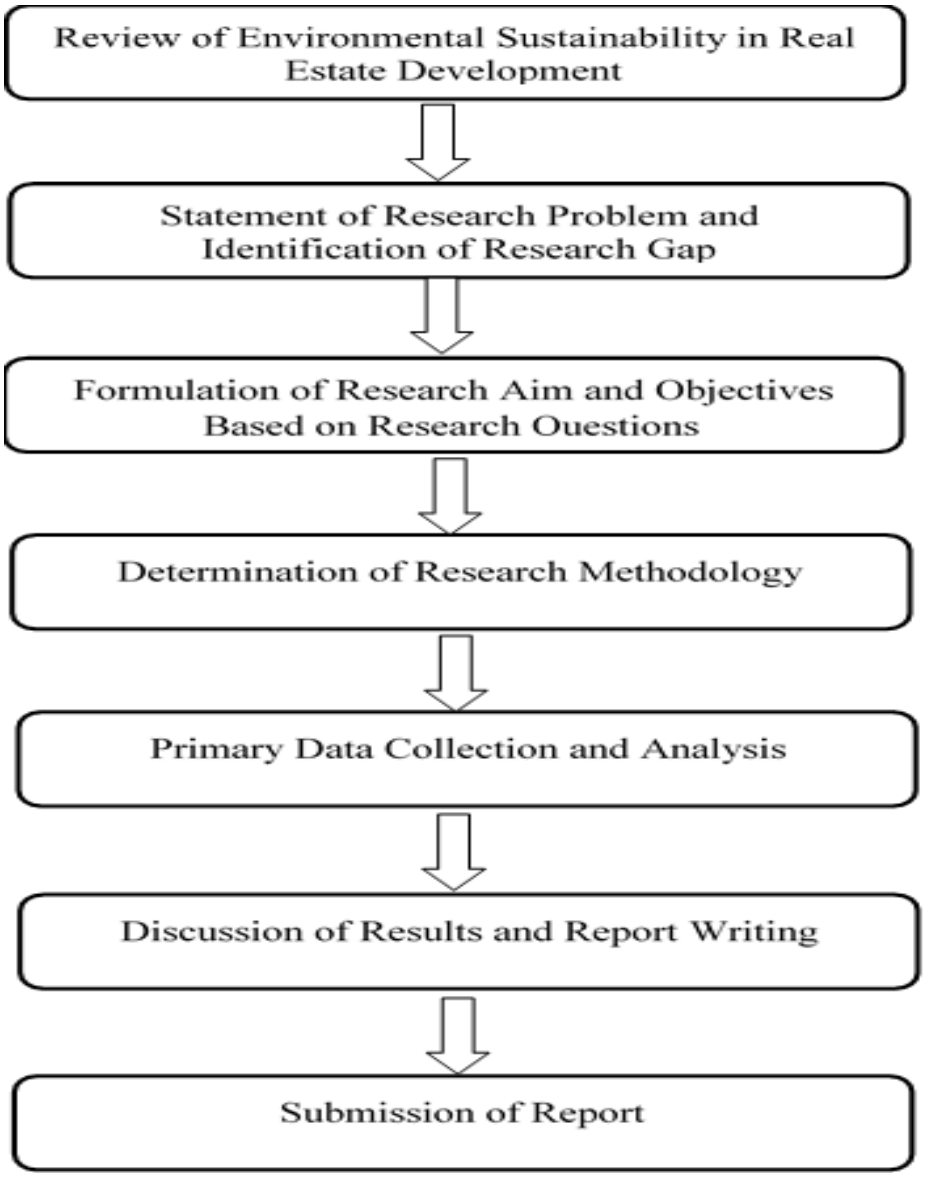
1.7 Significance of the Study

The findings of this study would be useful to developers and real estate professionals such as valuers, property managers, real estate agents among others who need to know about the environmental sustainability qualities of real estate development in Ghana to aid them in their professional decision making on real estate

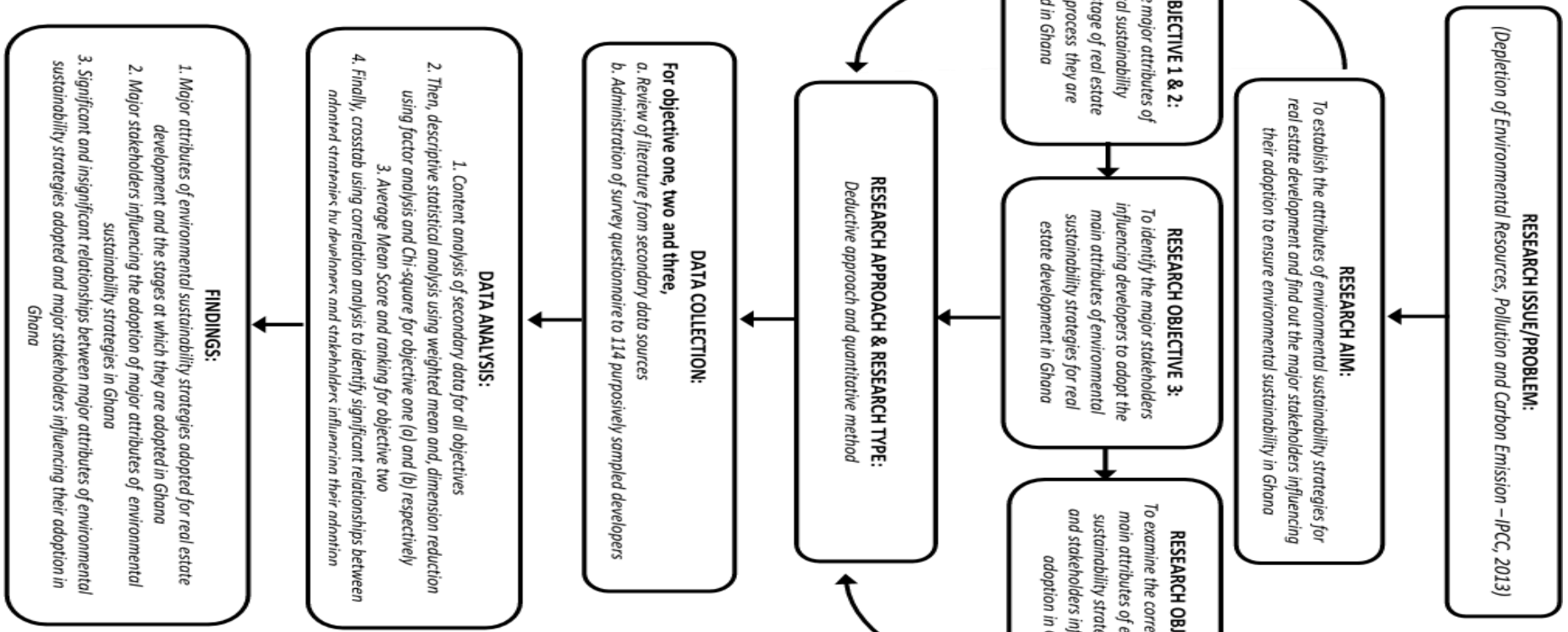
[2] ***http://www.salisbury.edu/sustain/about/whatissustainability.html***

and environment matters. Also, the findings and recommendations of this study would help policy makers such as National Development Planning Commission (NDPC), Environmental Protection Agency (EPA), Metropolitan, Municipal and District Assemblies (MMDAs) who are legally responsible for planning and controlling all physical developments with their jurisdictions to know the attributes of ESS for real estate development adopted in Ghana to be able to know areas that need improvement to achieve national environmental sustainability objectives. Hence, the conceptual framework established in the study would serve as guide to facilitate adaption of environmentally sustainable development practices in the real estate industry.

1.8 **Research Activities' Flowchart**



1.9 Flowchart of Research Methodology



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