

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Assessing Sustainable Design Practices in Selected Municipal Assemblies in Ghana

by

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MASTER OF SCIENCE

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DECLARATION

I hereby declare that this submission is my own work towards the MSc Construction Management and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

The widespread awareness of sustainability does not really reflect in engineering project decision making and delivery. It is against this background that the study sought to assess the sustainable design practice in selected Municipal Assemblies in Ghana. The study looked at the level of awareness of sustainable design concepts among professionals involved in project design at the selected Municipal Assemblies and its level of implementation in past, current and future projects. The study also identified ways of improving the practice of sustainable design in the selected Municipal Assemblies. The main tool for data collection was a structured questionnaire and the target population were professionals involved in project design at the Assembly level. The study was limited to ten (10) Municipal Assemblies in the Eastern Region. A total of 60 responses were retrieved from possible 74 respondents, representing a response rate of 81%. The descriptive statistics was used to analyse and give meaning to the data collected. It was evident from the study that there is high level of awareness of sustainable design at the selected Municipal Assemblies but its implementation in project design is low. The study identified the main barriers to the implementation of sustainable design to be perceived cost and lack of stakeholders' interest. It was established that the best way to improve sustainable design practice at the selected Municipal Assemblies is to consider sustainability right from the inception or the earliest stages of a construction project. It is recommended that the Local Government Service Council and the Ministry of Local Government and Rural Development should establish periodic programme or workshop on sustainable design for key stakeholders at the Assembly. The study is very significant within the framework of national and global quest for sustainable development.

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LIST OF ABBREVIATIONS

ERCC	Eastern Region Coordinating Council
GSS	Ghana Statistical Service
LGS	Local Government Service
L.I.	Legislative Instrument
MA	Municipal Assemblies
MDGS	Millennium Development Goals
MMDAs	Metropolitan, Municipal and District Assemblies
MTDP	Medium Term Development Plan
MOFEP	Ministry of Finance and Economic Planning
PPA	Public Procurement Authority
RII	Relative Importance Index
USEPA	United States Environmental Protection Agency
WCED	World Commission on Environment and Development

DEDICATION

Alhamdu li Allah, all thanks and praises belong to Allah. I dedicate this work to my mother, Zenatu Dabre, my lovely wife Khadija Osman, my son Bara Mohammed Umar Faruk (Mo Bara) and to my brother Abdulai Inusah for their love, support and encouragement.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Mont and Plepys (2008) sees the recent rate of consumption of the earth's natural resources not to be sustainable and subsequently suggests a paradigm shift which will have a much lower impact on the immediate environment. (Ametepey et al., 2015) explains sustainable construction (SC) as the construction process that focuses on the basic principles of sustainable development which is summarized as the process that ensures environmental responsibility, social awareness and economic prosperity at large.

The construction industry has been keyed out as unfriendly and unkind to the natural environment, this has brought the activities of the industry into scrutiny as it is presumed and continually seen to destroy and negatively impact the environment (Ametepey et al., 2015).

The Local Government Service is a public institution established by the Local Government Service Act, 2003 (Act 656) which has been repealed and replaced with the Local Governance Act, 2016 (Act 936). The Local Government Service (LGS) remains a major strategic contributor to the construction industry as it oversees the activities of Two Hundred and Fifty-Four (254) Metropolitan, Municipal and District Assemblies (MMDAs) across the nation. There exist the Department of Works, which is a merger of the Public Works Department, Department of Feeder Roads, District Water and Sanitation Unit, Department of Rural Housing and the Works Unit of the Assembly. Among the major functions of the

Department of Works as indicated in the Local Government (Department of District Assemblies) Instrument, 2009 (L. I. 1961) include:

- to advise and assist the Assembly to formulate and implement policies on works within the framework of national policies;
- facilitate the construction, repair and maintenance of public roads, public buildings and facilities within the district; and
- provide technical and engineering assistance on works undertaken by the assembly.

Halliday (2008) reveals that sustainable development is now the stated policy of local, national and international governments and this is the reason why sustainable construction is gradually becoming a guiding tool in creating a new kind of built environment; the one that satisfies the needs of humans in the present without compromising the ability of future generations to meet their needs. This primarily explains why most developing countries are striving to implement sustainable construction practices in their various construction endeavours (Ametepey et al, 2015).

Kimberly et al. (2006) are of the view that the application of sustainable construction design practices at every stage of construction from design, programming, actual construction, operations and even to final demolition is very important. Thus, sustainable construction design includes formal and informal initiatives by Governments, private and professional organizations which are geared towards the development of building design guides, the practice and development of low environmental construction methods, energy codes, materials, renewable energy and natural resources and the study of examining impact of design selections of the complete life cycle of the building.

This is the reason why assessment of the practice of sustainable design has become imperative in the Local Government Service since it plays a key role in the construction industry in Ghana.

1.2. PROBLEM STATEMENT

The rate at which the earth's resources are being used exceeds its long-term capacity and undermines the vital life support system of the earth. The construction industry is no exception to this menace, since it is a major consumer of non-renewable resources and also destroys the natural environment due to its activities (Ametepey et al., 2015).

Global interest on sustainability is rapidly on the rise, the reason why sustainability in the construction industry has become a focal point for countries worldwide since the earth's resources are under severe pressure due to increase in population and economic expansion (Halliday, 2008). The sustainable design concept has been introduced in most developed countries while little attention has been given to the concept in developing countries including Ghana (Ametepey et al, 2015).

Sustainable development is now the stated policy of local, national and international Governments (Halliday, 2008) and the Local Government Service has the responsibility for providing strategic direction for local government administration and management in Ghana (LGS Annual report, 2014). It is therefore incumbent on the Local Government Service to ensure the successful implementation of sustainable design concept at the project design stage, a situation the service is currently grappling to solve.

1.3 RESEARCH QUESTION

The questions established for the study are:

1. What is the level of awareness of sustainable design concepts in selected Municipal Assemblies in Ghana?
2. What is the level of implementation of sustainable design concepts in selected Municipal Assemblies in Ghana?
3. What are the measures to improve the implementation of sustainable design concepts in selected Municipal Assemblies in Ghana?

1.4 AIM AND OBJECTIVES

1.4.1 AIM

The aim of the study was to assess the sustainable design practices in selected Municipal Assemblies in Ghana.

1.4.2 OBJECTIVES

In pursuit of the above stated aim, three main objectives were established for the study.

The objectives were limited to three due to time and resource constraints. The objectives of the study were:

1. To assess the level of awareness of sustainable design concepts in selected Municipal Assemblies in Ghana;
2. To assess the implementation of sustainable design concepts in selected Municipal Assemblies in Ghana;

3. To propose measures to improve the implementation of sustainable design concepts in selected Municipal Assemblies in Ghana.

1.5 SIGNIFICANCE OF THE STUDY

The call for sustainable construction has been pointed out by many scholars and practitioners alike. Sustainable construction needs to be studied at the design stage because the design is what is translated into the physical product. The LGS design and award several construction projects every year. The study identified the level of awareness of sustainable design concepts in the selected MAs in Ghana; to what extent sustainability is implemented in the designing of the projects awarded by the selected MAs in the past and ongoing projects; finally, the findings of the study will help to improve and implement sustainability in project designs in the selected municipalities which can be adopted in other MMDAs across the nation.

1.6 METHODOLOGY

The main research design adopted was the quantitative approach which involved the use of survey questionnaires. This is because survey questionnaire makes it possible for large amount of data to be derived from considerable population in a very efficient way (Hair, Black, Babin, Anderson, & Tatham, 2010). The data collected was analyzed using descriptive statistical method with the findings represented in the form of graphs and tables. Secondary data was collected from books and publications from journals, internet, newspapers, among other sources.

1.7 SCOPE OF THE STUDY

The Local Government Service do not undertake construction activities directly but the Metropolitan, Municipal and District Assemblies (MMDAs) which is directly under the local Government Service award and supervise various forms of construction projects every year in different thresholds.

The geographical context of the study was to analyse the sustainable construction design practices of the Local Government Service in the Eastern Region of Ghana. The study focused on all the ten (10) Municipalities that were existing before the creation of the new ones in 2018. This is because the newly created assemblies are yet to fully have their structures in place and this provides a perfect opportunity for the implementation of the concept of sustainable design at the policy formation level in their structures.

1.8 STRUCTURE OF REPORT

The outline of the report was categorized under six chapters. Chapter One was the Introduction. This chapter presented an overview of the purpose and significance of the study. It also showed why the topic selected is worth investigating.

Chapter Two was dedicated to Literature Review. The content of this chapter was based mostly on most relevant and latest information/literature relating to the field of study.

Chapter Three was for Methodology and Approach. This chapter outlined the design adopted for the study, explained the methods employed to select the sample and discusses the tools used to collect the quantitative data.

Chapter Four outlined the Results and Discussion of the Data collected. The data collected and its analysis was presented in a comprehensive and easy to understand manner. The general discussion contributed to the understanding of the whole study.

Chapter Five was the final chapter and it was dedicated to outlining Conclusion and Recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter dealt with the relevant literature in relation to the topic under study. It is divided into three (3) sections: section one dealt with sustainability; section two is about sustainable design whereas section three is about the Local Government Concept. The integrative review was used in the literature reviewing. This approach provided summaries of past research.

2.2 SUSTAINABILITY

There are so many definitions given for sustainability in the global perspective. However, the most popular one is that of the Brundtland Commission in 1987 (Bediako and Frimpong, 2013). This commission was formed by the United Nations when the world was being threatened due to human activities leading to depletion of natural resources, global warming, hurricanes, tornadoes among others. The Brundtland commission defined sustainability as development that meet the needs of the present without compromising the ability of future generation to meet their own needs (Hosseini and Kaneko, 2011). Sustainability therefore focused on how to mitigate the negative impact on our environment within the context of economic, social and cultural heritage (Moses and Akogo, 2015). Whiles WCED (1987) and El-Zeney (2011) sees Sustainability as the economic growth that satisfies the present generation's need without endangering the potential and ability of future generation to meet their needs, Halliday (2008) on the other hand sees sustainability to involve big issues and their complex interaction. Hardisty (2010) is of the view that sustainability is basically about risk management.

Zainul Abidin (2008) posited that the introduction of the sustainability concept by the Brundtland commission has led to several events and initiatives aimed at increasing its awareness. To this, the United Nations in the year 2000 established the Millennium Development Goals (MDGs) which were to be realized in fifteen years. Then in 2016, the Sustainable Development Goals also known as Global Goals, were established to build upon the successes of the MDGs to be achieved by the year 2030.

The struggle to combat unsustainable trends, according to Halliday & Sandy (2008) in development started way back in 1972 prior to the Brundtland commission with the establishment of World Environment Day by the United Nations General Assembly. Before then, the United States Environmental Protection Agency (USEPA) was formed in 1969 (Hardisty, 2010). All these initiatives are carried out because according to Abidin (2010), knowledge and awareness are the elements that will kickstart the sustainable movement to be followed by interest, demand then implementation.

2.3 THE CONSTRUCTION INDUSTRY

Kwakye (2008) explains that the construction industry is responsible for the procurement of unique, generally large and immovable investment products, supplement or improve existing infrastructure and provide social utility. Chin (2003) perceives the construction industry as a project-based industry which is entirely different from each other making it known for its high consumption of natural resources. Gould (2005) states that the construction industry has been built on the needs of the world's inhabitants to provide shelter, conquer distances, harness energy, create public spaces, provide protection from natural disaster and build historical monuments.

Walker (1992) added that the complexity of the conditions within which the construction industry's clients exist make them place increasing demands on the earth's natural resources from the inception of the project to completion. Levy (2007) perceives the construction industry as a resource driven endeavor with high stakes on the natural environment in producing complex projects and infrastructures. The nature of the construction industry with its current increasing complexity of building, civil, industrial engineering and other works remain one of the reasons why sustainability has been placed at the center of construction projects (Walker, 1992).

2.4 SUSTAINABILITY IN THE CONSTRUCTION INDUSTRY

Soon after the industrial revolution according to Cook and Vanderzanden (2011) the campaign for sustainability in the construction industry arose as the population in cities begun to blow up, this resulted in the extraction and use of resources in an unprecedented manner. The reason why Thomas Malthus in 1798 after the industrial revolution according to Vanderzanden and Cook (2011) queried whether the earth's natural resources will be sustainable with reference to the construction industry.

Globally, there are major attempts regarding sustainability and is increasingly taking center stage in many fields of study and profession (Bediako and Frimpong, 2013) and has been increasingly applied in the construction industry (Zavadskas, Saparauska and Antucheviciene, 2018). Ametepey et al (2015) sees sustainability in construction as the subset of sustainable development and its application in the construction industry. The design, construction and management of infrastructure in a way that reduces the negative effect of the construction process to the environment as defined by Osaily (2010) as sustainability in construction. A different dimension of sustainability in construction as

proposed by DETR (2000) reviews that is the delivery of built asset to improve quality of life and stakeholder satisfaction by a profitable and competitive firm. Kheni and Akogo (2013) sees sustainability in construction to involve innovative strategies of construction principles that is in line with developmental goals. This is in consonance with the assertion by Shafii et al (2006) that the way forward for the construction industry is based on achieving sustainability in its efforts. According to the Technology Strategy Board in the United Kingdom, sustainability in the construction industry is huge and very complicated therefore considering sustainability right from the inception or the earliest stages of a construction project agreeably at the design stage becomes an integral part of the construction process.

The concept of sustainability per Addis & Talbot (2001) in the construction industry involves three main conceptions which include environmental protection, social wellbeing and economic prosperity (Borownhi & Raw, 2000). Initially, the premise of sustainability in the construction industry from (Häkkinen and Belloni 2011) point of view was founded on the limitation of resources such as reducing the effects of construction on the natural environment which subsequently shifted to designs, energy and other related issues. The ability to clearly point out the key components of sustainability will properly emphasis the services they will serve as a basis for designing guides geared towards achieving sustainability in the construction industry as suggested by Kibert (2007) at the design stage.

2.5 SUSTAINABLE DESIGN

Sustainable design is rapidly emerging in many countries according to Kibert (2007). The American Society for Interior Designers defines sustainable design as the practice of designing buildings so that they exist in harmony with natural systems. Sustainable design

as defined by Wiley (2009) is “the design process that integrates an environmentally friendly approach and encompasses resources as part of the design”. Underwood (2015) posited that sustainable design is used in different sectors like product design, architecture, interior design and others. Sustainable design is a philosophy that is applied by different companies, Governmental entities and Non-Governmental organizations in a bid to ensure a better future for the human race through the cautious and low-volume consumption of the Earth’s resources. Governments and Companies in the construction industry that have advanced design strategies and concepts are more likely to uphold the sustainable design practices (Margolin, 2007). Environmental activists in the early 1960s revealed that the earth is a collective responsibility for every human being and that it is imperative for all to be involved in practicing and assessing sustainable design practices.

2.5.1 SUSTAINABLE DESIGN PRACTICES

Ress and Wackernagel (1996) stated that extensive evidence had concluded that the world was in a wave-off, a situation which suggested that humanity’s ecological footprint had passed the global carrying ability of the earth. This necessitated the subsequent revelations which motivated people the world over to accept a move from environmentally irresponsible behaviors to a more responsible behaviors geared towards a sustainably environment (Ress and Wackernagel 1996). This move as explained by Jones (2008) refers to the majority of the people’s acceptance to change in their way of doing things, belief, attitude and an overall change in the worldview of people. According to Elmansy (2015), considering one of the vital problems associated with sustainability in the construction industry which is the irresponsible use of natural resources, sustainable design practices play a key role in providing solutions which will help ensure a lower consumption of the natural resources.

Chandler et al. (2013) indicated that this strategy combines the developing changes in the design and construction sector as a direct reaction to the sustainable design practices through the provision of a framework that supports the integration of sustainable design in the early stages of the design process where it is generally considered economical and the outcome is relatively achievable. Mckellay et al., (2013) explains sustainable design as bordering on the building procurement and other urban development which works to achieve a zero net environment impact. They include but not limited to the following:

- Eradicating the use of non-renewable energy
- Provision of a healthy and accessible indoor and urban environment
- Supporting the recycling of waste products
- Creating a resilient built environment which is flexible and adaptive to climate change

Source: (Mckellay et al., 2013).

Bonda (2003) suggests that stakeholders involved in sustainability and sustainable design practices of the built environment have to make a personal decision to accept the responsibility of making sure that sustainable design practices are upheld in the construction industry. There is much evidence as illustrated by Pidcock (2005) to demonstrate that if the construction industry accepts sustainable design practices with openness, inculcate it in the ways of thinking, planning and execution, the industry will develop quickly.

2.5.2 SUSTAINABLE DESIGN PRINCIPLES

The rate and style of development in many developing nations including Ghana are unfitting and unsustainable (Sandy Halliday, 2008). Halliday (2008) further posited that sustainable

design is geared towards attaining real value. The principles of sustainable design according to Sabins (2012) will require effective collaboration among all the parties involved in a project from inception through execution to completion. Gajanan (2012) outlines some sustainable design principles which is summarized below:

- Rate of use of natural resources should be in sync with the rate of its natural regeneration.
- Optimize site potential.
- Protect and conserve water.
- Optimize building space and material use.
- Improve indoor environmental quality.
- Optimize operational and maintenance practices.
- Energy and material efficiency.
- Humane design and design for human comfort.

2.5.3 BARRIERS TO THE IMPLEMENTATION OF SUSTAINABLE DESIGN PRACTICES

Implementation of sustainable design practices comes with daunting challenges and several difficulties as indicated by Hankinson and Breytenbach (2012). Despite the interest in sustainable design, a research undertaken in the United States of America and Australia reveals that the rate of application of sustainable design is poor (Aye, 2003; Kang & Guerin, 2009; Mate, 2006 cited by Hankinson & Breytenbach, 2012). Aye (2003), Kane & Guerin, (2009) and Mate (2006) as cited by Hankinson & Breytenbach (2012) have discovered several factors that impede the implementation of sustainable design practices. These factors

are as indicated in the table below. **Table 2.1: Impediment to the Implementation of Sustainable Design**

IMPEDIMENT TO THE IMPLEMENTATION OF SUSTAINABLE DESIGN
Perceived Cost
Time to source sustainable material
Education and training
Understanding and in-house expert on sustainable design
Client resistance
Knowledge of sustainable material
Limited sustainable material selection
Understanding the impact of material

Source: Hankinson & Breytenbach (2012)

The outcome of a study conducted by Hankinson & Breytenbach (2012) on the barriers that impact on the implementation of sustainable design practice reveals four (4) main barriers in addition to very low implementation and execution of national policy and legislation. The four main barriers identified which summarises Aye (2003), Kang & Guerin (2009) and Mate (2006) discovery are:

- Cost.
- Education and experience.
- Materials.
- The Client.

2.6 THE LOCAL GOVERNMENT SERVICE

The Local Government Service (LGS) is a public institution established by the Local Government Service Act, 2003 (Act 656) which has been repealed and replaced with the local Governance Act, 2016 (Act 936). The LGS is a body corporate with perpetual succession decentralized at the regional, district and sub-district level.

The Local Government Service (LGS) remains a major strategic contributor to the construction industry as it oversees the activities of Two Hundred and Fifty-Four (254) Metropolitan, Municipal and District Assemblies (MMDAs) across the nation. It also has oversight responsibility over all the Ten (10) Regional Coordinating Councils.

2.6.1 THE EASTERN REGION COORDINATING COUNCIL (ERCC)

The Eastern Regional Coordinating Council as at December, 2017 has Ten Municipal Assemblies and Sixteen District Assemblies. These numbers have been increased to a total of Thirty-Two (32) with the Municipalities increased to Thirteen (13) and District Assemblies to Twenty-Nine (29).

There exist the Department of Works in all MMDAs, which is a merger of the Public Works Department, Department of Feeder Roads, District Water and Sanitation Unit, Department of Rural Housing and the Works Unit of the Assembly. Among the major functions of the Department of Works as indicated in the Local Government (Department of District Assemblies) Instrument, 2009 (L. I. 1961) include:

- to advise and assist the Assembly to formulate and implement policies on works within the framework of national policies;

- facilitate the construction, repair and maintenance of public roads, public buildings and facilities within the district;
- provide technical and engineering assistance on works undertaken by the assembly.

2.6.2 CONSTRUCTION PROJECT DESIGN AT THE LGS

Construction Project designs at the LGS starts with planning. In this case decentralized development planning. This is followed by the preparation of the annual composite budget, procurement plan then finally contracting and contract management.

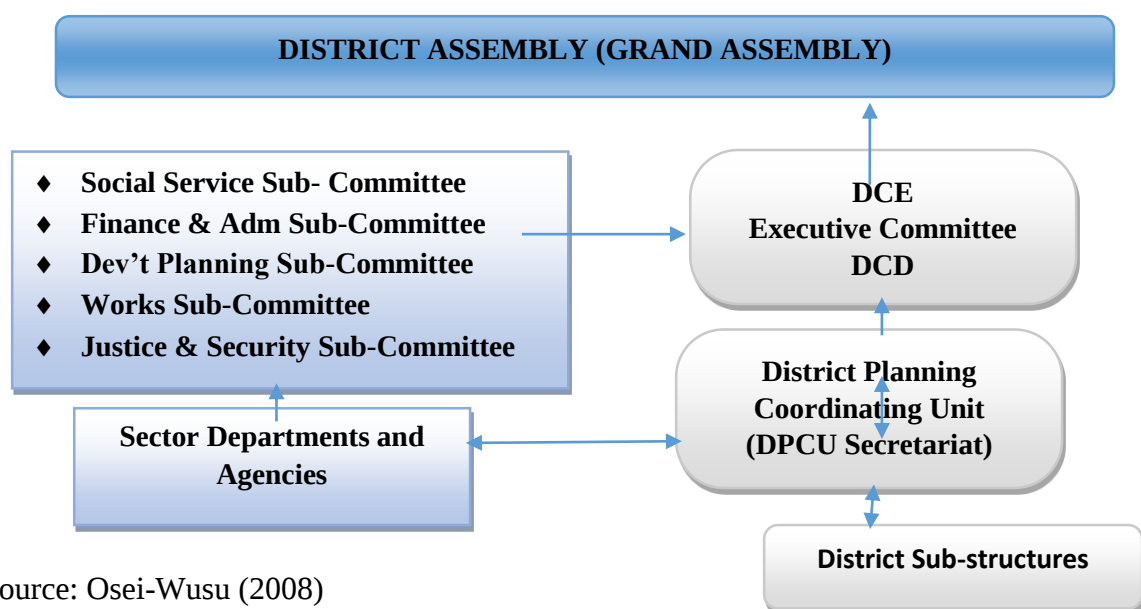
2.6.2.1 Development Planning

Clause 40 of the Local Governance Act, 2016 (Act 936) requires Assemblies to ensure that residents and other stakeholders in the district participate adequately in the activities of the District Assembly. It is against this background that community members and other key stakeholders are expected to be effectively engaged in the preparation of development plans for the Assembly. Clause 82 (1) mandates each District Assembly to serve as the planning authority for its area of jurisdiction with the following functions among others as captured under clause 83 (1):

- a) initiate and develop district development plans and settlement structure plans in the manner prescribed by the commission.
- b) ensure that the district development plans and the settlement structure plans are prepared with the full participation of the local community.

Agyemang (2010) and Obeng-Mensah (2014) both affirmed that development planning at the District level begins with the involvement of local communities in the needs assessment

of the community. The development planning process at the District level is summarized below:



Source: Osei-Wusu (2008)

Fig. 2.1: Development Planning Process at the District level

2.6.2.2 Composite Budget Preparation

The next stage in the project design after the preparation of the development plan (both Medium Term Development Plan and Annual Action Plan) is the Composite Budget.

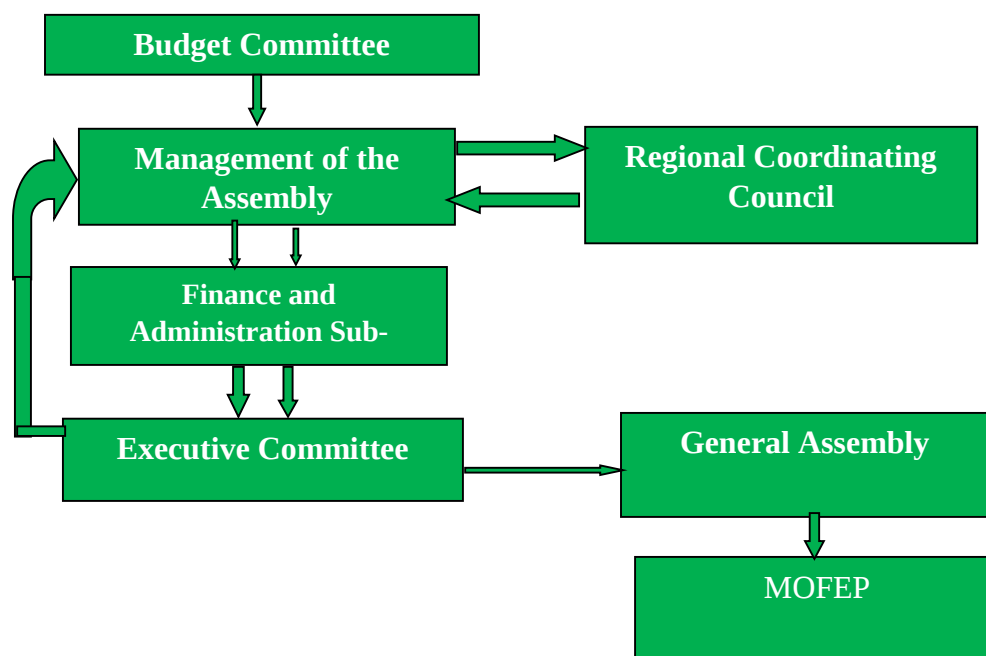
According to the Composite Budget Manual for MMDAs (2012), budget is derived from the French word ‘Budgette’ which means a ‘leather bag’ or a ‘wallet’. A budget simply shows the income and expenditure of an organization or institution for a specified period. Lucey, (1999) cited by Julia (2011) on the other hand define budget as a plan expressed in money terms. Tettey, (2009) sees budget as ‘a detailed quantitative plan showing how an organization will acquire and use resources for a given period of time.

Composite Budget on the other hand is the collection of projected revenue and expenditure of the departments and institutions of the MMDAs (MMDAs Budget Manual, 2012). Tettey, (2009) is of the view that composite budgeting is the act of bringing together the budgets of the decentralized departments and central administration in establishing the overall budget for the assembly.

The composite budget manual for MMDAs (2012) establishes the goal of the composite budget to be ‘to ensure that policies and programmes of the Assembly are implemented in an integrated manner using the budget as the tool.’ To this end, the Manual establishes five (5) stages of the budget cycle and these are:

- Planning.
- Preparation.
- Approval.
- Implementation.
- Monitoring and evaluation.

The preparation of the budget starts from the Annual Action Plan and ends at the office of the Minister responsible for Finance through the Regional Coordinating Councils (RCCs). Each district, in according to clause 123 (2) of the Local Governance Act, 2016 (Act 936), is required to submit their detailed budget for the ensuing year to their respective RCCs. A chart of the Assembly Budget Approval Process is as indicated below:



SOURCE: Composite Budget Manual for MMDAs (2012)

FIG. 2.2: Assembly Budget Approval Process

2.6.2.3 Procurement Plan

The next activity after the Budget is prepared is the Procurement Plan. The Procurement Unit of the Assembly prepares the Procurement Plan using the approved Annual Action Plan.

Clause 21 of the Public Procurement Act 2003 (Act 663) requires a procurement entity to prepare a procurement plan for its approved programme. It goes further to indicate the major component of the procurement plan to include:

- Contract packages description or lots
- Estimated cost for each package
- The procurement method approval needed, and
- Processing steps and times

Every procurement entity of the Assembly is mandated by law to prepare and submit their procurement plan for the ensuing year to its entity tender committee for approval no later than one month before the end of the year (Public Procurement Act, 2003 (Act 663).

Baily et al. (2008) defined procurement as the acquirement of goods, works and services. Whereas Mangan et al., (2008) used the word ‘process’ in their definition of procurement.

Procurement planning according to Agaba & Shipman, (2007) as cited by Asakeya, (2014) is the process used by institutions to plan purchasing activity for a given period of time. Asakeya, (2014) elaborated this by indicating that procurement planning is the process of identifying what needs to be procured, how it will be done in achieving the needed scope and the required time frame for the chain of activities. Procurement Plan therefore becomes a document outlining various procurement activity that needs to be undertaken with their scope, time frame for each activity and corresponding source of funding. The procurement plan is reviewed quarterly by the entity tender committee. The importance of procurement plan as captured in the Public Procurement Policy Manual (2009) is the identification of risk and opportunities prior to the award of contract.

2.6.2.4 Project Contracting

The next activity that followed after the preparation and adoption of the procurement plan is the project contracting. Project contracting begins with the preparation of the required documents for tendering. The method of procurement to be used will depend on the estimated contract value as captured under the Public Procurement (Amendment) Act, 2016. The options available in relation to the method of procurement according to the Public Procurement (Amendment) Act, 2016 are:

- International competitive Tender

- National Competitive Tender
- Price Quotation
- Restricted Tender, and
- Single Source Procurement and Selection

A key design function after the determination of the procurement route to use is the preparation of the tender document. The public procurement authority has developed standard tender document to be modified and used by procurement entities. The content of a tender document depends to a large extent on the type of contract. For the purpose of this thesis, key element of the content of a standard tender document for medium contracts for admeasurement as published by the Public Procurement Authority (PPA) will include:

- Instructions to Tenderers
- Forms of Tender
- Conditions of Contract
- Contract Data
- Specifications
- Drawings
- Bills of Quantities, and
- Security Forms

The act of sustainable design can be implemented during specifications, drawings and bills of quantities. It is at these three stages that the actual design elements are documented for tender. The drawings give a diagrammatic illustration of a project as perceived. The specification shows the quality requirement of the elements of the project. The bill of

quantities shows the description of the quality and mode of work to be executed with their corresponding quantities and cost.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter shows the manner in which data was collected and analyzed using quantitative method. It also shows the type of sampling methods and techniques used to collect the data and how the results were interpreted to aid in policy formulation and conducting of future researches.

3.2. THE STUDY AREA

The study area consists of construction designs in selected MAs in the Eastern region of Ghana. Eastern region covers an area of 19,323 square kilometers, which is about 8.1% of Ghana's total land area and well noted for its high capacity electricity generation. In terms of population, the Eastern Region was the third largest as at 2010 with a population of 2,633,154 occupying 10.68% of the total population in Ghana (GSS 2012). The Eastern Region shares common boundaries with Greater Accra, Central, Ashanti, Brong Ahafo and Volta Region. The four main geographical features of the region are the Kwahu Scarp (with an elevation of 2,586 feet above sea level), the Atiwa-Atwaredu Ranges (reaching an elevation of 2,400 feet), the Akwapim Highland (attaining an elevation of 1,530feet) and the Isolated Mountains dotted the relatively low-lying plains to the south.

The economy of the Eastern region is mostly agrarian with both subsistent and commercial production of food and cash crops. Cocoa is the most dominant crop for export since the colonial times with minerals such as gold and diamond. Currently, the most emerging nontraditional crop for export is pineapple.

The Eastern Region has Koforidua as its regional capital and Thirty-Two (32) Municipal and District Assemblies. This research focused on Ten (10) Municipal Assemblies in the Eastern Region.

3.3 POPULATION

The population for the research is all those involved in project design and formulation in all the Ten (10) Municipal Assemblies that were in existence in the Eastern Region before the creation of three (3) new Municipalities in 2018. According to the LGS Staffing Norms (2014), there is a minimum of two hundred and ninety (290) professionals that will be involved in project design and these includes Engineers, Architects, Quantity Surveyors, Planners, Budget Officers, Procurement Officers and Finance Officers.

The ten Municipal Assemblies, according to the MMDAs Chart, 2012 are:

1. Akwapim North Municipal Assembly
2. Birim Central Municipal Assembly
3. East Akim Municipal Assembly
4. Kwahu West Municipal Assembly
5. Lower Manya Krobo Municipal Assembly
6. New-Juaben Municipal Assembly
7. Nsawam Adoagyiri Municipal Assembly
8. Suhum Municipal Assembly
9. West Akim Municipal Assembly
10. Yilo Krobo Municipal Assembly

Due to lack of resources and time constraint couple with the daunting task that comes with collecting data from this large population, a sample size was used for this study.

3.4 SAMPLE SIZE AND SAMPLING TECHNIQUES

The research focused on the ten (10) Municipal Assemblies in the Eastern Region that were already in existence (as at the end of December, 2017) before the creation of new districts in 2018. The purposive sampling technique which is a non-probability sampling method was used. The main goal of purposive sampling is to focus on some particular characteristics of a population that are of interest and provide expert opinion on the subject under study (Creswell, 1994; Patton, 2002). The Ten Municipal Assemblies were purposely selected because of easy access to data that are relevant and assumed to be available due to their existence for longer period of time before the creation of three (3) new Municipal Assemblies in the region. The purposive sampling method further provides the opportunity to collect data from people within the Assembly that are responsible for setting a bench mark for sustainable designs. The process of designing, developing and inhabiting the built environment has a profound influence on a community's environment and quality of life (United States Environmental Protection Agency, 2013). It is important that construction designs are sustainable in order to meet the needs of future generations and to prevent hazards.

3.4.1 Sample Size Determination

Based on Yamane's (1967) formula for determination of sample size, a sample size of Seventy (74) professionals were used with a precision and confidence level of 10% and

$$n = \frac{N}{1 + N(e)^2}$$

95% respectively. The calculation for the determination was done using the formula

indicated below:
$$n = \frac{290}{1+290(0.1)^2} ; n = 74$$

Where n = Sample Size;

N = Sample Frame (Professionals involved in project design in the 10 Municipal Assemblies - 290);

e = level of precision (10%).

3.5 SOURCE OF DATA

The data used for the study were from primary sources. It was gathered from the administration of structured questionnaire purposely for this study. The participants were those directly involved with policy formulation in terms of project designs at the Assembly level. These included both Heads and Non-heads of units and departments of the Assembly.

3.6 DATA COLLECTION

Structured questionnaire was deployed for the data collection. The questionnaire was developed from the literature review based on the research questions established for the study. The questionnaire was in four parts. The first part was about the background of the respondent. The remaining parts were based on each of the research questions established for the study.

3.7 DATA ANALYSIS

The data collected from the field were compiled and summarized. The data were analysed using frequencies, percentages and rankings in some cases. This analysis was done from the data collected as against the literature reviewed using the descriptive data analysis approach. The analysis was done in line with the research questions or objectives as presented in the questionnaire to be administered.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter outlines the results obtained from the survey and analysis was drawn based on the literature reviewed. Since the survey questionnaire was based on the research questions established in chapter one for the study, the data analysis and discussion were also based on same.

4.2 NATURE OF SURVEY AND RESPONDENTS

In all a total number of seventy-four professionals made up of Engineers, Quantity Surveyors, Development Planning Officers, Procurement Officers, Finance Officers and Budget Officers were reached to answer the structured questionnaire. A total of 60 responses were received from the 74 respondents. This represents a response rate of 81%.

4.3 DATA ANALYSIS

The data collected were analysed using frequencies and percentages. This was represented in the form of graphs and tables. The data analysis was presented under four main headings in line with the survey questionnaire. The first heading was the Respondents' Profile. The second heading was on the understanding of sustainable design concepts at the LGS. The third and fourth headings were on the implementation of sustainable design concepts (in the past and current projects) and how to improve it, respectively.

4.4 PRESENTATION OF RESULTS AND DISCUSSIONS

Results obtained from the data collection was analysed based on the literature reviewed and conclusion were drawn from it. The presentation and discussion were done according to the outline of the questionnaire.

4.4.1 RESPONDENT'S PROFILE

The first set of questions were to identify three elements of the respondent's profile deemed relevant to the study. These elements were the profession of the respondents; the current position of the respondent; and the number of years respondents have been occupying their current position. Table 4.1 shows the summary of the data collected on the respondents' profile.

Table 4.1: Analysis of Respondent's Profile

	VARIABLE	FREQUENCY	PERCENTAGE
Profession	Engineering Officer	20	33.3%
	Architect	0	0.0%
	Quantity Surveyor	15	25.0%
	Development Planning Officer	9	15.0%
	Procurement Officer	8	13.3%
	Budget Officer	5	8.3%
	Finance Officer	3	5.0%
Current Position	Head of Department	11	18.3%
	Head of Unit	26	43.3%
	Supporting Staff	23	38.3%
Years of Experience	Less than 1 year	3	5.0%
	1 to 5 years	31	51.7%
	6 to 10 years	17	28.3%
	Above 10 years	9	15.0%

Source: Filed Data

The results showed that the highest represented class of professionals were the Engineering Officers with a 33.3% representation. This was followed by Quantity Surveyors having 25%

representation. Development Planning Officers and Procurement Officers had 15% and 13.3% representation respectively as shown on Table 4.1. However, there were no Architect amongst the respondents. This reflects the fact that there are very few Architects working in the Eastern Region and the LGS as a whole. Also, the percentage of Engineering Officers and Quantity Surveyors (58.3%) involved points to high level of validity and reliability in the responses.

The results also showed that most of the respondents, 43.3% were Heads of Units at their various Assemblies. This was followed by Supporting Staff having 38.3% and the least representation being Heads of Departments with 18.3%. Supporting Staff here refers to members of department or unit who are not the Heads. The high number of Heads of Unit was as a result of the fact that only three (Engineering Officers, Architects and Quantity Surveyors) out of the seven professional backgrounds can be Heads of Department. However, Heads of Unit and Supporting Staffs can come from all the professional backgrounds. This is in accordance to the L.I. 1961 of the LGS (Departments of District Assemblies).

51.7% of the respondents have been working for the past 1 to 5 years as it can be seen on Table 4.1. This was followed by those who have been working from 6 to 10 years now. The least being those who have been working for less than 1 year (5%) now coming after those working above 10 years now (15%).

4.4.2 ASSESSING THE LEVEL OF AWARENESS OF SUSTAINABLE DESIGN IN SELECTED MUNICIPAL ASSEMBLIES

It can be seen from Table 4.2 that 80% of the respondents were aware of sustainable design concepts; 20% were partially aware of it and no single respondent was not aware of it.

Most of the respondents, 46.7% and 23.3% got to know about sustainable design through academic training and personal studies respectively. 21.7% got to know about sustainable design through the internet whereas 8.3% got to know about it through LGS/MMDA training programmes.

On how well sustainable design is known, 70% of the respondents knew about sustainable design very well; 23.3% and 6.7% of the respondents' knowledge about sustainable design was at the intermediary and just a little level, respectively.

Table 4.2: Analysis on the Understanding of Sustainable Design

VARIABLE		FREQUENCY	PERCENTAGE
Awareness of Sustainable Design	Yes	48	80.0%
	No	0	0.0%
	Partially	12	20.0%
Means of knowing about Sustainable Design	LGS/MMDA training programme	5	8.3%
	Academic training	28	46.7%
	Personal studies	14	23.3%
	Internet	13	21.7%
How well Sustainable design is known	Very well	42	70.0%
	Intermediate	14	23.3%
	Just a little	4	6.7%

Source: Filed Data

4.4.2.1 Importance of Sustainable Design

Respondents were asked to rank the importance of sustainable design on a scale of 1 to 5 out of 12 variables. The relative importance index method was used to rank the outcome of the results and it was indicated in Table 4.3. The first on the scale was to *Attain real value* which was affirming Halliday's (2008) claim that sustainability is about attaining real value. The second importance of the practice of sustainable design from the data collected was to *Reduce life cycle costing*. This was followed by one of the elements for consideration on sustainable design by Mckellay et al. (2013), *To support the recycling of waste materials*. *To protect human life and property* and *To achieve social, economic and environmental gains for present and future generations* were the fourth and fifth positions respectively, on the relative importance index of the importance of the practice of sustainable design. The least important as it can be seen on Table 4.3 (on the next page) was to achieve a zero net environment impact.

Table 4.3: RII of Importance of Sustainable Design

NO.	IMPORTANCE OF SUSTAINABLE DESIGN	ΣW	MEAN	RII	RANKING
1	To attain real value	216	3.600	0.7200	1st
2	To reduce lifecycle costing	214	3.567	0.7133	2nd
3	To support the recycling of waste products	203	3.383	0.6767	3rd
4	To protect human life and environment	191	3.183	0.6367	4th
5	To achieve social, economic and environmental gains for present and future generations	188	3.133	0.6267	5th
6	To provide healthy and accessible indoor and urban environments	184	3.067	0.6133	6th
7	To create a resilient built environment which is flexible and adaptive to climate change	184	3.067	0.6133	6th
8	To eradicate the use of non-renewable energy	182	3.033	0.6067	7th
9	To create built environment that are livable, comfortable, safe and productive	182	3.033	0.6067	7th
10	To ensure lower consumption of natural resources	176	2.933	0.5867	8th
11	To establish balance in the ecosystem	174	2.900	0.5800	9th
12	To achieve a zero net environment impact	173	2.883	0.5767	10th

Source: Field Data

4.4.3 ASSESSING THE IMPLEMENTATION OF SUSTAINABLE DESIGN IN SELECTED MUNICIPAL ASSEMBLIES

It can be seen from fig. 4.1 below, 65% of the respondents' Assembly execute 4 to 7 construction projects in a year. This was followed by 1 to 3 projects (33%) and 8 to 10 projects (2%) with the least being respondents with the assembly executing more than 10 project having zero percent.

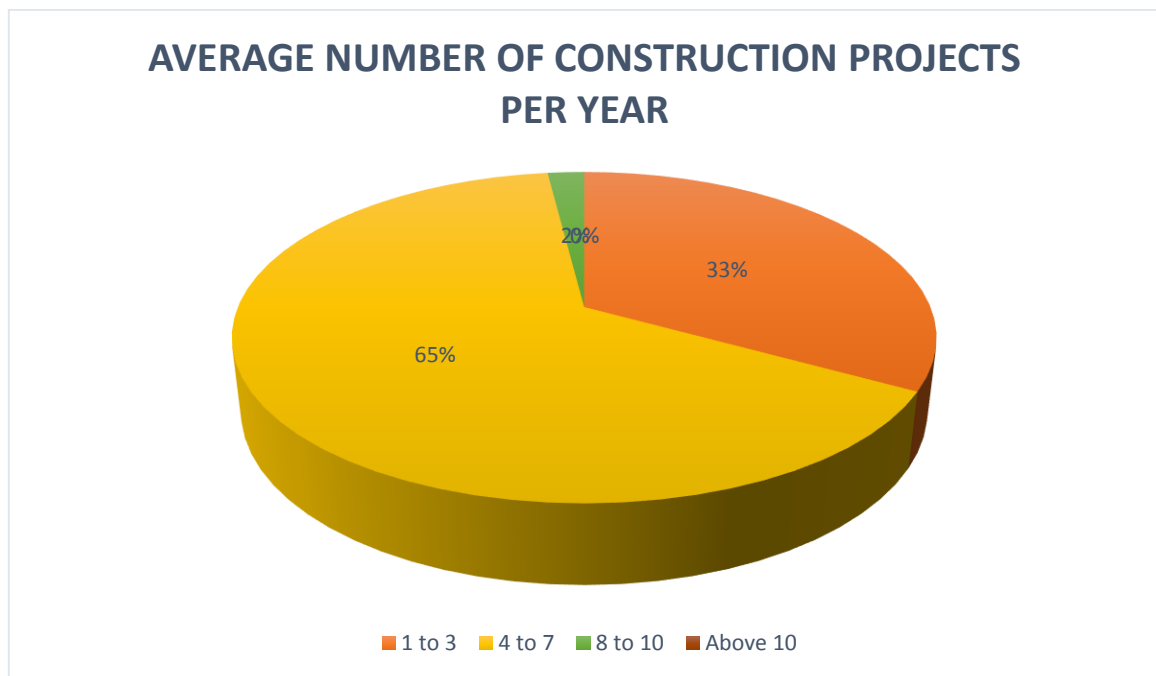


Fig. 4.1: Percentage of Average Volume of Annual Construction Project

4.4.3.1 Implementation of Sustainable Design in Past Projects

Table 4.4 shows the analysis on the implementation of sustainable design in the past projects of the Assembly where the respondents' work. Most of the respondents, 38.3% indicated that sustainable design concepts were not implemented in the design of construction projects

for the past ten years. Whereas 36.7% indicated there were partial implementation of sustainable design, 25% indicated there were full implementation in past project designs.

For those who indicated that there were either full or partial implementation of sustainable design, the extent of that implementation was also assessed. There was low level of implementation of sustainable design with a percentage of 47.6%, followed by high level of implementation (33.3%) and intermediary being the least with a percentage of 19%. On the reasons for non-implementation of sustainable design in past project, the results show *Lack of stakeholders' interest* as the number one reason with a percentage of 39.1%. This was followed by *Lack of professional knowledge* having a percentage of 30.4%. *Cost involved* in sustainable design implementation and *Cultural change resistance* were the next two reasons (why sustainable design was not implemented in past projects) with a percentage of 26.1% and 4.4% respectively.

The results so far indicated that despite greater number (80%) of the respondents being aware of sustainable design concepts and their level of awareness also being very well (70%), there was high (38.3%) level of non-implementation of sustainable design for the past ten years. The reason for this, from the data collected was as a result of high (39.1%) lack of stakeholders' interest in sustainable design implementation. This goes to affirm the claim by Hardisty (2010) that, widespread awakening to the sustainability dogma does not reflect in significant action. In the same vein Cook and VanDerZanden (2011) were emphatical in their statement that 'sustainability has to be more than a fad.'

Table 4.4: Analysis on the Implementation of Sustainable Design in Past Projects

VARIABLE		FREQUENCY	PERCENTAGE
Implementation of Sustainable Design in project designs	Yes	15	25.0%
	No	23	38.3%
	Partially	22	36.7%
The level of Implementation of Sustainable Design	Very High	12	33.3%
	Intermediary	7	19.0%
	Low	18	47.6%
Reason for Non-implementation of Sustainable Design	Cost involved	6	26.1%
	Lack of stakeholders' interest	9	39.1%
	Lack of professional knowledge	7	30.4%
	Cultural change resistance	1	4.4%

Source: Field Data

4.4.3.2 Implementation of Sustainable Design in Current and Future Projects

41.7% of the respondents indicated that sustainable design will be implemented in the design of current and future projects. 30% and 28.3% were those that indicated that sustainable design will not be implemented and there will be partial implementation respectively, in the design of current and future projects. Out of those who indicated that sustainable design will be implemented in the design of current and future projects, 45.2% indicated that the level of implementation will be low. This was followed by 40.5% being for intermediary level of implementation and the least was high level with a percentage of 14.3%.

Unlike the reason for non-implementation of sustainable design in past projects; the main reason for non-implementation of sustainable design in current and future project design was

the *Cost involved*, having a percentage of 33.3%. This was followed by *Lack of stakeholders' interest*, *Lack of professional knowledge* and *Cultural change resistance* representing 29.6%, 22.2% and 14.8% respectively. The results were as indicated in Table 4.5 on the next page.

Table 4.5: Analysis of the Implementation of Sustainable Design in Current and Future Projects

VARIABLE		FREQUENCY	PERCENTAGE
Sustainable Design to be implemented in current and future project designs	Yes	25	41.7%
	No	18	30.0%
	Partially	17	28.3%
The level of implementation of Sustainable Design	Very High	6	14.3%
	Intermediary	17	40.5%
	Low	19	45.2%
Reason for Non-implementation of Sustainable Design in current and future projects	Cost involved	6	33.3%
	Lack of stakeholders' interest	5	29.6%
	Lack of professional knowledge	4	22.2%
	Cultural change resistance	3	14.8%

Source: Field Data

4.4.4 MEANS OF IMPROVING SUSTAINABLE DESIGN CONCEPTS

The first part of this section was to identify the barriers to the practice of sustainable design. The results in Table 4.6 shows the RII of the data collected. The first five of the barriers to sustainable design confirm the findings by Hankinson and Breytenbach (2012) on barriers that impact on the practice of sustainable design. The first five were (in order of their

ranking) *Perceived cost, Lack of commitment by government and stakeholders, Preference of Immediate savings against long term savings, Understanding and in-house expert and Lack of professional knowledge.* The bottom two were *Limited material selection and Time to source for sustainable materials.* Table 4.6 is shown on the next page.

Table 4.6: RII of Barriers to the Practice of Sustainable Design

NO.	BARRIERS TO THE PRACTICE OF SUSTAINABLE DESIGN	ΣW	MEAN	RII	RANKING
1	Perceived cost	256	4.267	0.853	1 st
2	Lack of commitment by government and stakeholders	248	4.133	0.827	2 nd
3	Preference of Immediate savings against long term savings	246	4.100	0.820	3 rd
4	Understanding and in-house expert	243	4.050	0.810	4 th
5	Lack of professional knowledge	243	4.050	0.810	4 th
6	Lack of National policy and implementation	237	3.950	0.790	5 th
7	Education and training	230	3.833	0.767	6 th
8	Client resistance	226	3.705	0.741	7 th
9	Availability of accurate information	215	3.583	0.717	8 th
10	Cultural change resistance	214	3.567	0.713	9 th
11	Limited material selection	212	3.533	0.707	10 th
12	Time to source material	202	3.367	0.673	11 th

Source: Field Data

On how to improve the practice of sustainable design, respondents were asked to rank on a scale of 1 to 5, the means of improving the practice of sustainable design. Table 4.7 outlined the RII of the results. The topmost means of improving sustainable design practice identified from the data collection was *Considering sustainability right from the inception or the earliest stages of a construction project*. This goes to reinforce the postulation by the Technology Strategy Board of the United Kingdom that considering sustainability right from the inception or the earliest stages of a construction project has become an integral part of the process. The second means of improving sustainable design identified from the data collection was in line with the claim by Sabins (2012) that the principles of sustainable design will require *Effective collaboration among all the parties involved in a project at all the stages*. This was followed by *Appropriate budget allocation* for sustainable design implementation. This result can be linked to the claim by the 30% of the respondents that indicated that perceived cost was the top reason why sustainable design will not be implemented in the design of current and future projects. The fourth means of improving sustainable design was the affirmation of the statement by Margolin (2007) that government and companies that *Have advanced design strategies and concepts* are more likely to adhere to sustainable design practices. *Stakeholders' education on the importance of sustainable design* concluded the top five means of improving sustainable design practices in the selected MAs. Table 4.7 is shown on the next page

Table 4.7: RII to Improve the Practice of Sustainable Design

NO.	HOW TO IMPROVE THE PRACTICE OF SUSTAINABLE DESIGN	ΣW	MEAN	RII	RANKING
1	considering sustainability right from the inception or the earliest stages of a construction project	279	4.650	0.930	1st
2	Effective collaboration among all the parties involved in a project at all the stages	277	4.617	0.923	2nd
3	Appropriate budget allocation for sustainable design	276	4.600	0.920	3rd
4	Having an advanced design strategies and concepts	270	4.500	0.900	4th
5	Stakeholders' education on the importance of sustainable design	270	4.500	0.900	4th
6	Education of Clients on the importance of sustainable design	267	4.450	0.890	5th
7	Improve on sustainable design knowledge among stakeholders	267	4.450	0.890	5th
8	Formulation and implementation of national policy	259	4.317	0.863	6th
9	Organisation of trainings, workshops and seminars on sustainable design to increase its knowledge and awareness	247	4.117	0.823	7th
10	Establishment of sustainable design standards or codes	245	4.083	0.817	8th
11	Use of innovative strategies of construction principles that is in line with developmental goals.	243	4.050	0.810	9th
12	Development and production of environmentally friendly material	236	3.933	0.787	10th

4.5 CHAPTER SUMMARY

This chapter dealt with the analysis and discussion on the data collected from the field. The results of the data collected were analysed using descriptive statistics method represented in the form of graph and tables. The analysis was done based on the structured questionnaire

developed for the study in relation to the literature reviewed. The relative importance index was used to rank the importance of sustainable design, identify the top barriers to the practice of sustainable design and the means of improving it.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter is the concluding part of the report. It gives a summary of the objectives set for the research and how they were met, general conclusion and recommendations were proffered based on the outcome of the findings.

5.2 REVIEW OF RESEARCH OBJECTIVES

The aim of the study, as captured in chapter one was to assess the sustainable design practices in selected MAs. This was developed into three main objectives which were to assess the level of awareness of sustainable design in selected MAs in Ghana, to assess the implementation of sustainable design concepts and to propose means of to improve the implementation of sustainable design concepts in selected MAs in Ghana. Below is a brief review of the findings on the various objectives.

5.2.1 TO ASSESS THE LEVEL OF AWARENESS OF SUSTAINABLE DESIGN IN SELECTED MUNICIPAL ASSEMBLIES IN GHANA

There was high level of awareness of sustainable design concepts among LGS professionals involved in project designs, particularly Engineering Officers and Quantity Surveyors. The extent of awareness among these officers was high. It was also realized that the knowledge of sustainable design was acquired mainly through academic training. The study also revealed the top three importance of sustainable design to the selected MAs to be to attain real value, to reduce life cycle costing and to support the recycling of waste products.

5.2.2 TO ASSESS THE IMPLEMENTATION OF SUSTAINABLE DESIGN CONCEPTS IN SELECTED MUNICIPAL ASSEMBLIES IN GHANA

On the above objective, it was evident that despite the high level of awareness of sustainable design concepts in the selected MAs, its implementation on projects for the past ten years was low. The low implementation rate was attributed to lack of stakeholders' interest. However, for current and future project designs, the study revealed there will be more implementation of sustainable design but the level of implementation will be same as that of the past projects. Perceived cost (unlike lack of stakeholders' interest for the past projects) was ascribed to be the reason for the low level of implementation of sustainable design in the current and future projects.

5.2.3 TO PROPOSE MEANS TO IMPROVE SUSTAINABLE DESIGN CONCEPTS IN SELECTED MUNICIPAL ASSEMBLIES IN GHANA

In the quest to identify the means of improving sustainable design in the selected MAs, the factor inhibiting the implementation of sustainable design were first identified. The top five barriers to implementation of sustainable design the study revealed were Perceived Cost (which was evident as the reason for low level of implementation of sustainable design in current and future project design), Lack of commitment by Government and stakeholders, Preference of immediate savings against long term savings, Lack of understanding and in-house experts and Lack of professional knowledge.

The study finally established the main means of improving sustainable design at the selected MAs. The first one was to consider sustainability right from the inception or the earliest stages of a construction project. The second was for effective collaboration among all the parties involved in a project at all the stages. The third was having appropriate budget

allocation for sustainable design. This was followed by having an advanced design strategies and concepts. Finally, there should be Stakeholders' education on the importance of sustainable design.

5.3 CONCLUSION

The main aim of the study which was assessing sustainable design practices in selected MAs in Ghana was achieved.

The results of the findings have clearly indicated the high level of awareness with a low level of implementation of sustainable design concepts at the selected MAs. The lack of stakeholders' interest in sustainable design implementation in past projects is a worrying phenomenon that needed to be looked at by the local Government Service Council and the Ministry of Local Government and Rural Development. The top five means of improving sustainable design must be adopted and implemented by the LGS in their project designs in order to attain real value on investment of their construction projects.

5.4 RECOMMENDATIONS

The following recommendations are proffered based on the findings of the study.

- Assemblies must consider sustainability at the earliest part of the project design stage. Sustainable design elements must be factored in the design of projects to be captured in the medium-term development plan and action plans for appropriate budgetary allocation to be made for it.
- The Local Government Service Council in collaboration with the Ministry of Local Government and Rural Development should establish a periodic training programme or workshops on sustainable design for key stakeholders at the Assembly.

5.5 LIMITATIONS OF THE STUDY

The study only covers Municipal Assemblies in the Eastern Region and not the entire nation. Further studies can be looked at that will cover the entire MMDAs in the country. There were also time and administrative constraints. However, the research conducted was very useful and its findings are relevant in the nation's quest for attaining sustainable development.

5.6 FURTHER STUDIES

A research should be conducted to cover MMDAs in other regions of the country for broader appreciation of sustainable design practice in the LGS.

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APPENDIX: QUESTIONNAIRE

(CONFIDENTIAL SURVEY QUESTIONNAIRE)

TOPIC: ASSESSING THE SUSTAINABLE DESIGN PRACTICES SELECTED MUNICIPAL ASSEMBLIES IN GHANA.

INTRODUCTION

I am a post-graduate student of the Kwame Nkrumah University of Science and Technology studying for a Master of Science Degree in Construction Management.

As part of successful completion of the programme, I am conducting a research to Assess the Sustainable Design Practices selected Municipal Assemblies in Ghana.

I shall be very grateful for your time in answering the following questions. This is purely an academic exercise and **the information obtained from you will be used solely for that purpose and will be treated as confidential as possible**

Please direct any question or enquiry to:

Yunus Umar Faruk

P. O. Box WY 2480 – Kwabenya, Accra

Cont. 024 398 1551

Emial: yunus.umarfaruk@gmail.com

PART 1: RESPONDENT'S PROFILE

Please answer the following questions by ticking (✓) where appropriate:

1. What is your profession? *Please indicate:*

a. Procurement Officer ☐

b. Development Planning Officer ☐

c. Finance Officer ☐

d. Budget Officer ☐

e. Engineering Officer ☐
Surveyor

f. Architect ☐ g. Quantity ☐

2. What is your current position in the Department or Unit you belong?

a. Head of Department ☐

b. Head of Unit ☐

c. Supporting Staff ☐

3. How many years have you been working in your current position stated above?

a. Less than 1-year b. 1 - 5years c. 6 - 10 years d. Above 10 years

PART 2: TO ASSESS THE LEVEL OF AWARENESS OF SUSTAINABLE DESIGN IN SELECTED MAS IN GHANA

1. Are you aware of sustainable design concept?

a. YES b. NO c. Partially

2. How did you come to know about sustainable design concept?

a. LGS/MMDA training programme b. Academic training
c. Personal studies d. Internet

3. How well do you know about sustainable design concept?

a. Very well b. Intermediate c. Just a little

4. Please rank on a scale of 1 to 5, how important is the practice of sustainable design to the LGS? (where 1 = Not Important; 2 = Important; 3 = Very Important; 5 = Most Important)

IMPORTANCE OF SUSTAINABLE DESIGN	RANK				
	1	2	3	4	5
To ensure lower consumption of natural resources					
To achieve a zero net environment impact					
To attain real value					
To provide healthy and accessible indoor and urban environments					
To create a resilient built environment which is flexible and adaptive to climate change					
To support the recycling of waste products					
To eradicate the use of non-renewable energy					
To reduce lifecycle costing					
To establish balance in the ecosystem					

To achieve social, economic and environmental gains for present and future generations					
To protect human life and environment					
To create built environment that are livable, comfortable, safe and productive					

PART 3: TO ASSESS THE IMPLEMENTATION OF SUSTAINABLE DESIGN IN SELECTED MAs IN GHANA

1. On an average, how many construction projects do your Assembly award in a year?

- a. 1 to 3 b. 4 – 7 c. 8 - 10 years d. Above

2. Were sustainable construction design concepts implemented in the projects design for the past ten years?

- a. YES b. NO c. Partially

(PLEASE CHOOSE THE APPROPRIATE RESPONSE FOR THE NEXT TWO QUESTIONS BASED ON YOUR RESPONSE ABOVE)

3A. If your response was "Yes" or "May be", what was the level of implementation of sustainable design in the past projects?

- a. Very high b. Intermediary c. Low

3B. If your response was "No", why were sustainable design concept *NOT* implemented in the past projects design?

- a. Cost involved b. Lack of stakeholders' interest
c. Lack of professional knowledge d. Cultural change resistance

4. Will sustainable design concepts be implemented in the design of current and future project?

- a. YES b. NO c. Partially

(PLEASE CHOOSE THE APPROPRIATE RESPONSE FOR THE NEXT TWO QUESTIONS BASED ON YOUR RESPONSE ABOVE)

5A. If your response was "Yes" or "May be", what will be the level of implementation of sustainable design in the current and future projects?

a. Very high

b. Intermediary

c. Low

5B. If your response was "No", won't sustainable design concepts be implemented in the current and future projects design?

a. Cost involved

b. Lack of stakeholders' interest

c. Lack of professional knowledge

d. Cultural change resistance

PART 4: HOW TO IMPROVE OF THE IMPLEMENTATION OF SUSTAINABLE DESIGN CONCEPTS IN SELECTED MAs

1. In ascending order, from 1 to 5 (where 1 is the least and 5 is the highest), identify the Five main barriers to implementation of sustainable design

BARRIERS TO IMPLEMENTATION OF SUSTAINABLE DESIGN	RANK				
	5	4	3	2	1
Perceived cost					
Education and training					
Client resistance					
Limited material selection					
Accurate information					
Understanding and in-house expert					
Lack of National policy and implementation					
Time to source material					
Lack of professional knowledge					
Lack of commitment by government and stakeholders					
Cultural change resistance					
Preference of Immediate savings against long term savings					

2. Please rank in order of importance from 1 to 5 (where 1 is the least and 5 is the highest), how to improve the practice of sustainable design concepts in the LGS

HOW TO IMPROVE THE PRACTICE OF SUSTAINABLE DESIGN	RANK				
	5	4	3	2	1
Having an advanced design strategies and concepts					
Effective collaboration among all the parties involved in a project at all the stages					
considering sustainability right from the inception or the earliest stages of a construction project					
Formulation and implementation of national policy					
Use of innovative strategies of construction principles that is in line with developmental goals.					
Stakeholders' of Clients on the importance of sustainable design					
Client education on the importance of sustainable design					
Establishment of sustainable design standards or codes					
Development and production of environmentally friendly material					
Improve on sustainable design knowledge among stakeholders					
Organisation of trainings, workshops and seminars on sustainable design to increase its knowledge and awareness					
Appropriate budget allocation for sustainable design					