

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI
COLLEGE OF ARTS AND BUILT ENVIRONMENT
DEPARTMENT OF BUILDING TECHNOLOGY**

Topic
**INCORPORATING ENVIRONMENTAL SUSTAINABILITY ISSUES INTO
CONSTRUCTION PROCUREMENT AT THE DISTRICT LEVEL IN
GHANA**

A Thesis Submitted to the Department of Building Technology, College of Arts and
Built Environment
in partial fulfilment of the requirements for the degree of
**MASTER OF PHILOSOPHY Procurement
Management**

By
HAROLD ADJARKO (BSc. Building Technology)

Supervisor
PROFESSOR JOSHUA AYARKWA

NOVEMBER, 2015

DECLARATION

I hereby declare that this submission is my own work towards the MPhil 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.

STUDENT: ADJARKO HAROLD

Author (20290327)

Signature

Date

Certified by

PROFESSOR JOSHUA AYARKWA

Supervisor

Signature

Date

Certified by

DR BERNARD K. BAIDEN

Head of Department:

Signature

Date

ABSTRACT

Public procurement accounts for 50-70 per cent of imports and about 80 per cent of government expenditure. Any improvement in the public procurement system may have a direct beneficial effect on the economy and the environment. This enormous purchasing power of government can be harnessed into promoting environmental sustainable practices in the construction sector at the district level by increasing the level of environmental requirements in public contracts. Environmental considerations in public procurement have been on the international agenda since the 1992 conference in Rio, and the World summit on Sustainable Development in Johannesburg in 2002. In Ghana, the government established a task force on Sustainable Public Procurement in 2008. The function of the task force included among other things drawing an implementation plan, identifying procurements that have sustainability issues, establishing indicators to measure sustainable public procurement operations and impact and mobilising budgetary support for sustainable public procurement activities. But until now, there is little research on the impact of this initiative on construction procurement at the local government level. The aim of this study was to explore factors driving the incorporation of environmental sustainability issues into construction procurement at the Metropolitan, Municipal and District Assemblies (MMDA"s). Data collection method chosen was questionnaire, distributed to District Engineers, Quantity Surveyors, Procurement Officers and Environmental Officers purposely selected from the twenty-two (22) districts in the

western region of Ghana, based on the experiences from other studies. Data collected from the survey was further analysed, using factor analysis technique, one-sample t-test and descriptive statistics. The results revealed that though the respondents were aware of the impact of construction procurement activities on the environment they do not pay attention to addressing these issues through the procurement process. Also, though each district had environmental bye laws and many other national environmental laws, these laws are rarely incorporated into the construction procurement process. It was identified that Public Influence, Personal Skills, Leadership Influence, and Environmental Culture were the major factors driving the incorporation of environmental sustainability into construction procurement at the district level currently. The major challenges to the incorporation of environmental sustainability issues into construction procurement were identified as: Lack of Awareness, Lack of Strategy, Poor Management Support, Poor Communication and Complex Documentation and Processes. This suggests that government must take the lead role in providing the legal guidance through the Public Procurement Authority. The findings of this study are important in working out a strategy to promote the incorporation of environmental sustainability issues into construction procurement at the district level and subsequently at the national level in the long term.

ACKNOWLEDGEMENT

My ultimate gratitude goes to the Almighty God Jehovah for His mercies, kindness and love to me from the beginning to the completion of this work. I wish to acknowledge my major supervisor, Professor Joshua Ayarkwa for his encouragement and diverse contributions towards the completion of this study. Dr. Kofi Agyekum also assisted in shaping this study, I am most grateful. Without his advice, criticisms and directions, this work would not have been possible.

I also owe a debt of immense gratitude for the assistance offered me by Dr AgyeiKumi, Mr Owusu from the Ahanta West District Assembly and to Mr Teye, Mr Armah, and Madam Bridget Atengina. Special thanks go to colleague students of the Department of Building Technology, and colleague lecturers at Takoradi Polytechnic for their encouragement. I appreciate the advice of my good friends, Mr Bainy, Isaac Appiah, Enoch Baffoe, Osei Bonsu, Frank Nyasor and Isaac Offei.

I further wish to thank my wife Dorcas Boateng, Matthew Somiah, and Daniel Paintsil. May the almighty God richly bless you all.

DEDICATION

This work is dedicated to my mother, Christiana Adjarko, for all she has done in my life. I also dedicate it to my lovely wife, Dorcas Adjarko; the Adjarko family and the Boateng family for the support and encouragement in my academic pursuit.



TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENT	v
DEDICATION	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF ABBREVIATIONS	xi
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Problem Statement.....	3
1.3 Research Questions.....	5
1.4 Aim	5
1.5 Objectives	5
1.6 Significance of the Study.....	6
1.7 Scope of Research.....	7
1.8 Research Methodology	7
1.9 Organization of the Study	8
1.10 Summary of Chapter One	9
CHAPTER TWO: LITERATURE REVIEW	10
2.1 Introduction.....	10
2.2 Overview of Sustainable Construction Procurement in Ghana	10
2.2.1 Definition of Sustainability.....	10
2.2.2 Definition of sustainable procurement.....	10
2.2.3 Definition of construction procurement.....	12
2.2.4 Overview of Public Procurement Management in Ghana	12
2.2.5 Legal Framework for Public Procurement in Ghana	13
2.2.6 Definition of Construction Procurement in the Ghanaian Context.....	15
2.2.7 Principal Activities in Construction Procurement	16
2.2.8 Basic procurement Ethics in Ghana Compared to International Standards.....	17
2.3 Overview of Construction Environmental Management in Ghana	18
2.3.1 The Constitution of Ghana and the Environment	19
2.3.2 The Environmental Protection Agency Act, 1994 (Act 490)	19

2.3.3 The Environmental Assessment Regulations, (1999) (L. I. 1652)	20
2.3.4 Regulations for Licensing Of Industries	20
2.3.5 Citing Of Industries	24
2.3.6 Environmental Impact Assessment (EIA) Of Industrial Projects	24
2.3.7 Environmental Policies in Ghana	26
2.3.8 Environmental Laws and Legislature in Ghana.....	26
2.3.9 The Public Procurement Act 663 (2003) and the Environment.....	28
2.3.10 The Public Procurement Manual and the Environment.....	35
2.3.11 Environmental Management at the District Assembly Level	36
2.3.12 Construction Activities Undertaken by the District Assembly.....	38
2.4 International Approaches to Environmental Sustainability in Construction Procurement.....	40
2.4.1 International Laws on the Environment.....	40
2.4.2 Benefits of Voluntary Adoption of the ISO Standards	41
2.4.3 Benefits of Obtaining ISO 14000 Certification by Public Organizations	43
2.4.4 The European Union Guideline to Environmental Sustainable Construction Procurement.....	43
2.4.5 The British Standards Institution, BS 8903: Principles and Framework for Procuring Sustainably.....	44
2.5 Drivers to the Incorporation of Environmental Sustainability Issues into Construction Procurement	45
2.5.1 Internal Factors	45
2.5.2 External Drivers	47
2.6 Challenges to the Incorporation of Environmental Issues in Organisations.....	52
2.6.1 Internal Challenges	52
2.6.2 External Challenges	55
2.7 Construction Environmental Sustainability Issues	56
2.7 Identifying Environmental Sustainability issues Considerations in Construction.....	59
2.8 How to Incorporate Environmental Sustainability Issues in Contract Performance Clauses for Works or Services Procurement (Lessons from the European Union Procurement Procedures).....	60
2.9 Summary of Chapter two	61
CHAPTER THREE: MATERIALS AND METHODS	62
3.1 Introduction.....	62
3.2 Study Area	62

3.3 Research Design	63
3.4 Sources of Data	64
3.5 Study Population	64
3.6 Sample Size for the Study	65
3.7 Sampling Technique	66
3.8 Research Instrument	66
3.8.1 Questionnaire	67
3.9 Data Analysis and Presentation	68
3.10 Factor Analysis	69
3.10.1 Initial Considerations	70
3.11 One-Sample T-Test	71
3.12 Research Ethics	71
3.13 Summary of Chapter Three	71
CHAPTER FOUR: RESULTS AND DISCUSSIONS	72
4.1 Introduction	72
4.2 Background Information	73
4.3 Current Construction Procurement Management Practices at the District Assembly Level	75
4.3.1 Awareness of Impact of Construction Activities on the Environment	75
4.3.2 Parts of the Tender Documents to Insert Environmental Issues	78
4.3.3 Stages to incorporate environmental issues in the procurement process	80
4.4 Factors Driving the Incorporation of Environmental Sustainability Issues into Construction Procurement at the District Level	81
4.5 Discussion of Components	88
4.5.1 Component 1: Leadership Influence	88
4.5.2 Component 2: Environmental culture	88
4.5.3 Component 3: Public Influence	89
4.5.4 Component 4: Personal Skills	89
4.6 Challenges to the Incorporation of Environmental Sustainability Issues into Construction Procurement	90
4.7 Discussion of Components	98
4.7.1 Component 1: Lack of Awareness	98
4.7.2 Component 2: lack of strategy	99
4.7.3 Component 3: Poor Management Support	100
4.7.4 Component 4: Poor Communication	100

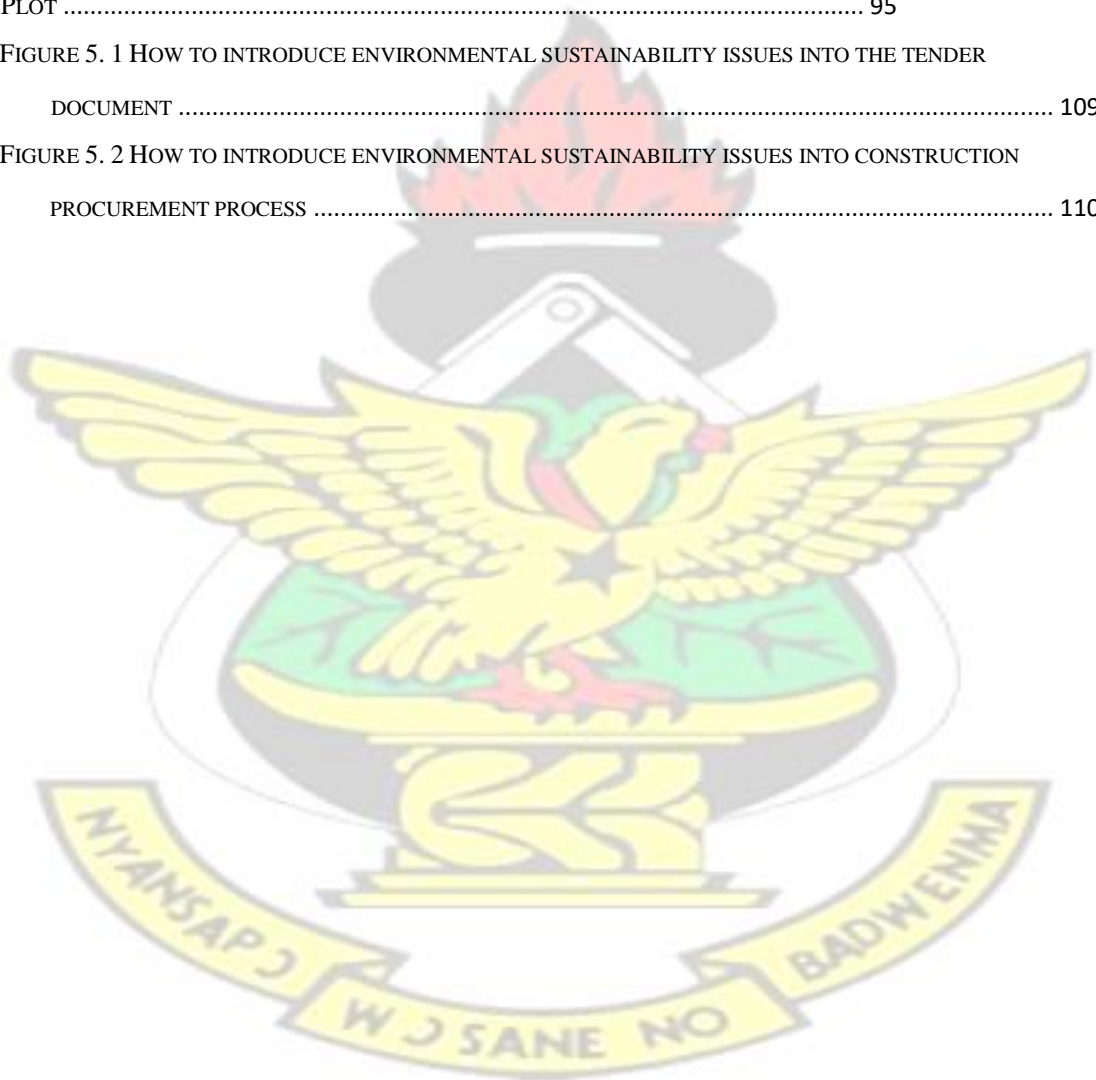
4.7.5 Component 5: Complex Documentation and Processes	101
4.8 Summary of Chapter four	102
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	103
5.1 Introduction.....	103
5.2 Review of Research Objectives	103
5.3 Scientific Contribution.....	106
5.4 Limitations of the Study	107
5.5 Recommendations and Policy Implications.....	107
5.6 Further Research	111
REFERENCES.....	111
APPENDIX I	122

LIST OF TABLES

TABLE 4. 1 POSITION OF RESPONDENT	73
TABLE 4. 2 HOW LONG HAVE YOU BEEN IN PROFESSIONAL PRACTICE	73
TABLE 4. 3 IMPACTS OF CONSTRUCTION ACTIVITIES ON THE ENVIRONMENT.....	88
TABLE 4. 4 PART OF A TENDER DOCUMENT THAT ENVIRONMENTAL SUSTAINABILITY ISSUES ARE INCORPORATED	78
TABLE 4. 5 STAGE OF PROCUREMENT THAT ENVIRONMENTAL SUSTAINABILITY ISSUES ARE INCORPORATED	80
TABLE 4. 6 DESCRIPTIVE ANALYSES OF FACTORS DRIVING THE INCORPORATION OF ENVIRONMENTAL SUSTAINABILITY ISSUES INTO CONSTRUCTION PROCUREMENT AT THE DISTRICT LEVEL	82
TABLE 4. 7 CORRELATION MATRIX	83
TABLE 4. 8 KMO AND BARTLETT'S TEST	85
TABLE 4. 9 TOTAL VARIANCE EXPLAINED	86
TABLE 4. 10 ROTATED FACTOR MATRIX	87
TABLE 4. 11 VARIMAX TRANSFORMATION MATRIX.	90
TABLE 4. 14 CHALLENGES IN THE INCORPORATION OF ENVIRONMENTAL SUSTAINABILITY ISSUES INTO CONSTRUCTION PROCUREMENT AT THE DISTRICT LEVEL	92
TABLE 4. 15 KMO AND BARTLETT'S TEST	94
TABLE 4. 16 TOTAL VARIANCE EXPLAINED	95

LIST OF FIGURES

FIGURE 2. 1 BALANCING SUSTAINABLE PROCUREMENT OBJECTIVES	12
FIGURE 2. 2 SUMMARY OF THE LEGAL FRAMEWORK FOR PUBLIC PROCUREMENT IN GHANA	15
FIGURE 3. 1 MAP OF STUDY AREA (WESTERN REGION).....	62
FIGURE 4. 1 SCREE PLOT	86
FIGURE 4. 2 SCREE PLOT	95
FIGURE 5. 1 HOW TO INTRODUCE ENVIRONMENTAL SUSTAINABILITY ISSUES INTO THE TENDER DOCUMENT	109
FIGURE 5. 2 HOW TO INTRODUCE ENVIRONMENTAL SUSTAINABILITY ISSUES INTO CONSTRUCTION PROCUREMENT PROCESS	110



LIST OF ABBREVIATIONS

BSI	British Standards Institution
CEMP	Construction Environmental Management Plan
CIDA	Canadian International Development Agency
CIRIA	Construction Industry Research And Information Association
CLGF	Commonwealth Local Government Forum
EC	European Commission
EIA	Environment impact assessment
EPC	Environmental Protection Council
GDP	Gross Domestic Product
GEMP	Ghana Environmental Management Project
GS	Ghana Standard
ISO	International Organization for Standardization
MMDAs	Metropolitan, Municipal and District Assemblies
NRCD	National Redemption Council Decree
PPA	Public Procurement Act
PUFMARP	Public Financial Management Reform Programme
SEA	Strategic Environmental Assessment
SMCD	Sub-Metropolitan District Council
SPSS	Statistical Package for Social Science
SPP	Sustainable Public Procurement
SPTF	Sustainable Procurement Task Force
UNCHS	United Nations Centre for Human Settlement
WCED	World Commission on Environment and Development

KNUST



CHAPTER ONE INTRODUCTION

1.1 Background of the Study

Prior to the 1970s, there had been growing concern globally about the dangers human activities pose to the environment. However there were no known systems in place to address these growing concerns. Environmental Protection in Ghana can be said to date back to the colonial era. Laws existing then were mostly related to disease prevention and control. And they were often enforced in the bigger towns where government officers and factories were located. One of the earliest laws on our statute books for example is the Beaches Obstruction Ordinance (Cap 240) of 29th January 1897. After independence, several laws were passed to help the young nation develop its industrial capabilities. Environmental Protection, however, became topical in Ghana after the 1972 Stockholm Convention that guided the establishment of the World Commission on Environment and Development (WCED) and the adoption of the Montreal Protocol and Basel Convention (Corbett and Kirsch, 2001). This led to the establishment of the Environmental Protection Council (EPC) in 1974 with the view of addressing emerging environmental challenges. The EPC was established by the Environmental Protection Council Decree, 1974 (National Redemption Council Decree, number 239, NRCD 239) and was inaugurated in June 4th, 1974. It was charged to with the responsibility of coordinating all environmental issues in the country and advising the government on all matters relating to the environment (Yeboah and Mensah, 2014). Despite these, further initiatives were required since the EPC could not arrest the growing environmental problems in the country.

In the year 1976, the environmental protection council decree, 1974 (NRCD239) was amended by the EPC (Amendment) Decree, 1976 (Sub-Metropolitan District Council, SMCD 58). The amendment led to many major achievements which

include the preparation of the National oil spill Contingency Plan in 1985 more than two decades before Ghana discovered oil in commercial quantities and the National Plan of Action to Combat Desertification in 1986 (Yeboah and Mensah, 2014). Despite these achievements by the EPC the task of environmental protection remained embryonic in the country.

It was the 1992 Earth summit held in Bio-de-Janeiro that generated a worldwide commitment to the environment according to Yeboah and Mensah (2014). The world's first environmental Management systems standard, BS 7750 was born in that year. The International Organisation for Standardisation (ISO) of which Ghana is an active member developed the ISO 14000 series in 1996 to promote voluntary environmental commitment for all types and sizes of organizations (Hewitt and Gary, 1998).

Following these developments globally, Ghana made a great stride with the establishment of the EPA on December 31, 1994 by the Environmental Protection Agency Act (Act 490). The Act 490 mandates the EPA to regulate the environment and ensure the implementation of government policies on the environment. The law mandates the EPA to ad infinitum improve and preserve the countries environment, while seeking solutions to global environmental issues (Yeboah and Mensah, 2014).

Notwithstanding these huge environmental strides that have been made in Ghana over the past 40 years, there is still evidence of gross environmental illiteracy among stakeholders in the construction, manufacturing, and procurement industries. For example in construction, destruction of natural vegetation is common as well as wrongful use of land (e.g. building in water ways); in manufacturing there is generally improper disposal of waste and improper storage and use of chemicals causing

pollution and harmful emissions; and in procurement, buying unfriendly environmental products just to mention a few (Opintan-Baah et al, 2011; Ayarkwa et al, 2010; Gbedemah, 2004). This calls for the need to look at other alternatives to manage the environment to compliment the work of the EPA. It is evident that the EPA alone cannot win the battle with the environment.

Sustainable Procurement has been identified by some researchers as one major alternative (Tse, 2001, UNCHS, 1993, Ofori, 1992). For example researchers such as Šelih (2007), Inno (2005) and Pun et al. (2002) have identified that in the foreseeable future, customer demand and business competition will be the dominant reason for driving environmentally sustainable issues.

The United Nations Guidelines for consumer protection as expanded (1999) provides the mandate and legal basis for work on sustainable procurement. Agenda 21 focuses on the purchasing policies of governments, paragraph 54 of the Guidelines state that „Government and International agencies should take the lead in introducing sustainable practices in their own operations, in particular through procurement policies“ (United Nations, 1999). What is the level of incorporation of environmental sustainable issues into public procurement in Ghana?

1.2 Problem Statement

There is increasing onus on public organizations in society to minimize impacts upon the environment in most countries (Strandberg, 2002; McWilliams and Siegel, 2000). This is due to the fact that construction activities especially buildings embarked on by public organizations contribute to environmental degradation in various ways such as resource depletion, energy consumption, air pollution, waste creation, etc (Opintan-Baah et al., 2011; Ayarkwa et al., 2010; Chavan, 2005; Ofori, 1998).

Worldwide buildings account for 20% fresh water consumption, 25% wood harvest, 40% CO₂ emissions, 40% energy use and 30% raw material use (Seneviratne, 2011). Kein et al. (1999) found that the consumption of raw material from the construction industry leads to major environmental degradation because the consumptions are non-renewable. According to Spence and Mulligan (1995), construction contributes to the loss of forests because the raw materials are consumed and irreversibly converted to lumber or other raw materials for construction activities; forest or agricultural lands are changed because of urbanization or other development projects mostly embarked on by the government. Many recent researchers have identified procurement as a major tool to augment governments' environmental protection efforts, but, it is apparent that none of the major studies into construction procurement management have identified environmental sustainability issues as key criteria for public construction procurement method selection (Gamage, 2011).

Interestingly, a study conducted by Adetunji et al. (2008) revealed that government procurement practices have largely been focused on price, whereas the commitment to environmental issues has been an act of faith rather than a contractual deliverable (Poon et al., 2004). Gamage (2011) noted that none of the major studies into procurement management have identified environmental sustainability as key criteria for construction procurement system selection. Likewise, Varnas et al. (2009) found that environmental criteria in tender evaluations are less common and seldom affect the award decisions. Furthermore, Jaillon et al., (2009) revealed that the construction industry pays less attention to environmental issues than other issues such as construction cost, construction time, familiarity with the construction technology, and availability of resources.

Boyefio (2008) identified efforts by Ghana's Public Procurement Authority to address sustainability in public procurement. However, little literature is available on the progress made since 2008 in the promotion of environmental sustainable construction through procurement. Are public organisations in Ghana incorporating environmental sustainability clauses in their procurement? This research focused on studying current environmental performance of construction procurement activities at the districts in the western region of Ghana in order to find out the progress made thus far.

1.3 Research Questions

1. What are the key legislature, regulations and standards relating to the environment that affect construction activities in Ghana?
2. What are the current practices of public institutions in incorporating environmental sustainability issues in their various procurement activities?
3. What are the factors driving the incorporation of environmental sustainability issues into public procurement practices at the district assembly level in Ghana?
4. What are the challenges facing the incorporation of environmental sustainability issues into construction procurement operations at the district assembly level in Ghana?

1.4 Aim

The aim of this research is to explore factors driving the incorporation of environmental sustainability issues into construction procurement management at the district level in Ghana.

1.5 Objectives

The research seeks to achieve these specific objectives:

1. to identify key legislature, regulations and standards relating to the environment that affect construction activities in Ghana.
2. to identify the current environmental sustainability practices in construction procurement at the district assembly level in the western region of Ghana.
3. to identify the factors driving the incorporation of environmental sustainability issues into construction procurement at the district assembly level in the western region of Ghana.
4. to identify the challenges facing the incorporation of environmental sustainability issues into the construction procurement operations at the District Assembly level.

1.6 Significance of the Study

Environmental management has become the discussion hot spot in many advanced countries and gradually various industries in developing countries are working to improve their environmental performances by establishing an effective environmental management system in order to achieve a better reputation (GonzalezBenito and Gonzalez-Benito, 2005). The progress made in the construction industry in Ghana seems to be very low. Construction activities have immense effects on the environment. Buildings are known to be responsible for high carbon emissions, high water consumption, and high amount of landfill waste and high usage of raw materials (HM Government, 2008). The process of construction alters and causes disruption to the natural environment. However it is possible to minimize damage to the environment by the way buildings and infrastructure are designed and procured.

By incorporating environmental sustainability issues into the procurement process it would be possible to reduce the corresponding impacts on the environment (Ball, 2005). With efficient guidelines to incorporate environmental issues into procurement,

buildings may be procured to be more energy and water efficient, use fewer resources over the life of the finished project, be flexible and adaptable both in use and to external conditions such as climate and would provide better outcomes for all involved that is designers, developers, procurement entities, consultants and end users.

The research is therefore necessary in order to highlight issues, requirements and responsibilities necessary to promote more responsive environmental outcomes from construction projects. It identifies the role of stakeholders such as the government, procurement officers of public sector institutions, suppliers, contractors and service providers to procure environmentally friendly solutions that offer equal or better value over their life than the traditional ways. The research also explores ways by which environmental management requirements would be contractually enforceable wherever possible and be in agreement with objective measures with stakeholders so that non-compliance is highlighted and corrective actions quickly identified.

1.7 Scope of Research

There are a number of sustainable procurement issues such as economic, human rights, health and safety, and fair business practices that may be incorporated into procurement management but this research sought to study the environmental sustainability issues that may be incorporated into construction procurement in the Districts Assemblies in the Western Region of Ghana. Factors driving the incorporation of environmental sustainability issues into construction procurement and the challenges in incorporating environmental sustainability issues into construction procurement management were the main focus of the study.

1.8 Research Methodology

Secondary source of data was employed to achieve the objective of identifying key legislature, regulations and standards relating to the environment. The secondary

sources of data included books, published electronic and print journals and information from stakeholders on environment in Ghana. This helped to identify key environmental legislature and standards in Ghana.

In order to identify the current environmental sustainability practices in construction procurement at the district assembly level, primary data was obtained to get a general overview of the current environmental management practices by procurement entities at the district assemblies. Research Instruments included questionnaire to collect the primary data. It combined both closed and open-ended questions. The questionnaire was administered to procurement officers, environmental officers, district engineers, and quantity surveyors in nineteen (19) out of the twenty-two (22) districts in the Western Region of Ghana.

Literature was reviewed and a sample survey of questionnaires were designed and administered to obtain empirical data on the factors driving the incorporation of environmental sustainability issues into construction procurement at the district level.

Empirical study was again conducted into the challenges facing the incorporation of environmental sustainability issues into construction procurement at the district level. This was achieved through a structured questionnaire survey with key stakeholders on procurement and environmental issues at the district level. Factor analysis using SPSS was adopted to group the identified factors and challenges.

Deductive reasoning was employed to arrive at conclusions in the final analysis.

1.9 Organization of the Study

The research is organized under five chapters:

Chapter one - Chapter one introduces the research; it states the problem on which the thesis is based and brings out the problem statement aim and objectives of the study, scope, and organization of the study.

Chapter two - Chapter two reviews literature on sustainable procurement management, Environmental Management and related information on procurement relevant to the research scope identified in chapter one.

Chapter three -Chapter three describes the Methodology that is the process of data collection and data analysis, the sources of data collection and techniques for analysing the data collected.

Chapter four - Chapter four is results and discussion. It focuses on how data was analysed, interpreted and discussed.

Chapter five - Chapter five is Conclusion and Recommendations and it deals with the summary, conclusion and recommendation of the research work.

1.10 Summary of Chapter One

This chapter has presented an introduction to the study, the problem statement, aim and objectives and research significance. The scope of the research and methodology of this research has been discussed. The subsequent chapter discusses a review of related literature.

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter discusses sustainable procurement and legal structures relating to the environmental management and construction procurement at the district level in the western region of Ghana. Also factors driving the incorporation of environmental issues into public procurement and challenges affecting the incorporation of environmental issues into construction procurement would be discussed.

2.2 Overview of Sustainable Construction Procurement in Ghana

The concept of sustainable construction procurement can be said to be at its embryonic stage in Ghana. Little literature is available locally on this subject however the study discusses the subject broadly and applies the points in the Ghanaian context.

2.2.1 Definition of Sustainability

Berry and McCarthy (2011), explain that sustainability deals with finding a balance between economic, social and environmental needs. They argue that sustainability is about taking a long-term view when making decisions to ensure that in meeting our own needs, we are not compromising the needs of others today and in the future. Also, it involves taking responsibility for the local, regional and global effects of our way of life. Sustainability has emerged because it is believed that current development is unsustainable socially and environmentally (Berry and McCarthy, 2011). Sustainability is therefore about doing what we do in a way that has minimal effect on the world.

2.2.2 Definition of sustainable procurement

According to the Department of Environment, Food and Rural Affairs of the United Kingdom, DEFRA, (2006) sustainable procurement is defined as „a process whereby

organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy". Sustainable procurement should consider the environmental, social and economic consequences of: design; non-renewable material use; manufacture and production methods; logistics; service delivery; use; operation; maintenance; reuse; recycling options; disposal; suppliers' capabilities to address these consequences throughout the supply chain (DEFRA, 2006). Figure 2.1 shows how sustainable procurement attempts to find the best balance between the procurement objectives whilst minimising damage to the environment.

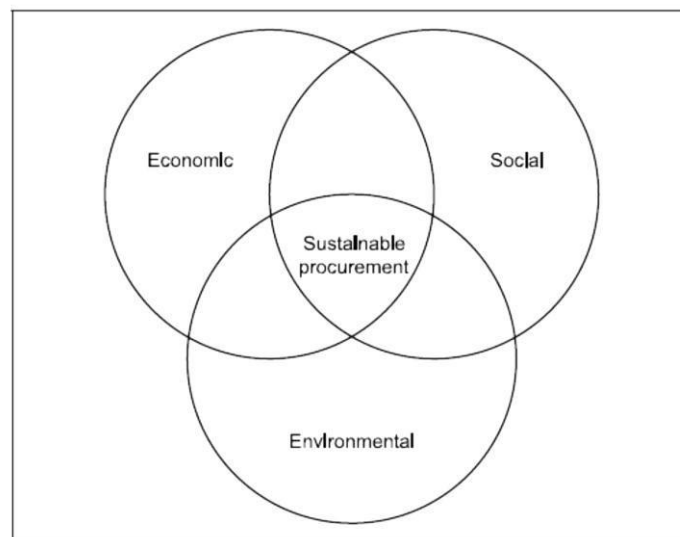


Figure 2. 1 Balancing Sustainable Procurement Objectives

Source: (British Standards Institution, 2010)

According to the British Standards Institution (2010), when integrating sustainability into the procurement process, four key aims should be addressed:

- a. minimizing demand for resources (e.g. by reducing purchases, using resource - efficient products, considering end of life, etc.);

- b. minimizing any negative impacts of goods, works or services across their life cycle and through the supply chain (e.g. impacts on health, air quality, etc.);
- c. ensuring that fair contract prices and terms are applied and respected and that minimum ethical, human rights and employment standards are met;
- d. providing opportunities for small and medium businesses, voluntary sector organizations and also supporting jobs, diversity, training and skills development (British Standards Institution, 2010).

2.2.3 Definition of construction procurement

The construction industry is a broad conglomeration of industries and sectors which add value in the creation and maintenance of fixed assets within the built environment. Construction procurement covers various aspects of procurement within the construction industry. It covers all categories of procurement commonly encountered in other industrial sectors and is not confined to construction works. Construction procurement includes services, goods, construction works and disposals in the form of demolitions and the disposal of surplus materials, plant and equipment (International Organization for Standardization, 2010).

2.2.4 Overview of Public Procurement Management in Ghana

In the year 1996, the Government launched the Public Financial Management Reform Programme (PUFMARP) to improve overall public financial management in Ghana (Adu, 2011). The Public Financial Management Reform Programme (PUFMARP) identified weaknesses in the procurement system which includes: no comprehensive public procurement policy, no central body with technical expertise, absence of clearly defined roles, responsibilities and authority for procurement entities, no comprehensive legal regime to safeguard public procurement, lack of rules and regulations to guide, direct, train and monitor public procurement, no independent

appeals process to address complaints from tenderers, no authority to dispose of public assets, and no independent procurement auditing function (Adu, 2011). This led to the establishment of the Procurement Oversight Group in 1999 to steer the design of a comprehensive public procurement reform programme. The result was a Drafted a public procurement bill in September 2002. The Public Procurement Act, 2003 was subsequently passed into law on 31 December 2003 and is now operational (Adu, 2011).

2.2.5 Legal Framework for Public Procurement in Ghana

The legal framework for public procurement in Ghana comprises of the Public Procurement Act, 2003 (Act 663), Public Procurement Regulations, Guidelines,

Standard Tender Documents, Public Procurement Manual (Adu, 2011). The Public Procurement Act, 2003 (Act 663) establishes the Public Procurement Authority, Tender Committees and Tender Review Boards. It Specifies rules for procurement methods procedures, it also defines offences and applicable penalties. Public Procurement Regulations is issued by the Minister for Finance in consultation with PPA under section 97 of the Act and contain detailed rules and procedures for all aspects of the procurement system such as the operations of PPA and procurement entities and the conduct of procurement activities. The Guidelines is issued by PPA under the Act and provide supplementary guidance on specific topics e.g. disposal, single source procurement, margins of preference. The standard Tender Documents is issued by PPA and are listed in Schedule 4 of the Act. Separate documents for

Standard invitation and contract documents for procurement of goods, works and services are provided (Adu, 2011). Figure 2.1 provides the legal framework for public procurement in Ghana.

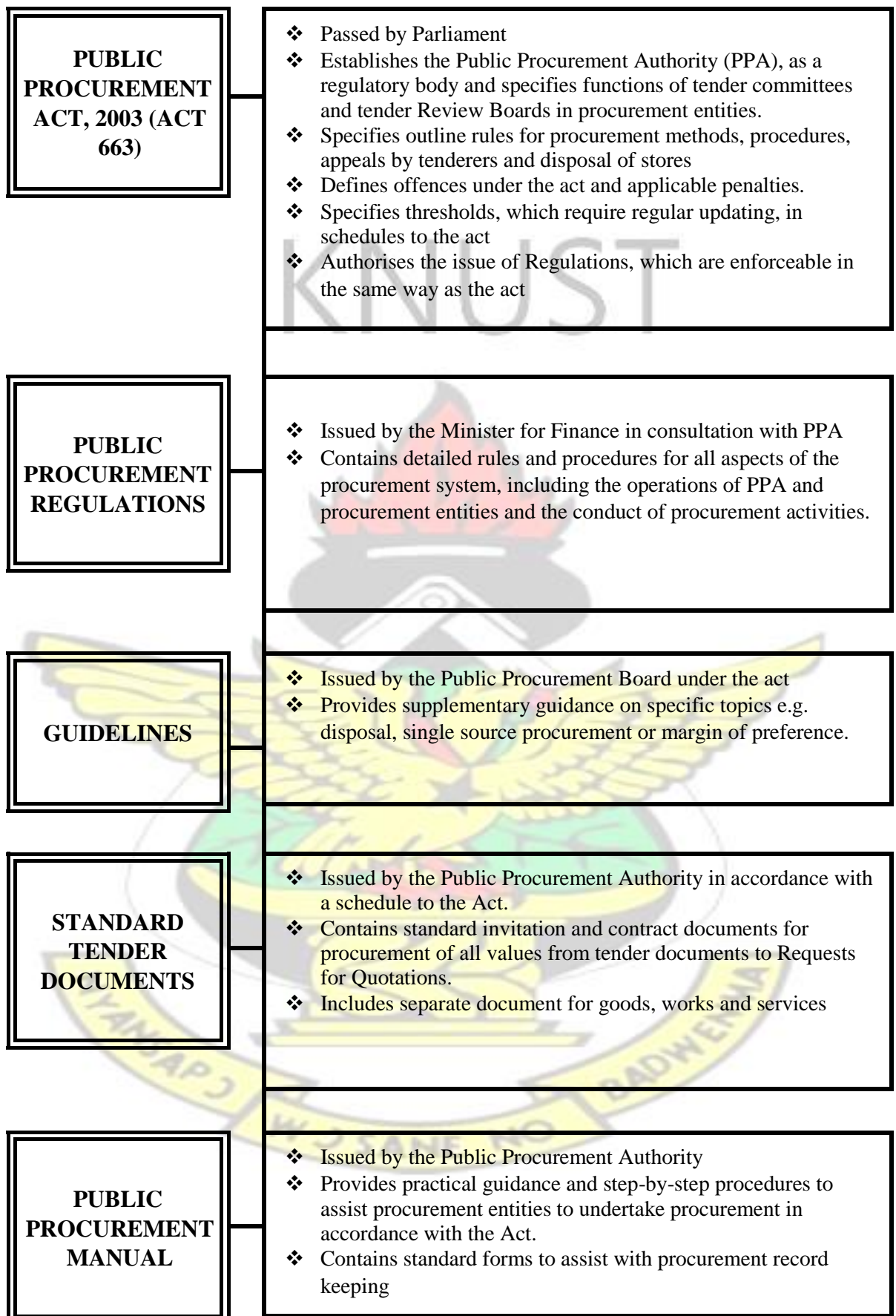


Figure 2. 2 Summary of the Legal Framework for public procurement in Ghana

Source: (Adu, 2011)

2.2.6 Definition of Construction Procurement in the Ghanaian Context

According to the Public Procurement Manual (2003) of Act 663, “Works means work associated with the construction, reconstruction, demolition, repair or renovation of a building or structure or surface and includes site preparation, excavation, erection, assembly, installation of plant, fixing of equipment and laying out of materials, decoration and finishing, and any incidental activity under a procurement contract.”

Procurement may be defined as the process which creates, manages and fulfils contracts (British Standards Institution, 2010). It is described as a succession of logically related actions occurring or carried out in an explicit manner and which culminate in the completion of a major deliverable or the attainment of a milestone.

The processes involved are underpinned by methods which mean documented and systematically-ordered collection of rules or approaches. Extrapolating from the Public Procurement Act 663, (2003) and the British Standards Institution (2010), construction procurement is defined in this study as:

“ a succession of logically related methods and procedures which culminates with the completion of work associated with the construction, reconstruction, demolition, repair or renovation of a building or structure or surface and includes site preparation, excavation, erection, assembly, installation of plant, fixing of equipment and laying out of materials, decoration and finishing, demolishing and disposal of surplus materials goods and services and any incidental activity under a construction contract.”

According to the British Standards Institution (2010), construction procurement activities commence once the need for procurement is identified and end when the transaction is completed.

2.2.7 Principal Activities in Construction Procurement

Six principal activities are associated with the construction procurement process according to the British Standards Institution (2010) which concurs with the procurement process outlined in the public procurement Act 663 (2003) of Ghana.

This include:

- Establish what is to be procured;
- decide on procurement strategies in terms of contract, pricing and targeting strategy and procurement procedure;
- solicit tender offers;
- evaluate tender offers;
- Award contract; and
- Administer contracts and confirm compliance with requirements (British Standards Institution, 2010).

These principal activities are in agreement with those stated in the Public Procurement Act 663 (2003). Environmental issues can be included in any of these key procurement activities. Environmental sustainability issues may also be inserted in the tender document. The Procurement Directives of the European Commission (2004), states very clearly sections of a tender document where and how environmental sustainability issues can be introduced. The sections include:

- The subject matter of the contract;
- The technical specifications for the product/work/service;
- The selection criteria for candidates;
- The contract award criteria;
- The contract performance clauses.

The point is: Basic procurement ethics should not be compromised in any way with the introduction of environmental sustainability issues. The next section discusses the relationship between the basic procurement ethics and requirements in Ghana and some developed countries that should not be compromised. Environmental sustainability issues can be included in tender documents as long as these principles are not breached (European Commission, 2011).

2.2.8 Basic procurement Ethics in Ghana Compared to International Standards

There is little difference in the procurement ethics specified in the Public Procurement Acts in Ghana compared to other international standards. The table below shows the relationship of the Public Procurement Act 663 (2003) to two other international standards namely: the British Standards Institution, BS 10845-1(2010) requirements and the European Commission Treaty for Procurement (2004) requirements. From table 2.1, it can be seen that the three legal documents addresses almost the same procurement ethics. It is clear that the current national procurement legislation is in agreement with international procurement legislation.

Table 2. 1 Relationship of Basic procurement system ethics in Ghana to two other International Standards

Public Procurement Act 663 (2003) requirement	British Standards Institution, BS 10845-1 (2010) requirement	EC Treaty for procurement (2004) requirement	Meaning of requirement
Fair	Fair	The principle of freedom to provide services	The process of offer and acceptance should be impartial, without bias and provides participating parties concurrent and timely access to the same information. Terms and conditions for performing the work should not unfairly prejudice the interests of the parties. Procurement should be done in the most efficient manner, upholding the principles of fairness

Non-discriminatory	Equitable	1.The principle of equal treatment 2.The principle of nondiscrimination 3.The principle of proportionality	The only grounds for not awarding a contract to a tenderer who complies with all requirements are restrictions from doing business with the organization, lack of capability or capacity, legal impediments and conflicts of interest.
Transparency	Transparency	The principle of transparency	The procurement process and criteria upon which decisions are to be made shall be publicized. Decisions (award and intermediate) are made publicly available together with reasons for those decisions. It is possible to verify that criteria were applied. The requirements of procurement documents are presented in a clear, unambiguous, comprehensive and understandable manner. Procurement shall be done in the most efficient manner, upholding the principles of transparency
Competitive	Competitive		The system provides for appropriate levels of competition to ensure cost-effective and best value outcomes.
Efficiency	Costeffectiveness		The processes, procedures and methods are standardized with sufficient flexibility to attain best value outcomes in respect of quality, timing and price, and the least resources to effectively manage and control procurement processes. Procurement shall be done in the most efficient manner, upholding the principles of value for money. Value for money can be demonstrated by comparison with market rates
N/A	Promotion of other objectives	N/A	The system may incorporate measures to promote objectives associated with a secondary procurement policy subject to qualified tenderers not being excluded and deliverables or preferencing criteria being measurable, quantifiable and monitored for compliance.

Environmental sustainability issues can be included as a secondary procurement policy without breaching national legislation, and as long as these principles are followed (European Commission, 2011). This research is therefore focused on the promotion of other objectives such as environmental sustainability issues through procurement. The next section discusses approaches to environmental management in Ghana over the years.

2.3 Overview of Construction Environmental Management in Ghana

In Ghana there are various laws, regulations and legislature that relate to construction activities. These laws, regulations and other related legislature for protecting the environment over the past years are discussed below.

2.3.1 The Constitution of Ghana and the Environment

The 1992 constitution of the fourth Republic in chapter six, article 41 (k), bids citizens of Ghana to protect and safeguard the environment. This applies to both clients and contractors and all construction stakeholders in Ghana. Public institutions must be seen to take the lead in enforcing this constitutional requirement. One way this can be done is through public procurement (Gbedemah, 2011).

2.3.2 The Environmental Protection Agency Act, 1994 (Act 490)

According to Yeboah and Mensah (2014), the Environmental Protection Council (EPC) was established in Ghana as a public institution with oversight responsibility for the environment in 1974 through the National Redemption Council Decree, number 239 (NRCD 239). Section 2 of the decree required among other things, the Environmental Protection Council to ensure the observance of proper safeguards in the planning and execution of all development projects including those already in existence that are likely to meddle with the quality of the environment.

In March 1989, a government directive was issued that required that, the EPC be consulted on development proposals and that a “certificate of clearance” be issued indicating that adequate provisions had been made in the project proposals to contain potential adverse environmental impacts (Yeboah and Mensah, 2014).

In 1994, the Environmental Protection Agency Act, 1994 (Act 490) was enacted to create a corporate body called the Environmental Protection Agency (EPA) which replaced the EPC. This agency has been in existence and in charge of environmental issues in Ghana to date. Among its functions the EPA was mandated to “ensure compliance with any laid down environmental assessment procedures in the planning

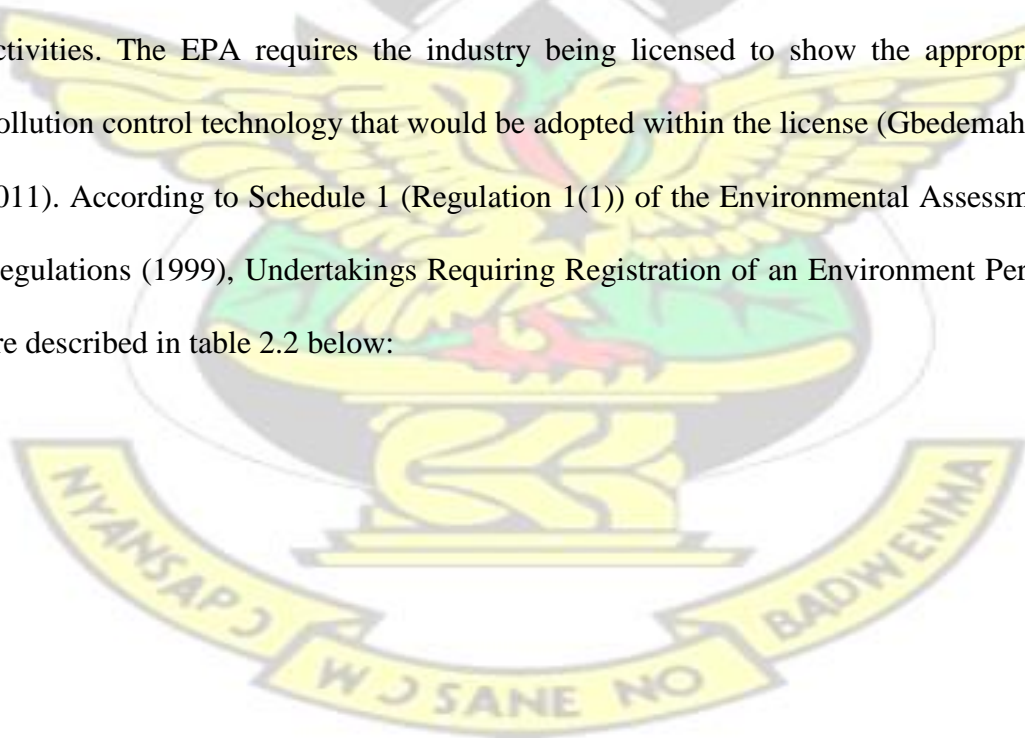
and execution of development projects, including compliance in respect of existing projects.”

2.3.3 The Environmental Assessment Regulations, (1999) (L. I. 1652)

On the 24th of June 1999, The Environmental Assessment Regulations, (1999) (L. I. 1652) was enacted. The L. I. 1652 deals with the various procedures to be followed prior to the grant of a permit to develop, procedures for filing complaints, offences and penalties. Act 490 together with L. I. 1652 establishes the Environmental Assessment Systems in Ghana which briefly comprises Registration, Screening, Environmental Impact Assessment and Environmental Management Planning.

2.3.4 Regulations for Licensing Of Industries

This procedure offers a viable option for prevention of pollution from industrial activities. The EPA requires the industry being licensed to show the appropriate pollution control technology that would be adopted within the license (Gbedemah, 2011). According to Schedule 1 (Regulation 1(1)) of the Environmental Assessment Regulations (1999), Undertakings Requiring Registration of an Environment Permit are described in table 2.2 below:



2 Undertakings Requiring Registration and Environment Permit include adapted from Schedule 1 (Regulation 1(1)) of the Environmental Assessment Regulations (1999)

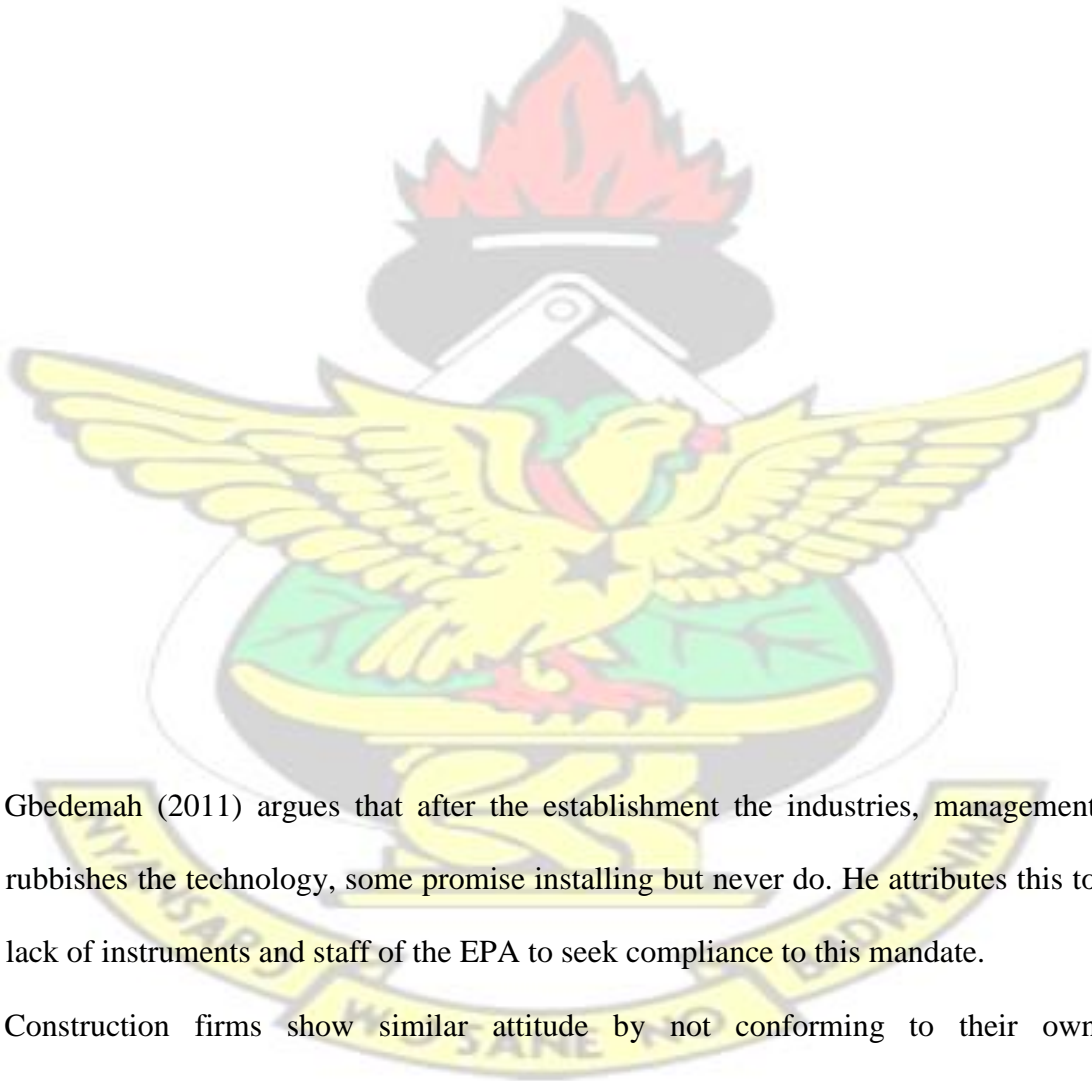
KNUST



Table 2.

	INDUSTRY	CONSTRUCTION RELATED ACTIVITY
	CRUDE OIL AND NATURAL GAS	<ul style="list-style-type: none"> a. Facilities for crude oil or petroleum production; b. Facilities for natural gas production.
2	QUARRIES AND SAND PITS	<ul style="list-style-type: none"> a. Where the total area is greater than 10 hectares, or where any portion is to be located within an environmentally sensitive area. b. Sand and gravel pits where the total area is greater than 10 hectares, or c. Where any portion is to be located within an environmentally sensitive area.
3	CHEMICALS AND CHEMICAL PRODUCTS	<ul style="list-style-type: none"> a. Plastics and synthetic resins; b. Paints and varnishes. c. Other chemical products
4	CONSTRUCTION	<ul style="list-style-type: none"> a. Construction of pipelines for the transmission of oil, natural gas and other related products from the source to the point of distribution, where – <ul style="list-style-type: none"> □ any portion of the pipeline is to be located at a distance greater than 500 meters <ul style="list-style-type: none"> • from an existing right-of-way; or • any portion of the pipeline is to be located in an environmentally sensitive area; b. Diesel electric power generating plants having a capacity greater than 1 megawatt; c. Gas turbine electric power generating plants having a capacity greater than 1 megawatt; d. Nuclear electric power generating plants.
5	HIGHWAYS AND HEAVY CONSTRUCTION	<ul style="list-style-type: none"> a. roads b. waterworks and sewage system – c. construction of trunk pipelines for transmission of water from the source to distribution; d. construction of trunk sewer pipelines; e. construction of trunk sewer pipeline outfalls. f. hydroelectric power plants and related structures – g. construction of dams and associated reservoirs; a. inter-or intra-basin water transfers; b. construction of hydroelectric power developments
6	UTILITIES	<ul style="list-style-type: none"> a. establishment of waste disposal sites; b. establishment of facilities for the collection or disposal of hazardous waste materials
7	ACCOMMODATION SERVICES	<ul style="list-style-type: none"> c. Establishment of recreation and vacation camps.
8	AMUSEMENT AND RECREATIONAL SERVICES	<ul style="list-style-type: none"> a. Commercial spectator sports – <ul style="list-style-type: none"> • establishment of horse racetrack operations; • establishment of racetrack operations for motorized vehicles sports and recreation clubs and services; b. Establishment of facilities, including trails c. Establishment of outdoor firearm ranges; d. Establishment of marina operations e. Establishment of facilities, including trails, for motorized recreational vehicles f. Other amusement and recreational services.

KNUST



Gbedemah (2011) argues that after the establishment the industries, management rubbishes the technology, some promise installing but never do. He attributes this to lack of instruments and staff of the EPA to seek compliance to this mandate.

Construction firms show similar attitude by not conforming to their own environmental management plan.

Table 2.

2.3.5 Citing Of Industries

According to Gbedemah (2011), industrial zones are being created at designated areas in the country. This will check the haphazard way of siting industries in Ghana. The ad hoc nature of the construction industry however does not allow this initiative to be applicable.

2.3.6 Environmental Impact Assessment (EIA) Of Industrial Projects

EIA is planning tools that predict and evaluate the impacts of proposed projects in order to assist decision-making (Ortolano and Shepherd, 1995). The EIA comprises a series of nine steps which includes: preliminary activities, impact identification, scoping, baseline study, impact evaluation, mitigation measures, assessment (comparison of alternatives), and documentation, decision-making and post auditing. Gbedemah (2011) argues that the EIA process has a problem of not showing relationship between impact assessment and environmental management. It also over emphasizes treatment of impacts calling for its combination with other tools. According to (Regulation 3) examples of undertakings for which environmental impact assessment (EIA) is mandatory are listed in the table below:

3 Undertakings for which environmental impact assessment (EIA) is mandatory adapted from Schedule 1 (Regulation 3) of the Environmental Assessment Regulations (1999)

	INDUSTRY	CONSTRUCTION RELATED ACTIVITY
1	AIRPORT	a. Construction of all airport or airstrips as well as the enlargement of existing airports or airstrips.
2	HOUSING	a. Human settlement development undertaking; b. Housing development.
3	INFRASTRUCTURE	a. Construction of hospitals b. Industrial estate development c. Construction of roads and highways d. Construction of new townships

		e. Construction of railways
4	PORTS	a. Construction of ports b. Port expansion involving an increase of 25 per cent or more in handling capacity per annum
5	PETROLEUM	a. Oil and gas fields development b. Construction of off-shore and on-shore pipelines c. Construction of oil and gas separation, processing, handling and storage facilities d. Construction of oil refineries e. Construction of product depots for the storage of petrol, gas or diesel which are located within 3 kilometres of any commercial, industrial or residential areas
6	RESORT AND RECREATIONAL DEVELOPMENT	a. Construction of coastal resort facilities of hotels with more than 40 rooms b. Hill top resort or hotel development c. Development of tourist or recreational facilities in national parks d. Development of tourist or recreational facilities on islands in surrounding waters.
7	WASTE TREATMENT AND DISPOSAL	a. Construction of incineration plant b. Construction of recovery plant (off-site) c. Construction of wastewater treatment plant (off-site) d. Construction of secure landfills facility e. Construction of storage facility (off-site) f. Construction of composting plant g. Construction of recovery/recycling plant h. Construction of waste depots i. construction of marine outfall j. Night soil treatment
8	WATER SUPPLY	a. Construction of dams impounding reservoirs b. Groundwater development for industrial, agricultural or urban

Unfortunately not all these construction related activities are done with EIA mandatorily made. It can be said that most of them only exist in law and are not functional. The next section highlights policies and guidelines available in Ghana for environment protection.

Table 2.

2.3.7 Environmental Policies in Ghana

Ghana has a number of policies for protecting the environment. Whole or sections of these policies relate to construction and may be consulted for relevant aspects that may be incorporated into construction procurement at the district level. According to the Environmental Protection Agency (2014) some environmental policies in Ghana include:

- Environmental Protection Agency- Guideline
- Environmental Sanitation Policy
- Growth and Poverty Reduction Strategy (GPRS II) (2006-2009)
- National Action Programme to Combat Drought and Desertification
- National Irrigation Policy
- National Land Policy
- National Water Policy
- National Wildlife Policy

2.3.8 Environmental Laws and Legislature in Ghana

Ghana has a number of laws and legislature for protecting the environment. The table below groups all environmental related laws and legislature in Ghana under relevant environmental themes for easy referencing. From the table, for example, it is clear that there are no laws on noise control in the country currently. This explains the difficulty in dealing with construction noise and noise from churches in residential areas. These laws are available for consultation by procurement entities for planning environmental sustainable construction procurement. Table 2.4 below is a summary of environmental laws in Ghana.

4 Summary of Environmental Legislation in Ghana (Source: Environmental Protection Agency, 2014)

1. AIR POLLUTION

Environmental Protection Agency Act, 1994(Act 490), Management of Ozone Depleting Substances and Products Regulations,2005

2. COASTAL & MARINE ENVIRONMENT
Fisheries Act, 2002, Maritime Zone(Delimitation) Act,1986, Wetlands Management (RAMSAR Sites) Regulations,1999
3. ENERGY AND MINERAL RESOURCES
Atomic Energy Commission Act,2000, Diamonds Act,1972, Energy Commission Act, 1997, Ghana National Petroleum Act,1983 , Mining and Minerals Act,1986, Minerals Commission Act,1993, Minerals Export Duty(Abolition) Act,1987, Minerals Health Areas Act,1925 , Small Scale Gold Mining Act,1989, Volta River Development Act,1961, West African Gas Pipeline Act,2004
4. FLORA AND FAUNA
Animals (Artificial Insemination)Act,1955, Animals (Control and Importation)Act,1952 , Control and Prevention of Bush Fires Act,1990, Economic Plants Protection Act,1979, Forest Plantation Development Act,2000, Timber Resource Management Regulation Act,1998, Timber Operations Act, Tree and Timber Act,1974, Timber Resource Management Regulations,1998, Timber Industry and Ghana Timber Marketing Board Act,1977, Wild Animals Preservation Act 1961(Act 43)
5. HAZARDOUS SUBSTANCES/CHEMICAL
Mercury Act,1989
6. HUMAN DEVELOPMENT AND SETTLEMENT
Concessions Act,1939,Concessions Act,1962, Copyright Act,2005, Centre For Scientific and Industrial Research Act,1996, Centre For Scientific Research into Plant Medicine Act,1975, Confiscated Assets (Recovery and Disposal) Committee Act,1979, Food and Drugs Board, Administration of Lands, Act 1962, Ghana Ports and Harbors Authority Act,1986, Ghana Maritime Security Act, 2004,Ghana Maritime Authority Act,2002, Ghana Shipping Act,2003, Ghana National Fire Service Act, 1997, Ghana Meteorological Agency Act,2004, Ghana Tourist Control Authority Act,1973, Ghana Standards Board(Food, Drugs and Other Goods)General Labelling Rules,1992, Infectious Diseases Act,1908 Seeds(Certification and Standard)Act,1972, Local Government Act, ,Local Government Service Act, Standards Authority Act,1973, Telecommunications(Frequency Registration and Control) Act,1977, Town and Country Planning Act,1945, Towns Act,1992, Traditional Medicine Practice Act,2003, Vaccination Act,1919, Weights and Measures Act
7. HEALTH AND SAFETY
Factories, Offices and Shops Act of 1970
8. LAND MANAGEMENT
Lands Commission Act,1994 , Lands Miscellaneous Provision Act,1963, Land Planning and Soil Conservation Act,1953, Landed Properties of Ghana, Rubber Estates Limited and Fire Stone Act,1977, Land Registry Act,1962 Irrigation Development Authority Act,1977, Lands(Statutory Wayleaves) Act,1963 , Land Title Registration Act,1986
10. SOLID WASTE MANAGEMENT
Abandoned Property(Disposal)Act ,1974, Environmental Assessment Regulations 1999, (LI 1652) , Layout Designs, Local Government Act (1994), Act 462
11. WATER MANAGEMENT AND POLLUTION
Beaches Obstructions Act,1897 , Environmental Protection Agency Act, 1994(Act 490) Part I & II, Ghana Water and Sewerage Corporation Act 1965 (Act 310), Rivers Act,1903, Water Resources Commission Act, 1996 (Act 522)

The sections that follow discuss other indirect sources of environmental related laws in Ghana relevant to construction procurement.

Table 2.

2.3.9 The Public Procurement Act 663 (2003) and the Environment

Section 19 under Tender evaluation panel requires each procurement entity to appoint a tender evaluation panel with the required expertise to evaluate tenders and assist the Tender Committee in its work. „In the performance of its functions, a tender evaluation panel shall proceed according to the predetermined and published evaluation criteria.“ This means that an environmental officer may be included in the tender evaluation panel to assist in promoting environmental sustainability issues. Any other environmental expert may be added to the panel. Also any intention to include environmental issues in the criteria for evaluation may be included in the published evaluation criteria prior to evaluation.

1. **Section 28 of Record of procurement proceedings** can be argued to provide room to include environmental sustainability issues in the procurement process as a margin of preference. It states that records should include ‘a summary of the evaluation and comparison of tenders, proposals under section 69, offers or quotations including the application of any margin of preference pursuant to section 60.’ If any environmental issues were used in the criteria for evaluation this could be recorded. The continued records on any environmental requirement could be vital in establishing an environmental culture in the long term. Under subsection 4 „Disclosure of the portion of the record referred to in subsections (1) (c) to (e), and (1)(m), may be ordered at an earlier stage by a competent court; except that when ordered to do so by a competent court and subject to the conditions of the court order,

the procurement entity shall not disclose information relating to the examination, evaluation and comparison of tenders,

KNUST



proposals, offers or quotations and tenders, proposal, offer or quotation prices, other than the summary referred to in subsection(1) (e) of this section.” The procurement entity is protected from examining tenders considering environmental issues to suit the entities environmental policy. This clearly provides room for including environmental issues into procurement evaluation criteria.

2. **Section 48 of Contents of invitation to tender and invitation to prequalify** states that the invitation to tender shall contain the following information: the criteria and procedures to be used to evaluate the qualifications of suppliers or contractors, in conformity with section 23; meaning environmental sustainability issues could be incorporated at the invitation to tender stage of the procurement process.
3. **Section 50 of Contents of tender documents and use of standard tender documents**, indicates that the following may be included : the nature and required technical and quality characteristics, in relation to the goods, works or technical services to be procured under section 33 including, but not limited to, technical specifications, plans, drawings and designs; the quantity of the goods; any incidental services to be performed; the location where the works is to be effected or the services are to be provided; and the desired or required time, if any when the goods are to be delivered, the construction is to be effected or the services are to be provided. Clearly requirements to be included in tender documents are unlimited.
4. **Section 50 of Contents of tender documents and use of standard tender documents**, states: „The invitation documents shall include, the criteria and

procedures, in conformity with the provisions of section 22, for the evaluation of the qualifications of suppliers or contractors; and the requirements on additional documentary evidence or other information that is to be submitted by suppliers or contractors to demonstrate their qualifications.” This means that Environmental certification documents and any other environmental requirement may be requested by the procurement entity. Also „the criteria to be used by the procurement entity to determine the successful tender, including any margin of preference and any criteria other than price to be used under section 59(4)(b)(c) or (d) and the factors apart from price to be used to determine the lowest evaluated bid, shall, to the extent practicable, be expressed in monetary terms, or given a relative weight in the evaluation provisions in the tender documents” This provides room to

set out points for environmental issues.

5. **Section 57 (1) under Examination of tenders states;** ‘The procurement entity may ask a supplier or a contractor for clarification of its tender in order to assist in the examination, evaluation and comparison of tenders.’ Clarification on environmental sustainability requirements may be requested.
6. **Section 58 (3) under Responsiveness of tenders** ‘The deviations shall be quantified, to the extent possible, and shall be taken into account in the evaluation and comparison of tenders’. This deviation may include deviation from entity’s environmental policy.
7. **Section 59 of Evaluation of tenders,** ‘The procurement entity shall evaluate and compare the tenders that have been accepted in order to ascertain the

successful tender in accordance with the procedures and criteria set out in the invitation documents. Also no criterion shall be used that has not been set out in the invitation documents.” This provision makes it clear that environmental issues could be included right from the invitation to tenderers. Also „To determine the lowest evaluated tender, the procurement entity shall consider the cost of operating, maintaining and repairing the goods or works, the time for delivery of the goods, completion of works or provisions of the services, the functional characteristics of the goods or works, the terms of payment and of guarantees in respect of the goods, works or services.” This section clearly side-line environmental issues which could have been explicitly stated. However, according to the European Commission (2011), you may allocate points during the award stage to recognise environmental performance better than the minimum requirement set in the specifications. It states that there is no maximum limit on the weighting you can give to environmental criteria. According to the European Commission (2011) two options for evaluation are available: either compare offers on the basis of lowest price only, or award the contract to the ‘most economically advantageous’ tender (MEAT), which implies that other award criteria will be taken into account, as well as the price. The additional award criteria under MEAT can include environmental criteria. Indeed, others include quality, price, technical merit, aesthetic and functional characteristics, environmental characteristics, running costs, cost effectiveness, after-sales service and technical assistance, delivery date and delivery period or period of completion.

It is not necessary for each individual award criterion to give an economic advantage to the procurement entity. Non- economic factors may influence the

value of a tender from the point of view of the procurement entity, including a range of environmental factors. As the best offer is normally be determined on the basis of a number of different sub-criteria, several techniques for comparing and weighing up the different sub-criteria are used. These techniques include matrix comparisons, relative weightings and bonus systems (European Commission, 2011).

8. **Section 60 of Margin of preference**, ‘A procurement entity may grant a margin of preference for the benefit of tenders for work by domestic contractors or for the benefit of tenders for domestically produced goods or for the benefit of domestic suppliers of services.’ This section is one area that may be extended to include environmental issues.
9. **Section 62 of Repeat tender qualifications**, ‘The criteria and procedures to be used for the further demonstration shall be set out in the tender documents. Also where pre-qualification proceedings have been used, the criteria for further demonstration shall be the same as those used in the pre-qualification proceedings.
10. **Section 63 under Non-disclosure of tender evaluation details** ‘Information relating to the examination, clarification, evaluation and comparison of tenders shall not be disclosed to suppliers or contractors or to any other person not involved officially in the examination, evaluation or comparison of tenders or in the decision on which tender should be accepted, except as provided in section 28 on the record of procurement proceedings. This provision protects entity from using any environmental criteria for evaluation.

11. **Section 68 (1) under Content of requests for proposals for consultancy services**, consultancy services are not exempted from environmental considerations. ‘The procurement entity shall use the standard invitation for proposals stipulated in Schedule 4 and any requirements for a specific assignment shall be introduced through information to consultants, data sheets or contract data sheets and not by introducing changes in the standard tender documents. Under sub-section (2) „The invitation for proposals shall include the criteria and procedures related to the evaluation of the qualifications of the consultants and those related to additional qualifications under section 24(5);
12. **Section 69 (1) under Criteria for the evaluation of proposals** ‘The procurement entity shall establish criteria to evaluate the proposals and determine the relative weight to be accorded to each criterion and the manner in which they are to be applied in the evaluation of proposals’. This provision allows the procurement entity to set her own environmental criteria.
13. **Section 74 (1) under Evaluation of proposals**, ‘the evaluation of the proposals shall be carried out in two stages: first the quality, and then the cost.’ Environmental criteria can be carried out under quality evaluation.
14. **Section 75 (1) Selection procedure where price is a factor**: Where the procurement entity uses the procedure in this section, it shall establish a threshold on the quality and technical aspects of the proposals in accordance with the criteria established under section 69 apart from those set out in the request for proposals and shall rate each proposal in accordance with that criteria and the relative weight and manner of application of those criteria set

out in the invitation for proposals. Also under sub-section (2) The procurement entity shall notify the consultants whose proposals did not meet the minimum qualifying mark or were non responsive to the invitation for proposals and terms of reference after the evaluation of quality is completed within a period of 14 days after the decision has been taken by the procurement entity. (6) The successful proposals shall be the proposals with the best combined evaluation in terms of the criteria established under section 69 apart from price in the case of quality and cost-based selection; the proposals with the lowest price in the case of least-cost selection; or the consultants that submitted the highest ranked technical proposals within the budget.

15. **Section 97 under Regulations** on the margin of preference in the evaluation of tenders; environmental sustainability issues may be incorporated.

16. **Schedule 4 (Section 50, Section 68)** Standard tender documents and standard request for Proposals, Standard Tender Evaluation Format and Reporting Format for Goods, Works and Selection of Consultants do not currently have any provision for environmental issues, but provides room for inclusion.

2.3.10 The Public Procurement Manual and the Environment

1. **Section 4.3 of Specification of Requirement**, Specifications for goods (including goods for construction works) shall include: a functional description of the goods, including any environmental or safety features.

2. **Section 5.19 of Contract Supervision and Administration**, The Project

Manager/Supervision should: Notify the Contractor in writing requesting rectification of any deficiencies in workmanship, materials used, safety or environmental standards, or other required performance standards.

3. **Section 6.6.1 of Lump Sum (Fixed Price) Contracts** Lump sum contracts are widely used for simple planning and feasibility studies, environmental studies, detailed design of standard or common structures, preparation of data processing systems, etc.
4. **Section 9.4.4 of Destruction, Dumping or Burying**, states that to ensure that the destruction, dumping or burying of hazardous items are properly executed, it is recommended that a committee of at least three persons supervise the process.
- The Committee should: Obtain approval from the relevant Environmental/Health Agency to destroy, dump or bury the items; should supervise the destruction, dumping or burial, at an appropriate place.

2.3.11 Environmental Management at the District Assembly Level

The Constitution of the Republic of Ghana (1992) provides that a District Assembly is the highest political authority in the district, and that the District Assembly has deliberative, legislative and executive powers. The main legislative texts pertaining to District Assemblies are:

- Civil Service Law 1993 (PNDCL 327);
- Local Government Act No. 462 of 1993;
- National Development Planning (System) Act 480 of 1994;
- National Development Planning Commission Act 479 of 1994;
- District Assemblies' Common Fund Act 455 of 1993;
- Local Government (District Tender Boards) Establishment Regulations (which has now been repealed);
- Local Government Service Act 656 of 2003, (and other legislation pertaining to administration of local government and central government personnel at local level);
- Institute of Local Government Studies Act 647 of 2003 and

- A range of finance legislation, such as the District Assemblies Common Fund Act No. 455 of 1993, and local government fiscal regulations (Kuusi, 2009).

According to the Local Government Act No. 462 (1993), Sections 1, 3 (1) there are three kinds of districts – districts, municipalities and metropolises and they are categorised as:

1. District Assemblies in districts with a minimum population of 75,000 people;
2. Municipal Assemblies in districts with a minimum population of 95,000 people; and
3. Metropolitan Assemblies in districts with a minimum population of 250,000 people.

The Assemblies have an executive committee, which is headed by a District Chief Executive who is appointed by the President. The District Chief Executive has significant authority over the affairs of the Assembly.

The District Environmental Management Committee incorporate environmental issues into their Medium Term Development Plan which normally has a four or five year lifespan depending on available funds and the time frame for the projects. The Environmental Management Committee respond swiftly to reports on allegations of activities that degrade the environment.

Agyekwena (2010) explained that the services of the Police Force is sometimes sought to restore law and order on environmental issues in the communities where need be. Such reports are collated to enable the district to discuss and adopt appropriate action.

Agyekwena (2010), some members of the District Environmental Management team are the National Disaster Management Committee (NADMO), the Environmental Health and Sanitation Unit, District Community Development Officer, the Ghana Education Service (GES), the Department of Social Welfare, the Gender Desk office

the, representatives of traditional rulers and the Town and Country Planning most of whom already have basic information about the environment and are given further training.

The Community Environmental Management Committees are set up and undergo training under the Ghana Environmental Management Project (GEMP) which was initiated in 2008 and funded by the Canadian International Development Agency (CIDA).

2.3.12 Construction Activities Undertaken by the District Assembly

The Local Government Act of 1993 prescribes to the District Assemblies broad mandates. The District Assemblies deliver many services, such as pre- and primary education, social welfare, health clinics, cemeteries, museums and libraries, water and sanitation, refuse collection, environmental protection and transport, but with varying degrees of authority and political responsibility for the service provision (Farvacque et al, 2008). The district assemblies together with district environmental management committees are responsible for local management of the environment. The table 2.5 below summarises the degree of responsibility of the district assembly in relation to construction activities.

Table 2.5 Summary of Construction Related Activities Undertaken at the Central Government, Regions and District Level

SERVICE	CENTRAL GOVERNMENT	REGIONS	DISTRICTS (local government)
<u>Housing and Town Planning</u>			
Housing			x
Town planning			x
Regional planning		x	
<u>Transport</u>			
Roads	x	x	x
Transport		x	x

Urban roads			
Urban rail			
Ports	x		
Airports	x		
<u>Environment and public sanitation</u>			
Water and sanitation			x
Refuse collection and disposal			x
Cemeteries and crematoria			x
Slaughter-houses			x
Environmental protection	x	x	x
Consumer protection	x		
<u>Culture, leisure and sports</u>			
Theatre and concerts			(x)
Museums and libraries	x		(x)
Parks and open spaces			x
Sports and leisure			x
Religious facilities			
<u>Economic</u>			
Agriculture, forests, fisheries			x

(x) = discretionary services by the local authority

x = services rendered

Source: (Farvacque et al., 2008)

Environmental protection at the district assembly level is guided by the district assembly bye-laws. The environmental officer at the district assembly is responsible for ensuring the implementation of these bye-laws. There are a number of environmental bye-laws which when incorporated into the procurement system at the district level would ensure environmental sustainability. For example the Ahanta

West District assembly has these laws:

- Ahanta West District Assembly (Protection of Forest Wildlife and Habitats) Bye-law, 2013;
- Ahanta West District Assembly (Forest Resources and Protected Areas) Byelaw, 2013;
- Ahanta West District Assembly (Cultural and Natural Heritage Conservation) Bye-law, 2013 and

- Ahanta West District Assembly (Protection and Conservation of Coastal Environment) Bye-law, 2013 (Farvacque et al., 2008).

These laws are analogous to other districts in Ghana but the problem lies in how they could be incorporated into the construction procurement system for implementation.

2.4 International Approaches to Environmental Sustainability in Construction Procurement

The next section discusses approaches to environmental sustainability in construction procurement in developed nations and lessons that can be learnt.

2.4.1 International Laws on the Environment

The ISO 14000 series, developed by the International Organisation for Standardisation (ISO), of which Ghana has been a member since the 1970's, is a collection of voluntary standards that assists organizations to achieve environmental and financial gains through the implementation of effective environmental management. The standards provide both a model for streamlining environmental management, and guidelines to ensure environmental issues are considered within decision-making practices. ISO 14001 is the standard for EMSs. The goal of ISO 14000 environmental standards is to provide global businesses, at the management level, with a framework for managing their environmental impacts by establishing an effective EMS (Zabihollah and Szendi, 2000). The primary purpose of an EMS is to strive for continuous improvement of environmental performance and to become certified to the ISO 14001 standard by:

- defining environmental goals and missions;
- identifying the significant environmental aspects of corporate operations;
- establishing adequate and effective environmental policies and procedures;

- continuously monitoring environmental policies and procedures and ensuring compliance with them;
- developing environmental programs which describe how the EMS requirements will be met and how environmental goals and objectives will be achieved; and
- establishing proper methods for internal and external communication of environmental information (Zabihollah and Szendi, 2000).

The environmental management system requires companies to evaluate and revise their environmental management system when necessary by measuring and monitoring progress, addressing problems, and analyzing results. The incorporation of EMS claims to lessen the difficulty that companies now have in gauging their environmental performance and facilitate pertinent comparisons of operations in various countries which may improve trade across borders (Begley, 1996).

2.4.2 Benefits of Voluntary Adoption of the ISO Standards

Chavan, (2005) found that an environmental standard can be a powerful tool for organisations to both improve their environmental performance, and enhance their business efficiency. He explains that An EMS is not prescriptive; rather, it requires organisations to take an active role in examining their practices, and then determining how their impacts should best be managed. This approach encourages creative and relevant solutions from the organisation itself.

Although the implementation of the ISO standard is essentially a voluntary initiative as it stands now, it can also become an effective tool for governments to protect the environment as it can assist regulation. For example, Chavan, (2005) argues that

regulatory bodies such as the EPA can encourage organisations to use such standards, by providing incentives for strong environmental performance to public institutions.

The ISO 14001 certifications are mainly apprehended by large organizations, as small to medium enterprises (SMEs) have a smaller turnover and thus a correspondingly small return on the costs of certification. (Chavan, 2005) identified that a fully certified ISO standard may not be suitable for smaller organizations, however it does provide guidelines that assist organizations to consider all the relevant issues, and thus gain the most benefit from their EMS, even without certification. SMEs can, therefore, use ISO 14001 as a model for designing their own EMS.

According to Zabihollah and Szendi's, (2000) research, the following are some benefits of applying the ISO 14000 Standards: Ensuring compliance with environmental rules and regulations, Environmental risk reduction and avoidance Monitoring of company's environmental policies and actions, Identifying environmental hazards, Evaluating environmental performance, Educating personnel on environmental concerns, Identify opportunities to improve environmental performance, Legal protection, Risk assessment of causing environmental damage, Formulating environmental policies and reporting systems, Lowering environmental costs, Reducing financial uncertainties in environmental transactions, Developing an environmental management system, Assessing the adequacy and effectiveness of the internal environmental auditing function, Reducing environmental obligations, Improving public relations, Lower insurance premiums.

2.4.3 Benefits of Obtaining ISO 14000 Certification by Public Organizations

Zabihollah and Szendi, (2000) also discussed benefits of obtaining ISO 14000 certification by public organizations. It was identified that Organisations are able to:

- Document the internal environmental management systems including goals, policies, and procedures,
- Satisfy the requirements under ISO 14000 to enter and effectively compete in the global market place,
- Show commitment and compliance with environmental laws and regulations,
- Enhance company image as a good environmental citizen by acting voluntarily in advance of environmental regulations,
- Demonstrate commitment to environmental concerns,
- Comply with governmental and authoritative agencies requirements to register to ISO 14000 standards,
- Train workers to discern effects of environmental actions,
- Implement adequate and effective environmental auditing,
- Safeguard the environment,
- Identify and assess the present and potential environmental risk, obligations, and costs,
- Establish sound accounting and reporting systems to measure, recognize, and disclose environmental costs and obligations,
- Provide information to manage environmental contingencies.

2.4.4 The European Union Guideline to Environmental Sustainable Construction Procurement

The European commission (2011) provides the following steps guidelines based on EU GPP criteria that would promote the incorporation of environmental issues into works procurement. These include:

1. Include selection criteria for architects and engineers on experience in sustainable building design, and for contractors in applying appropriate environmental management measures.
2. Specify minimum energy performance standards for the final building at each stage of the procurement process. Consider providing additional points during award of design contracts for performance beyond the minimum.

3. Consult standards such as the TC/CEN 350 (Sustainability of construction works) and 351(Construction products – Assessment of release of dangerous substances) to determine if compliance with these or equivalent standards should be included in your specification
4. Give preference to designs which incorporate renewable energy systems
5. Restrict the use of hazardous substances in building materials
6. Encourage the use of sustainably sourced timber and other natural materials, recycled and reused materials and the recyclability of materials at their end-of-life
7. Give importance to indoor air quality, occupant wellbeing and adequate ventilation
8. Require the use of water-saving installations and encourage the reuse of grey water and rainwater
9. Include contract clauses related to waste and resource management and transport of construction materials
10. Give contractors responsibility within the contract for monitoring energy performance for several years after construction, and for training users of the building on sustainable energy use.

2.4.5 The British Standards Institution, BS 8903: Principles and Framework for Procuring Sustainably

This document is the world's first standard for sustainable procurement, published in September 2010 by the British Standards Institution. It builds on current best practice and thinking, and provides guidance on adopting and embedding sustainable procurement principles across all stages of the procurement process, including practical advice, examples and links to further support. The BS 8903 guidance is a generic approach to sustainable procurement and it includes three key elements, namely Fundamentals, Enablers, and Procurement process (British Standards

Institution, 2010).

2.5 Drivers to the Incorporation of Environmental Sustainability Issues into Construction Procurement

The drivers to the incorporation of environmental issues into procurement management are discussed under internal and external factors.

2.5.1 Internal Factors

Internal factors driving the incorporation of environmental issues in procurement management are many. They include:

Skilful policy entrepreneurs: In order to incorporate environmental sustainability issues into construction procurement, Drumwright (1994) identified that the personal skills of the procurement officer plays a key role. A skilful procurement officer would be able to identify opportunities to include environmental issues due to intrinsic reward.

Desire to reduce costs, improve quality, pressure from investors, and manage economic risk: The desire to reduce costs represents a common driving force for environmental considerations in projects according to Green et al., (1996). Costs can be prevented by embracing the concept of pollution prevention, and this is a major driving factor for environmental considerations (Green et al., 1996).

Extension of Founder's Value, Values of Owner, Managers Improving Position In Company: Wycherley (1999) found that the personal and ethical values of the founder of the company could filter through the organisation. In the district assembly level, the district chief executive representing government should have passion for the environment and find ways to promote environmental protection in their districts.

Employee involvement: it has been determined that middle management’s support positively influences environmental purchasing (Carter et al., 1998). Hanna et al., (2000) identified that employee involvement is positively related to environmental improvement.

Investor pressure: Increased pressure from investors contributes to the development of environmental policies, according to Trowbridge (2001). Projects from donor supported funds perform better environmentally due to pressures from the donors.

Quality improvement: desire to improve quality influences whether environmental issues would be considered in a contract or not. It has been determined that Environmental performance drive superior quality (Pil and Rothenberg, 2003).

Personal commitment: the commitment of individuals has been found to be positively related environmental considerations in procurement management (New et al., 2000 cited in Walker et al, 2008). When all workers are committed to the environment including the procurement officer, it would be easier to promote environmental issues in their activities.

Table 2.6 Summary of internal drivers to environmental sustainability issues into procurement management and Research Methodology adopted

Internal Drivers For Environmental Considerations In Procurement Management	Reference	Research Methodology
Skillful policy entrepreneurs	Drumwright (1994)	Qualitative/interviews
Desire to reduce costs, pressure from investors, manage economic risk	Green et al. (1996)	Case study/interviews
Desire to reduce costs, improve quality, values of the founder	Handfield et al. (1997)	Case study/interviews

Extension of founder's value	Wycherley (1999)	Case study/interviews
Values of owner, managers improving position in company	New et al. (2000)	Case study/participation
Employee involvement	Hanna et al. (2000)	Survey/questionnaire
Desire to reduce costs	Carter and Dresner (2001)	Case study/interviews
Investor pressure	Trowbridge (2001)	Case study
Improve quality	Pil and Rothenberg (2003)	Survey/questionnaire

2.5.2 External Drivers

The external drivers identified in this research are discussed under five (5) broad categories namely regulation, customers, competitors, society and suppliers.

Regulation:

Legislative and regulatory compliance: government regulation and legislation has been identified as a major driver for promoting environmental management practices (Zhu et al., 2005 cited in Walker et al 2008).

Proactive action pre-regulation: companies which are initially motivated to comply to regulations integrate environmental concerns into their procurement processes more thoroughly than those that are not proactive. (Handfield et al., 1997, p.306, cited in Walker et al 2008). If companies are proactive and innovative in their approach to regulatory compliance, compliance to regulations would not be a problem.

ISO 14000 certification: External regulation and legislation appears to be a strong driver for environmental projects according to Walker et al. (2008).

Regulatory compliance: Environmental regulations promote the reduction of environmental impact at low cost, rather than a cause for litigation (Porter and Van de Linde, 1995 cited in Walker et al 2008). The perception of the importance of environmental compliance is key to compliance (Min and Galle, 2001 cited in Walker et al 2008).

Customers:

Pressure by customers to green supply chain: In investigating the role of procurement in environmental management, it was found that customer demands that take a long-term procurement perspective have a more positive influence on environmental management in contrast to customer requests which involve an unreasonable timeframe (Carter and Dresner, 2001 cited in Walker et al 2008).

Customer demand: Green et al., (1996) found that customers exert pressure on organisations to engage in environmental supply chain practices.

Collaborate with customers: Hall, (2001) revealed that supermarkets are in the position to collaborate with their suppliers. They must take responsibility for their suppliers' actions, as they are more likely to draw media attention.

E-logistics and environment: Sarkis, (2003) found that some companies encouraged strategic suppliers to obtain accreditation, such as the Eco-Management and Audit Scheme (EMAS).

Marketing pressures: Non-organisational stakeholder groups can request and pressure supermarkets to address environmental concerns, rather than going after thousands of independent suppliers (Hall, 2001).

Gaining competitive advantage: According to Gonzalez-Benito and GonzalezBenito, (2005), a policy of environmental purchasing may not be undertaken because of a desire to protect world's resources, but to gain competitive advantage

and improving the financial performance of the institution. Competition does not seem to be a driver for implementing green supply chain management practices in the public sector according to Walker et al. (2008). However, he stated that an element of competition may emerge in the UK public sector, as organisations that perform well financially are given greater independence.

Improve firm's performance: A proactive environmental strategy can help a firm to gain competitive advantage through the development of supply management capabilities, and thus improve performance (Walker et al 2008).

Stakeholders can encourage environmental strategy: stakeholder groups can leverage on environmental sustainability issues by requesting and pressuring people in charge of procurement to address environmental concerns (Hall, 2001).

Potential for receiving publicity: The deterioration of the environment over recent years has drastically increased public awareness of environmental issues. Walker et al. (2008) argued that procurement that makes environmental considerations is as a result of its potential to receive public admiration and win new customers.

Public pressure: Public pressures have also been found to influence green procurement management (Zhu et al, 2005). He argued that the public is increasingly influenced by a company's reputation with respect to the environment when making purchasing decisions. This puts pressure on firms to make environmental considerations in their purchasing.

Reduce risk of consumer criticism: Consumers and stakeholders are causing firms to review their environmental practices (New et al. 2000). In order to reduce risk of consumer criticism, firms are beginning to comply with environmental regulations.

Non-economic Stakeholders and Pressure by Environmental Advocacy Groups: The voice of activist campaigners, non-governmental organisations (NGOs) or green

pressure groups (Hall, 2001; Trowbridge, 2001) cannot be ignored anymore, as they have the ability to seriously embarrass non-compliant organisations (Gabriel et al, 2000).

Collaboration with Suppliers and Supply Integration: It has been suggested that suppliers can help to provide valuable information to be used in the implementation of environmental projects (Carter and Dresner, 2001). Whilst suppliers may not be direct drivers, integration and cooperation in supply chains can support more effective management of environmental issues (Vachon and Klassen, 2006). A collaborative paradigm has been used to explore green supply chain management practices in manufacturing plants (Vachon and Klassen, 2006). It was found that greater supply chain integration can benefit environment management in operations. As the supply base was reduced, the extent of environmental collaboration with primary suppliers increased.

Table 2.7 summarises the external drivers of environmental sustainability issues into procurement management.

Table 2.7 Summary of drivers of environmental issues into procurement management and Research Methodology adopted

EXTERNAL	RESEARCHERS	RESEARCH METHODOLOGY
Regulation		
Legislative and regulatory compliance	Green et al. (1996), Walton et al. (1998), Hall (2001); Beamon (1999); Min and Galle (2001)	Case study/interviews Literature review Survey/ questionnaire
Proactive action preregulation	Carter and Dresner (2001) ;Bowen et al. (2001a, b)	Case study/interviews; Interviews/questionnaire
ISO 14000 certification	Montabon et al. (2000)	Survey/questionnaire
Regulatory compliance	Zhu and Sarkis (2006)	Survey/questionnaire
Customers		

Pressure by customers to green supply chain	Lamming and Hampson (1996); Walton et al. (1998), Green et al. (1996), Handfield et al. (1997); New et al. (2000); Hall (2001)	Qualitative/interviews; Case study/interviews; Case study/participation; Case study/interviews
Customer demand	Carter and Dresner (2001)	Case study/interviews
Collaborate with customers	Klassen and Vachon (2003)	Survey/questionnaire
E-logistics and environment	Sarkis, 2003	Case study/interviews
Marketing pressures	Zhu and Sarkis (2006)	Survey/questionnaire
Competition		
Gaining competitive advantage	Lamming and Hampson (1996); Sharma and Vredenburg (1998); New et al. (2000); Sarkis (2003); Noori and Chen (2003); Zhu and Sarkis (2006); Ferguson and Toktay (2006)	Qualitative/interviews; Case study/survey; Case study/participation; Survey/questionnaire; Case study/interviews; Survey/questionnaire; Modelling
Improve firm performance	Porter and Van de Linde 1995; Melnyk et al. (2003), Carter et al. (2000); Gonzalez-Benito (2005); Chen (2005); Rao and Holt (2005)	Industry analysis; Survey/questionnaire; Industry analysis; Literature review; Survey/questionnaire

Table 2.8 Summary of drivers of environmental issues into procurement management and Research Methodology adopted (CON'T)

Society		
Stakeholders can encourage environmental strategy	Sharma and Vredenburg (1998)	Survey/questionnaire
Potential for receiving publicity	Wycherley (1999)	Case study/interviews
Public pressure	Beamon (1999)	Literature review
Reduce risk of consumer criticism	New et al. (2000)	Case study/participation

Non-economic stakeholders	Delmas (2001)	Survey/questionnaire
Pressure by environmental advocacy groups	Hall (2001)	Case study/interviews
Suppliers		
Collaborate with suppliers	Klassen and Vachon (2003)	Survey/questionnaire
Supply integration	Vachon and Klassen (2006)	Survey/questionnaire

2.6 Challenges to the Incorporation of Environmental Issues in Organisations

Below, the author reviews literature on challenges to the incorporation of environmental issues in an organisation. These have been grouped under internal and external challenges.

2.6.1 Internal Challenges

Cost concerns: An investigation of green procurement practices in US firms revealed that cost concerns are the main obstacle for taking environmental issues into account in the procurement process (Min and Galle, 2001, cited in Walker et al 2008). The situation is the same in developing countries (Ayarkwa, et al., 2010). Fear of incurring costs is more considerable for SMEs which have generally less funds available and thus are more susceptible (Wycherley, 1999 cited in Walker et al 2008). To change the attitude, training has been recommended by many researchers as an effective remedy against „environmental illiteracy“ (Ayarkwa, et al., 2010, Carter and Dresner, 2001).

Lack of understanding of how to incorporate environmental issues into buying:

One study found that procurement officers are unsure of how to incorporate environmental issues in their buying (Cooper et al., 2000 cited in Walker et al 2008).

In terms of social responsible buying, it has been observed that: Even when they recognize the relevance of corporate social responsibility, many purchasing managers do not know how to concretely and systematically include social and environmental issues into purchasing decisions. They have little experience with such demands. (Maignan et al., 2002, p. 642, cited in Walker et al 2008)

Reluctance to change from traditional practices: Ayarkwa, et al. (2010) identified that many procurement professionals are used to the traditional way of doing things and are reluctant to change and use innovative ways to promote environmental issues.

Conflict with company's objective: companies have objectives but many of these objectives are not aligned with the concept of environmental protection. Many see the need to incorporate environmental issues in their activities as conflicting with the objectives of the company (Ayarkwa, et al., 2010).

Loss of competitive edge: competition drives green purchasing but loss of competitive edge makes firms reluctant to consider environmental friendly practices (Walker et al., 2008).

Lack of training and commitment: there is little knowledge on how to introduce environmental issues into the procurement process on the part of procurement officers. Also there is a problem with management commitment (Walker et al 2008). Ayarkwa, et al. (2010) identified that lack of training and commitment by government hinders the implementation of environmental standards.

Accounting methods limit green reporting: there is no evidence that contractors are rewarded for taking measures to protect the environment during the construction stage.

The traditional methods of valuation for building works have no consideration for protecting the environment in most cases (Rao and Holt, 2005).

Shortage of personnel: A barrier to the enforcement of environmental standards in construction has been found to be shortage of personnel. Often the limited numbers of employees are made to attend to more core businesses of the organisation rather than non-core businesses (Ayarkwa, et al., 2010).

Table 2.8 Challenges to the Incorporation of Environmental Sustainability Issues into Procurement Management and Research Methodology Adopted

INTERNAL CHALLENGES	REFERENCE	RESEARCH METHODOLOGY
Cost concern, Lack of understanding of how to incorporate environmental issues into buying, Reluctance to change from traditional practices, Conflict with company's objective, Loss of competitive edge Resistance of employees	Ayarkwa, AyirebiDansoh, Amoah(2010)	Survey/questionnaire
Lack of understanding of how to incorporate green into buying	Cooper et al. (2000)	Case study/interviews
Focus on cost reductions at expense of green practices, lack of management commitment, lack of buyer awareness	Min and Galle (2001)	Survey/questionnaire
Lack of training	Bowen et al. (2001a, b), ayarkwah	Interviews/questionnaire
Lack of training and commitment	Carter and Dresner (2001)	Case study/interviews
Costs hinder greening in forest industry	Caro et al. (2003)	Survey/modelling
Accounting methods limit green reporting	Rao and Holt (2005)	Survey/questionnaire
Costs especially for SMEs	Hervani and Helms (2005)	Survey
Pressure for lower prices	Orsato (2006)	Case studies
Shortage of personnel	Ayarkwa, AyirebiDansoh, Amoah(2010)	Literature review, survey and questionnaire

2.6.2 External Challenges

Lack of Regulation and Unclear regulations: Walker et al (2008) argues that Environmental legislation and regulation can inhibit innovation by prescribing best available techniques and setting unreasonable deadlines. On some environmental issues there are no regulations at all, and many are unclear.

Lack of government support: the government is responsible for taking the lead in sustainable development, notwithstanding, little support is provided in the areas of finance, and legal structure to incorporate environmental sustainability issues into construction procurement (Ayarkwa et al., 2010).

Poor Communication: It is important to communicate a green purchasing policy to a wide range of stakeholders, including present and future suppliers, service providers or contractors, so that they can take account of the new requirements (European Commission, 2011). Cooperation between purchasing authorities is another way of increasing access to environmental expertise and know-how and of communicating the policy to the outside world. According to Vachon and Klassen (2006), companies are often not willing to barter information on green supply for fear of exposing flaws or leaking information to other companies for competitive advantage. In analysing relationships between one customer and twenty suppliers it was found that confidentiality was a major difficulty in green supply chains (Wycherley, 1999 cited in Walker et al 2008).

Specific Industrial Challenges: It has been found that there are different drivers, challenges and practices experienced by different companies in different industries and this may influence how reactive or proactive firms in a particular sector are to environmental supply (Zhu and Sarkis, 2006).

Unwilling to exchange information: Wycherley (1999) found that most companies are unwilling to exchange information on environmental friendly practices for fear of competition.

Summary of Challenges to the incorporation of environmental issues into procurement management is provided in the table below.

Table 2.9 Summary of challenges to the incorporation of environmental sustainability issues into procurement management and research methodology adopted

EXTERNAL CHALLENGES	REFERENCE	RESEARCH METHODOLOGY
Lack of regulation Unclear regulations	Porter and Van de Linde, 1995, cited in Walker et al 2008)	Survey/Questionnaire
Lack of government support Lack of knowledge in the industry	Ayarkwa, Ayirebi-Dansoh, Amoah(2010)	Survey/Questionnaire
Inhibits innovation Poor supplier commitment	Porter and van de Linde (1995)	Case studies
Unwilling to exchange information	Wycherley (1999)	Case study/interviews
Industry specific barriers Different sectors have different challenges	Zhu and Sarkis (2006)	Case study/interviews

The next section discusses construction environmental sensitive areas that may be considered necessary to include environmental sustainability clauses in the procurement process.

2.7 Construction Environmental Sustainability Issues

We can identify construction environmental sustainability issues by taking a look at some of the environmental laws on Ghana. According to the Environmental Assessment Regulations (1999), Schedule 5 (Regulation 30 (2)) the following areas are designated as environmentally sensitive areas:

- All areas declared by law as national parks, watershed reserves, wildlife reserves and sanctuaries including sacred groves;
- Areas with potential tourist value;
- Areas which constitute the habitat of any endangered or threatened species of indigenous wildlife (flora and fauna);
- Areas of unique historic, archaeological or scientific interests;
- Areas which are traditionally occupied by cultural communities;
- Areas prone to natural disasters (geological hazards, floods, rainstorms, earthquakes, landslides, volcanic activity etc.);
- Areas prone to bushfires;
- Hilly areas with critical slopes;
- Areas classified as prime agricultural lands;
- Recharge areas of aquifers;
- Water bodies characterized by one or any combination of the following conditions:
 - water tapped for domestic purposes;
 - water within the controlled and/or protected areas;
 - water which support wildlife and fishery activities.
- Mangrove areas characterised by one or any combination of the following conditions
 - areas with primary pristine and dense growth;
 - areas adjoining mouth of major river system;
 - areas near or adjacent to traditional fishing grounds and
 - areas which act as natural buffers against shore erosion, strong winds or storm floods.

These areas as highlighted in the Environmental Assessment Regulations (1999), all constitute environmental issues that can be addressed through the procurement

process. The table below provides some common construction activities associated with the environment which could be considered as environmental sustainability issue. These activities affect the environment in various ways and are associated with almost every form of construction.

Table 2.10 Common Construction Activities Associated With the Environment

WORK CATEGORIES	EXAMPLES OF OPERATION ACTIVITIES
Site investigations	Trial holes, soil and rock sampling, test wells, ground bearing and other physical tests, etc.
Demolition and site clearance	Removal of existing buildings and structures, temporary access roads, removal of topsoil, clearance of trees and shrubs, and removal of existing services
Geotechnical and other specialised processes	Various methods by which the properties of the ground are modified, including grouting, drainage, diaphragm walls and other impermeable barriers, and remediation of contaminated land
Tunneling	Boring, blasting and spoil disposal
Earthworks	Dredging, excavation for foundations and basements, and reprofiling site contours, etc.
Piling	Variants include bored or driven; pre-formed or cast in sites
Superstructure	Fabrication of pre-formed components, casting of structures, laying of brickwork, blockwork, stone and rip-rap, etc
Services	Drains, water and gas supplies, etc.
Roads and paving	Access roads including public highways, loading areas and car parks
Fitting out	Installation of plant, internal services, cladding and testing, etc.
Landscaping	Planting, seeding and replacement of topsoil, etc.

Source: (Pun et al. 2001)

Pun et al. (2001) also identified common pollutants on construction sites that inevitably affect the environment. These constitute environmental sustainability issues needed to be addressed through construction procurement.

Table 2.9 Common Pollutants on Construction Sites

MAJOR SOURCES	EXAMPLES OF POLLUTANTS
----------------------	-------------------------------

Air	Duct and smell from burning wood
Noise	Unwanted sound from machine operations
Water	Waste water after car washing, cooling systems and the mixing of concrete or other mixtures
Waste	Solid and chemical waste after construction
Dangerous goods	Chemical and acid use or storage on site
Asbestos	Material containing asbestos handled during renovation and alterations

Source: (Pun et al., 2001)

2.7 Identifying Environmental Sustainability issues Considerations in Construction

The Table 2.13 summarises how to identify relevant environmental issues that may be incorporated into the construction procurement. The table shows the environmental impact and considerations of construction activities discussed by Ofori (2000).

Table 2.10 Environmental Impact and Considerations of Construction Activity

What is built	Where it is built	How it is built	What is used
* planning and design of facility (eg. Potential of daylighting and natural ventilation)	* location of facility; nature of terrain and ground conditions; alternative uses of the land	* methods of construction on site	* where raw materials are obtained
* life-cycle economic, quality, maintainability considerations	* immediate physical environment; proximity to water sources and ecosystems	* construction project management systems (eg. quality management systems)	* how raw materials are extracted; how land is restored after extraction (if necessary)
* extent of use of energy and other resources in operation of building	* social disruption (eg. displacement of site's inhabitants)	* site control measures (housekeeping)	* how raw materials are processed
* ease of demolition of building (deconstruction)	* economic disruption (eg. loss of livelihoods of previous inhabitants)	* welfare of site workers, neighbours and general public	* whether, and how renewable raw materials are regenerated
* recycling and reuse of demolition waste	* present infrastructure, need for expansion to serve new building, its impact	* resource management (including waste minimisation)	* how materials are transported to, and stored on, site

	* impact on local vehicular traffic		* how materials are moved on site
--	-------------------------------------	--	-----------------------------------

Source: (Ofori, 2000)

2.8 How to Incorporate Environmental Sustainability Issues in Contract Performance Clauses for Works or Services Procurement (Lessons from the European Union Procurement Procedures)

Contract performance clauses specify how a contract is to be carried out. Environmental considerations can be included in contract performance clauses, provided they are published in the contract notice or the specifications and comply with relevant laws. According to the European commission (2011) the following are possible contract performance clauses for works or service contracts include:

1. How the service or work is performed:

- Application of specific environmental management measures, where appropriate in accordance with a third-party certified scheme such as EMAS or ISO 14001
- Minimisation of waste associated with the contract, e.g. by including specific targets or maximum amounts accompanied by penalty or bonus clauses
- Efficient use of resources such as electricity and water on site
- Use of dosage indicators to ensure appropriate quantities of cleaning products etc.

2. Training of contractor staff:

Staff trained in the environmental impact of their work and the environmental policy of the authority in whose buildings they will be working

3. Transport of products and tools to the site:

- Delivery of products to the site in concentrated form and then dilution on

- site
- Use of reusable containers or packaging to transport products
- Reduction of CO₂ or other greenhouse gas emissions associated with transport

4. Disposal of used products or packaging:

Products or packaging taken away for reuse, recycling or appropriate disposal by the contractor

2.9 Summary of Chapter two

This chapter has revealed that environmental issues can be included in a construction contract so long as the basic procurement requirements are not breached. It has revealed that there are a number of local and international legislature for protecting the environment in Ghana, however these has not been able to solve Ghana's environmental problem. The chapter also addressed the factors driving the incorporation of environmental sustainability issues into public procurement as well as the challenges. Procurement has been identified to have enough impetus to help tackle Ghana's environmental problem by incorporating environmental sustainable issues public procurement. This may be achieved by inserting environmental requirements in the tender document and ensuring compliance. It is possible to apply environmental award criteria, provided those criteria: are linked to the subjectmatter of the contract; do not confer unrestricted freedom of choice on the contracting authority; are expressly mentioned in the contract notice and tender documents, together with their weightings and any applicable sub-criteria; are not selection criteria (e.g. experience or general capacity); comply with the fundamental principles of Ghana's procurement law and other related laws and legislature.

CHAPTER THREE MATERIALS AND METHODS

3.1 Introduction

This chapter presents the approach to which the work was carried out in order to achieve the aim and objectives of the study. The sections presents an overview of the study area, research design, sampling technics and research instruments. Each of these sections describes how the research process was undertaken to collect the required data. The chapter also presents the adopted process for data analysis and ethical issues.

3.2 Study Area

The Western Region is about 10 per cent of Ghana's total land surface covering an area of 23,921 square kilometres. It is located in the south-western part of Ghana, bordered by Ivory Coast on the West, Central Region on the East, Ashanti and Brong-Ahafo Regions on the North and on the South by 192 km of coastline of the Atlantic Ocean. The southernmost part of the region is also the southernmost part of Ghana called Cape Three Points, near Busua. There are 410,142 households in 259,874 houses, which give an average of 1.6 households per house for the region (Ghana Statistical Service, 2012). Most were built in the cocoa and timber economic boom years of the late 1950s and early 1960s. There is congestion in many houses which has resulted in the construction of new buildings at areas that served as agricultural lands and other purposes. There is the need for measures to reduce the effect of these growing construction activities on the environment. The key environmental concerns in the western region include: Impacts of large and small scale mining, Deforestation, Industrial pollution (disposal of solid waste, effluent discharges and gaseous emissions), Coastal erosion and sanitation, Urban sanitation, Water hyacinth/ marine pollution. The western region was selected based on these growing environmental concerns. These environmental concerns arising from construction

activities could be curtailed by incorporating environmental issues into public procurement in the various districts. Figure 3.1 illustrates the map of the study area.

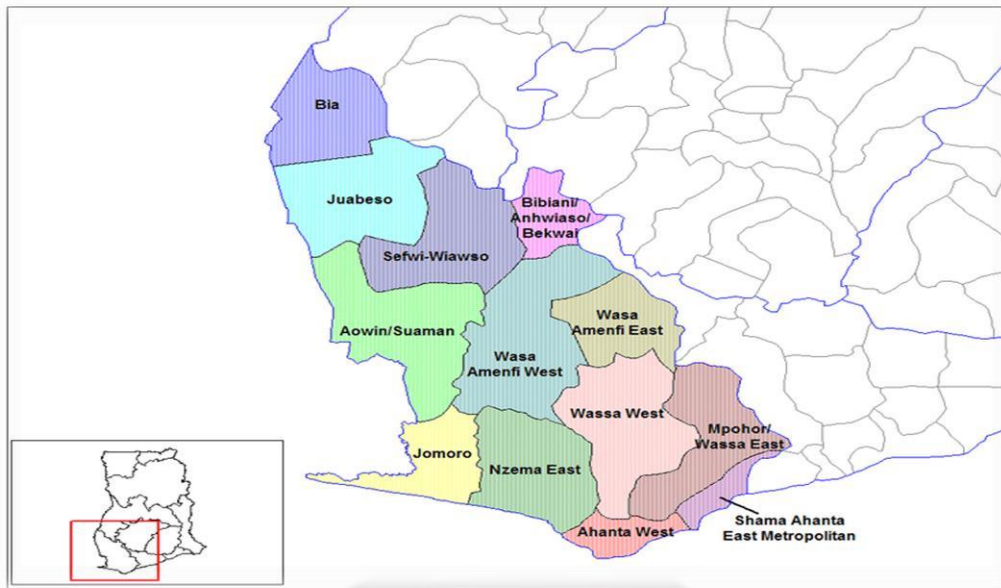


Figure 3. 1 Map of Study Area (Western Region)

For a detailed breakdown of the western regional administrative locations used in the study, see table 3.1.

3.3 Research Design

In order to understand the factors driving the incorporation of environmental sustainability issues into Public Procurement as well as the challenges, explanatory research was used to explain the driving factors and challenges to the incorporation of environmental sustainability issues into public procurement in the Western Region.

Explanatory research involves collecting data in order to answer questions concerning the current status of the subject of the research (Gay, 1990). Yin (1993) explained that explanatory research is an empirical inquiry that explains causal relationship between cause and effect of a phenomenon. Multiple sources of evidence were used in this

explanatory research as suggested by Yin (1993). It is economical and convenient for the study of this nature.

3.4 Sources of Data

Primary source of data was obtained for the study. The primary data was obtained directly from respondents in the twenty-two district assemblies in the Western Region of Ghana through the administration of questionnaires. The primary data provided empirical data for this study about the challenges and factors driving the incorporation of environmental sustainability issues into construction procurement at the district level.

3.5 Study Population

The study population consisted of the following:

- District Engineers;
- Quantity Surveyors; □ Procurement Officers and
- Environmental Officers.

The involvement of the procurement officers, district engineers and quantity surveyors helped in bringing to bear the challenges in incorporating environmental sustainability issues into construction procurement and other problems in the procurement process at the district level. The procurement officers, district engineers and quantity surveyors helped in bringing out the driving factors pushing environmental issues into the procurement process. The inclusion of environmental officers helped the researcher to know the relevant environmental laws and problems that could be solved through the construction procurement process.

3.6 Sample Size for the Study

There are several approaches to determining the sample size of a study. These include: using a census for small populations; imitating a sample size of a similar study; using published tables; and lastly applying a formula such as the Kish formula and others (Nkyi, 2012). For this study, census sampling technique was used to select the twenty-two districts due to the fact that all the districts are located in one region, Western Region; and that the number of districts are relatively small.

Table 3.1 Mmda's In the Western Region Used In the Research

LI	Metropolitan	Capital	Number of Respondents
1928	Sekondi-Takoradi	Sekondi	4
	MUNICIPAL ASSEMBLIES		
1886	Tarkwa Nsuaem	Tarkwa	4
1917	Nzema East	Axim	4
2015	Sefwi Wiaso	Sefwi Wiaso	4
	DISTRICT ASSEMBLIES		
1387	Bibiani/Ahwiaso/Bekwai	Bibiani	4
1394	Jomoro	Half Assini	4
1395	Ahanta West	Agona Nkwanta	4
1757	Amenfi West	Wassa Akropong	4
1840	Prestea-Huni Valley	Bogoso	4
1882	Shama	Shama	4
1884	Sefwi Akontobra	Sefwi Akontobra	4
1918	Ellembele	Nkroful	4
2011	Wassa Amenfi Central	Manso	4
2012	Wassa Amenfi West	Asankrogu	4
2013	Bia West	Essam-Dabiso	4
2014	Bia East	Adabokrom	4
2016	Suaman	Dadieso	4
2017	Aowin/Suaman	Enchi	4
2018	Wassa East	Daboase	4
2019	Mpohor	Mpohor	4
2020	Juaboso	Juaboso	4
2021	Bodie	Bodie	4
22			88

These respondents were selected from the Sekondi-Takoradi Metropolitan, Tarkwa Municipal, Nzema East Municipal, and Sefwi Wiaso Municipal including 18 other

districts. As can be seen from Table 3.1, 4 respondents were drawn from each of the above mentioned metropolis, municipality and district assemblies, comprising district engineers, quantity surveyors, procurement officers and environmental officers. Out of the total number of 88 questionnaires sent, 60 responses were received.

3.7 Sampling Technique

In selecting samples to be included in the study, non-probability sampling techniques were used. Particularly the purposive sampling technique which is a non-probability sampling technique was used to select the procurement officers, environmental officers, district engineers and quantity surveyors. This is because it was believed that all these officers were responsible for construction procurement and were in the best position to respond to the research questions. The snow-ball sampling technique was also adopted to identify respondents by name and contact (*c.f* Somiah, 2014). With the snow-ball method, one respondent was identified in the Sekondi-Takoradi Metropolis, and through him, the name of another respondent in another district was provided, who in turn provided the name of a third in another district, the third provided the name of the fourth in another district and so on, until the twenty-two districts were covered. This strategy helped to improve the response rate.

3.8 Research Instrument

The study used Questionnaire as the main data collection instrument. According to Saunders (2007), questionnaire is used for explanatory research which will enable the study to examine and explain relationships between variables, in particular cause-and-effect relationships. The questionnaire used was appropriate because it was assumed that the procurement officers, environmental officers, as well as the district engineers and quantity surveyors were literate and for that matter they could be able to respond to the questions without any help. The use of questionnaire also facilitated the

collection of data that ensured the best matching of concepts with reality; it provided the same responses from a given set of respondents and helped reduce inconvenience caused by unfavourable interview times and busy schedules.

3.8.1 Questionnaire

The questions were designed with the aim of capturing;

1. Will (certain set of values motivating environmental sustainability issues),
2. Knowledge (knowledge on how to incorporate environmental sustainability issues) and
3. Opportunity (the possibility to do so in practice) (*c.f* Dolva, 2007).

The questionnaire was divided into four (4) parts including different types of questions: background (6 questions); current environmental sustainable construction procurement practices (8 questions); factors driving the incorporation of environmental sustainability issues into public procurement (15 questions); challenges to the incorporation of environmental sustainability issues into public procurement (40 questions); future trends and improvements (4 questions). The final version of the four-page questionnaire was based on five revisions and a pilot study from construction procurement expert at Takoradi Polytechnic.

In all 88 questionnaires were sent out for this study, out of this figure, 22 were given to procurement officers, quantity surveyors, district engineers, and the rest were given to environmental officers. Sixty questionnaire were retrieved and this made the response rate stood at 68 percent. The researcher personally administered the questionnaire to the respondents between the months of May and July 2014. The structured questionnaire was used to direct the researcher in interviewing the

respondents. The questionnaire consisted of mostly closed ended questions and few open questions, based on the research objectives and can be found in the appendix.

3.9 Data Analysis and Presentation

Data collected through questionnaire surveys (except open-ended questions) were analysed using quantitative techniques. The data analysis techniques depend on the type of data collected and their scales of measurement: nominal, ordinal, interval and ratio. Therefore, the identification of data scales of measurement is essential prior to a statistical analysis of collected data. One of the most common rating scales is the Likert scale. As with other scales, the Likert scale is also used either as a summated scale or as an individual scale item. The Likert scale is widely used in measuring attitude and image (Jacoby and Matell, 1971) and often considers as an interval scale. Because of the ordinal nature, Elene and Seaman (2007) stated that the Likert scale is most suitable for data being analysed by non-parametric procedures such as frequencies, tabulation.

The rating scales used in the questionnaire of this study were on a 5 point scale. The 5 point scale enables respondents to express neutrality and helps to eliminate forced choice for a favourable response. It helps minimise positive response bias (Gamage, 2011).

Computer data analyses software such as the Statistical Package for Social Sciences (SPSS) was the main tool employed to analyse the data in order to help interpret results. The justification for the choices of these programmes was that, these techniques facilitated word processing and data analysis very easily and provides accurate pictorial presentations.

3.10 Factor Analysis

The main applications of factor analysis in this study was to reduce the number of variables and to classify variables (Tabachnick and Fidell, 1996). Factor analysis was therefore applied as a data reduction or structure detection method in this research.

In the literature review, factors driving the incorporation of environmental sustainability issues into construction procurement were identified. On each of the 15 factors, respondents were asked to indicate the extent to which that factor influenced construction procurement professionals into incorporating environmental sustainability issues into the construction procurement process, based on a five-point Likert scale where: 1-Least Significant, 2- Less Significant, 3-Significant, 4-More Significant and 5-Most Significant.

On each of the 40 factors, respondents were asked to indicate the most significant challenge to the incorporation of environmental sustainability issues into the construction procurement process at the district level, based on a five-point Likert scale where: 1-Least Significant, 2- Less Significant, 3-Significant, 4-More Significant and 5-Most Significant.

Also, responses were requested on a 5 point scale (where 1-Strongly Disagree, 2-Disagree, 3-Uncertain, 4-Agree 5-Strongly Agree) to measure the extent of agreement to: areas in the tender document where environmental issues could be incorporated; and stages in the procurement process where environmental issues may be incorporated. On a 3 point Likert scale (where 1-Low, 2-Medium, and 3-High), responses were requested on the impact of construction activities on the environment. After all necessary tests of reliability, survey size adequacy and population matrix were satisfied; the data set was subjected to factor analysis using

Principal Component Analysis (PCA) with varimax rotation. Extraction values (eigenvalues) of more than 0.50 at the initial iteration indicated that the variable is significant; and were included in the data for further analysis (c.f Field, 2005). From the scores, it was possible to rank each of the factors according to the mean scores calculated as follows (c.f Ayarkwa et al., 2010):

$$\mu = \frac{\sum_{i=0}^{n5} i \cdot fl}{\sum_{i=1}^{n5} fl}$$

Where f is the frequency of the score and i is for the factor concerned. The one sample t-test was used to determine whether the mean rating of a factor is significantly different from the population mean, $\mu = 3$ (c.f Ayarkwa et al., 2010).

The test statistics were obtained from the formula

$$t = \frac{\bar{x} - \mu_x}{s/\sqrt{n}}$$

where \bar{x} is the sample mean; μ_x is the population mean; s is the sample standard deviation, and n is the sample size.

3.10.1 Initial Considerations

Factor analysis depends on the correlation matrix of the factors involved (Somiah, 2014). The correlations usually need a large sample size before they are stabilized. The size of the sample determines the reliability of factor analysis. A minimum of ten observations per variable is necessary to avoid difficulties in computation (Decoster, 1998 cited in Somiah, 2014). A suitable choice is offered by SPSS to check whether the sample is big enough: the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test). According to existing literature, the value of the KMO must be greater than 0.5 (c.f Somiah, 2014). The Bartlett test of Sphericity was used to establish the potential correlations suggesting that clusters do exist in the factors.

3.11 One-Sample T-Test

The t-test assesses whether the means of two groups are statistically different from each other. Two main types of the t-test were employed. They include the independent-samples t-test which was used when comparing the mean scores of two different groups of people or conditions; and the paired-samples t-test, which was used when comparing the mean scores for the same group of people on two different occasions (Ahadzie, 2007).

In analysing the results of the factors driving the incorporation of environmental sustainability issues into construction procurement, and the challenges to the incorporation of environmental issues into construction procurement, the one sample t-test was used to ascertain the relative significance of the factors. An arbitrary mean was fixed at an appropriate level of 3.0 and the significance level was set at 95% in accordance with predictable risk levels (*c.f* Ayarkwa et al., 2010).

3.12 Research Ethics

Didenko and Konovets, (2008) discussed that any researcher who collect data, analyse and report findings may face ethical concerns. Therefore this section states researcher's awareness in this area. Respondents were assured that the purpose of the research is entirely academic; Participation in survey is voluntary; By any chance no information can be traced back to the respondents; and all the answers will be kept confidential.

3.13 Summary of Chapter Three

This chapter outlined key elements that are primary in deciding a suitable research methodology to address the research problems. The chapter described the underlying philosophical assumptions of the research methods as well as method of data collection

employed by the study. The analytical technique adopted for the study has also been clarified. Table 3.2 provides the summary of the research design for this study.

Table 3.2 Summary of research design

DECISION LEVEL	CHOICE
Epistemological and ontological assumptions	Positivism, Interpretive
Research instrument	questionnaires
Research techniques	Exploratory study
Organization	Districts Assemblies in the Western Region
Sub-units analysis	Environmental department, Procurement department, Planning department, Works department,
Subject	Incorporating Environmental Sustainability Issues Into Construction Procurement At The District Level In Ghana

Chapter four presents the results of the study.

CHAPTER FOUR RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the questionnaire administered to the 22 district assemblies in the western region of Ghana. These results reveal the current environmental management practices, with regards to construction procurement and the role of Environmental Officers in construction procurement. The questionnaire survey highlighted stakeholders' involvement in environmental sustainability regarding construction procurement at the district level. The results come in a form as descriptive statistics summaries (quantitative).

4.2 Background Information

An attempt was made to establish a deeper understanding of the background of the respondents. According to Bansa (2007) you may be able to target the best institution for your research, but as to whether the right individuals in that institution are contacted is more important since the people that matter most are the once that are able to provide us with all the needed responds. Bodriguez (2008) indicated that the position held by any person form a great part in every responds that comes from that person. For instance if a Procurement Officer and a District Engineer are asked the same question say: How long would it take for the construction of a toilet facility? Their responds to this question would defer since they all have different background.

Table 4.1 Position of Respondent Response **Frequencies**
Percentage %

Chief executive	0	0.0
Procurement Officer	13	21.7
Development Officer	0	0.0
of stores	0	0.0
District Engineer	17	28.3
Quantity Surveyor	16	26.7
Environmental Officer	14	23.3
Project Manager	0	0.0
Missing value	0	0.0
Total	60	100

Source: Field Survey 2014

The data presented in Table 4.1 above shows that, a high number of the respondents, representing 28 percent are District Engineers. Whiles 27 percent involved with the survey are Quantity Surveyors it is followed closely by Environmental Officers which scored 23 percent, 22 percent of the total respondents are Procurement Officers. Also, the following positions such as Chief Executive, Development Officer, Head of stores,

Project Manager has not received any respondent representing 0 percent. It is safe to mention that all the 60 respondents across the 19 districts are District Engineer, Quantity Surveyors, Environmental Officers and Procurement Officers. We are sure of a good result since the majority of the respondents are experienced in issues into Construction Procurement at the district level and of high competency to provide data which is credible and representative.

Table 4.2 How Long Have You Been In Professional Practice

Response	Frequencies	Percentage %
<5 years	14	23.3
5-10 years	17	28.3
>10 years	29	48.3
Other	0	0.0
Total	60	100

Source: Field Survey 2014

Empirical studies have been conducted to investigate the number of years one has been in the profession. Rodriguez-Rodriguez (2011) indicated that people that stay long within the same profession know more about their work and gain a lot of experience since they have constantly been dealing with the same work over and over again. Previously, other authors have considered the number of years one stay in a particular work as reducing productivity stating that, when the same job is done over a period of time it becomes boring and laziness set in. Berger and Udell, (1998) argue in their research that, newly employed worker comes on board with new experience and work with zeal but as they stay on the same work they become use to the old experience they game in with. But they concluded that even though that could be a possibility experience is always gaining from the job but them advice that workers should always seek for on the job training. Drawing from these experiences, there was a need to know how long our respondent has been on their respective professional work for us to

determine their level of experience on their respective work. The criteria for experience and professionalism in the context of this research are determined as the number of years of practiced. From Table 4.2 above, 23.3 percent of the respondents involved with the survey have been in the Profession for less than 5 years. Meanwhile 28.3 percent of the respondent has been in the profession between 5 and 10. But 48.3 percent which form the large part of the respondent has stayed in their respective profession for a period of more than 10 years. The conclusions drawn on these findings are that, the results give indications that the respondents have reasonable experience in their respective field. Furthermore, the findings suggest that most respondents are regularly active and have had the chance to be part of a lot of issues into construction procurement at the district level. It seems therefore plausible to conclude that those who responded to the survey are sufficiently experienced in issues into construction procurement at the district level and are competent to provide data which is credible and representative.

4.3 Current Construction Procurement Management Practices at the District Assembly Level

This section sort to bring to light the awareness of environmental impacts of construction activities and efforts to incorporate environmental issues into the construction procurement process in accordance with the Public Procurement Act, Act 663 (2003) at the various districts in the Western Region.

4.3.1 Awareness of Impact of Construction Activities on the Environment

Respondents were asked to rate the impact of their construction activities on the environment. The results are presented in Table 4.3 below and discussed.

Table 4.3 Impacts of Construction Activities on the Environment

	Low Frequencies (%)	Medium Frequencies (%)	High Frequencies (%)	Total	Rating Response
--	--------------------------------	-----------------------------------	---------------------------------	--------------	----------------------------

Noise and vibration impacts	11(18.3%)	30(50.0%)	19(31.7%)	60(100%)
Air quality impacts	20(33.3%)	16(26.7%)	24(40.0%)	60(100%)
Visual impacts	32(53.3%)	8(13.3%)	20(33.3%)	60(100%)
Water quality impacts	7(11.7%)	13(21.7%)	40(66.7%)	60(100%)
Construction waste impacts	20(33.3%)	5(8.3%)	35(58.3%)	60(100%)
High energy consumption	40(66.7%)	15(25.0%)	5(8.3%)	60(100%)
Deforestation	9(15.0%)	12(20.0%)	39(65.0%)	60(100%)
Other	5(8.3%)	10(16.7%)	45(75.0%)	60(100%)

Source: Field Survey 2014

Harry (2002), in his research to evaluate the effect of human activities on the environment pointed out a number of things that are affected during construction. Among them were Deforestation, Waste generation, Water pollution, Visual impacts, and Air pollution. According to him even though contractors are aware of all these negative effects on the environment, little is done to safeguard residents, the forest and water bodies. Table 4.3 above shows the respondents' responses on the impacts that construction procurement activities have on the environment. On „Noise and vibration“, 30 of the respondents representing 50.0 percent rated it as having medium impact, 19 of them representing 31.7 percent also rated it as having high impact while only 11 of them representing 18.3 percent rated it as having low impact. On the impact of construction activities on „air quality“, 24 of the respondents representing 40.0 percent rated it as having high impact, 20 of the respondents representing 33.3 percent rated it as having low impact with the rest, representing 16.7 percent rating it as having medium impact. More so, concerning „Visual impacts“, 32 of the respondents representing 53.3 percent rated it as having low impact, 20 of the respondents representing 33.3 percent rated it as having high impact while few of the respondents

representing 13.3 percent rated it as having medium impact. However, with regards to impact on water quality, 40 of the respondents representing 66.7 percent rated it as high impact, 13 of the respondents representing 21.7 percent rated it as medium impact with just 7 of them, representing 11.7 percent rating it as low impact. On the issue of „construction waste“, 35 of the respondents representing 58.3 percent rated it as having low impact, 20 of them representing 33.3 percent rated it as having medium impact and few of the respondents representing 8.3 percent rated it as having high impact. Furthermore, on „High energy consumption“, 40 of the respondents representing 66.7 percent rated it under low impact, 15 of the respondents representing 25.0 percent rated it under medium impact while 5 of the respondents representing 8.35 percent rated it under high impact. Concerning deforestation, 39 of the respondents representing 65.0 percent rated it under high impact, 12 representing 20.0 percent of respondents rated it under medium impact while 9 of the respondent representing 15.0 percent rated it under low impact. Lastly, other environmental impacts, 45 of the respondents representing 75.0 percent rated it under high impact, 10 of them representing 16.7 percent said it has medium impact with just 5 of the respondents representing 8.3% rating it under low impact. Land degradation and erosion were itemised by respondents under other environmental impacts of construction activities. The findings lean to the understanding that, though the respondents are aware of the impacts that construction procurement activities have on the environment they do not pay attention to it when procurement is being done. With reference to donor funded projects such as World Bank projects, environmental officers are trained as Safeguard officers with the responsibility of monitoring the implementation of environmental requirements that are specified in the contract. The rich experience gained as safeguard officers in the donor funded projects are not exploited when it comes to local projects.

4.3.2 Parts of the Tender Documents to Insert Environmental Issues

Respondents were asked to indicate which part of the tender documents were relevant areas to insert environmental considerations and at what stages in the procurement process are potential areas to introduce environmental sustainability issues. Table 4.4 below depicts the summary of respondents' responses on the part of a tender document that environmental sustainability issues may be incorporated. Respondents were asked to rate the extent of agreement to the parts of the tender document where environmental issues may be incorporated on a 5 point Likert scale (where 1-Strongly Disagree, 2-Disagree, 3-Uncertain, 4-Agree, and 5-Strongly Agree). The results were ranked based on their mean scores and are presented in table 4.4 below and discussed (*c.f.* Ayarkwa et al., 2010).

Table 4.4 Part of a Tender Document That Environmental Sustainability Issues Are Incorporated

Parts of the Tender Document	Mean	Std. Deviation	Rank
The Subject Matter of the Contract	4.27	1.023	2nd
Technical Specifications for the Product/Work/Service	4.15	.899	4th
The Selection Criteria for Candidates	3.98	1.000	5th
The Contract Award Criteria	4.27	1.103	3rd
The Contract Performance Clauses	4.43	.789	1st

Using the t-test indicates that the score is significantly above 3.0 at 5% level. Respondents ranked the „contract performance clause“ (mean- 4.43, standard deviation .789) first, indicating strong agreement that it is the best part of the contract document to insert an environmental requirement. It must however be noted that almost all the parts recorded high means indicating that all parts of the tender document are likely areas to include an environmental sustainability issue. Nevertheless, three of the variables had high standard deviations, namely „the subject

matter of the contract“ (1.023), „the selection criteria“ (1.0), and „the contract award criteria“ (1.103). This indicates variability in the data collected and inconsistency in agreement among the respondents. Literature revealed environmental byelaws that cover key environmental issues such as protection of forest wildlife and habitats, forest resources and protected areas, cultural heritage conservation, protection and conservation of coastal environment etc. Apart from the bye laws, the National Development Planning Committee (NDPC) of the Ministry of Finance and Economic Planning has made it mandatory for all Medium Term Development Plans submitted by all district assemblies in Ghana to include an environmental component. Medium Term Development Plans that do not include the Strategic Environmental Assessment (SEA) needs into their Medium Term Development Plans are not funded by the NDPC. This forms part of efforts to check environmental degradation by ensuring that district assemblies adopt development strategies that are environmentally friendly. Other regulations include the National Environmental Management plan, Environmental Impact Assesment (EIA) and the District Environmental Sanitation Action Plan (DESAP). The results emphasized that, in all parts of a tender document, environmental sustainability issues may be incorporated, and with the involvement of Environmental Officers this would be realised more easily since they have the expertise knowledge on the environmental at the district level. The key issue is not to breach the basic procurement ethics (European Commission, 2011; British Standards Institution, 2010, Public Procurement Act, Act 663, 2003). This is a good signal that portrays opportunity for environmental considerations even with the current procurement system in Ghana.

4.3.3 Stages to incorporate environmental issues in the procurement process

Table 4.5 below, shows the summary of responses on the stages of procurement that environmental sustainability issues may be incorporated. Respondents were asked to indicate extent of agreement to the stages in the procurement process where environmental issues may be incorporated on a 5 point Likert scale (where 1 Strongly Disagree, 2-Disagree, 3-Uncertain, 4-Agree, and 5-Strongly Agree). The results were ranked based on their mean scores and are presented in Table 4.5 below and discussed (c.f. Ayarkwa et al., 2010).

Table 4. 5 Stage of Procurement That Environmental Sustainability Issues Are Incorporated

Stages of Procurement	Mean	Std. Deviation	Rank
Establishing What is to be Procured	*3.98	1.242	3rd
Decision on Procurement Strategies in terms of Contract, Pricing and Targeting Strategy and Procurement Procedure	*3.87	1.142	5th
Soliciting Tender Offers	*3.90	1.175	4th
Evaluation of Tender Offers	*4.20	1.132	1st
Award of Contract	2.12	1.195	6th
Administering Contracts and Confirmation of Compliance with Requirement	*4.10	1.160	2nd

Using the t-test * indicates that the score is significantly above 3.0 at 5% level

The fourth stage of procurement, Evaluation of tender offers, recorded the highest mean value of 4.20. This suggests that respondents strongly agreed that it as the best stage in procurement to introduce an environmental sustainability issue. It is surprising to note that, all the variables had high standard deviations, indicating variability in the data collected and inconsistency in agreement among the respondents. Administering contracts and confirmation of compliance with requirement had the second highest mean value of 4.10. This also suggests that respondents strongly agreed that it was crucial to confirm compliance with environmental requirements during the contract

execution period. However, theory suggests that all stages are relevant areas to include an environmental issue (European commission 2011). It can be concluded that, in totality, almost all the respondents agreed that at each stage of the tendering process, environmental sustainability issues could be incorporated though there was inconsistency in agreement among the respondents. The stages are; Establishing what is to be procured, procurement strategies in terms of contract, pricing and targeting strategy and procurement procedure, Soliciting tender offers, Evaluation of tender offers and administering contracts and confirmation of compliance with requirement except for the Award of contract that recorded the lowest mean value of 2.12. Since this fell below the neutral score of 3.0, it is considered least significant when it comes to stages in the procurement process where environmental issues may be incorporated. Again, the key issue here is that basic procurement ethics must not be breached (European Commission, 2011; British Standards Institution, 2010, Public Procurement Act, Act 663, 2003)

4.4 Factors Driving the Incorporation of Environmental Sustainability Issues into Construction Procurement at the District Level

Respondents were asked to rank on a scale of 1 (Least) to 5 (Highest) the significance of the various factors driving the incorporation of environmental sustainability issues into construction procurement at the district level. Factors driving the incorporation of environmental sustainability issues into the procurement system at the district level are analysed and presented below. The variables are coded for easy interpretation.

CODE	VARIABLE
V1	Gaining competitive advantage
V2	Government pressure
V3	Investor pressure
V4	Awareness of environmental impacts
V5	Consensus on standard EMS needed in sector
V6	Environmental culture among competitors

V7	Society pressure
V8	Legislature and Legal compliance
V9	Develop good image
V10	Desire to improve quality on performance
V11	Skilful policy procurement/environ officers
V12	ISO 14001certification
V13	Desire to manage economic risk
V14	Potential for receiving publicity
V15	Reduce risk of consumer criticism

Table 4.6 Descriptive Analyses of Factors Driving the Incorporation of environmental Sustainability Issues into Construction Procurement at the District level

Code	Factors	Mean	Std. Deviation	Rank
V1	Gaining competitive advantage	*4.09	1.11	5th
V2	Government pressure	*3.91	1.18	6th
V3	Investor pressure	1.49	0.61	15th
V4	Awareness of environmental impacts	*3.65	1.27	9th
V5	Consensus on standard EMS needed in sector	*3.73	1.34	8th
V6	Environmental culture among competitors	*3.56	1.39	10th
V7	Society pressure	2.35	0.93	14th
V8	Legislature and Legal compliance	*4.60	0.66	2nd
V9	Develop good image	*4.24	0.98	4th
V10	Desire to improve quality on performance	1.91	0.89	13th
V11	Skilful policy procurement/environ officers	*3.22	1.34	12th
V12	ISO 14001certification	3.87	1.09	7th
V13	Desire to manage economic risk	*4.45	0.74	3rd
V14	Potential for receiving publicity	*3.31	1.41	11th
V15	Reduce risk of consumer criticism	*4.85	0.36	1st

Using the t-test *indicates that the score is significantly above 3.0 at 5% level

Source: Field Survey 2014

From the above table, it can be seen that the factor V₁₅ (“reduce risk of consumer criticism”) recorded the highest mean value of 4.85 with a corresponding standard deviation of 0.36 being the least number of standard deviation. V₃ (investor pressure) recorded the least mean number of 1.49 and a corresponding standard deviation of 0.61. This means that respondents rated it mostly under 1 and 2, implying that it is of

the least important when it comes to factors driving the incorporation of environmental sustainability issues into the procurement system. It can also be seen that factors such as legislature and legal compliance, desire to manage economic risk, develop good image, gaining competitive advantage, government pressure, ISO 14001 certification, consensus on standard EMS needed in sector, potential for receiving publicity, Skilful policy procurement/envirom officers all recorded high mean values. This suggests that they have been rated high by the majority of the respondents.

Table 4.7 Correlation Matrix

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	V ₉	V ₁₀	V ₁₁	V ₁₂	V ₁₃	V ₁₄	V ₁₅
V ₁	1.00														
V ₂	0.09	1.00													
V ₃	-		1.00												
V ₄	0.23	0.09	0.13	1.00											
V ₅	0.22	0.13	0.13	0.27	1.00										
V ₆	0.15	0.28	0.03	0.32	0.60	1.00									
V ₇	0.42	0.17	0.03	0.38	0.44	0.23	1.00								
V ₈	0.27	0.00	0.01	0.15	0.33	0.23	0.41	1.00							
V ₉	0.33	0.10	0.29	0.39	0.23	0.27	0.19	0.41	1.00						
V ₁₀	0.29	0.02	0.26	0.10	0.23	0.27	0.19	0.41	0.08	1.00					
V ₁₁	-	-	-	-	-	-	-	-	-	-	1.00				
V ₁₂	0.07	0.06	0.19	0.09	0.07	0.08	0.01	0.10	0.08	0.08	0.05	1.00			
V ₁₃	0.29	0.27	0.14	0.15	0.33	0.25	0.18	0.04	0.21	0.05	0.21	0.05	1.00		
V ₁₄	0.07	0.44	0.04	0.17	0.23	0.04	0.07	0.07	0.25	0.12	0.10	0.10	0.25	0.05	1.00
V ₁₅	0.17	0.20	0.09	0.07	0.22	0.22	0.07	0.38	0.31	0.22	0.25	0.05	0.05	1.00	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
	0.17	0.33	0.12	0.23	0.38	0.28	0.08	0.06	0.31	0.21	0.21	0.63	0.09	0.09	1.00

V_{15}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.20	0.08	0.09	0.03	0.19	0.06	0.04	0.14	0.05	0.02	0.15	0.05	0.11	0.02	1.00

Source: Field Survey 2014

Table 4.7 represents the correlation matrix of the data. The correlation matrix helps in determining the relationship between the various factors. The highest correlation is between V_{14} (potential for receiving publicity) and V_{12} (ISO 14001 certification) with the value of 0.63. The second highest correlation is between V_6 (environmental culture among competitors) and V_5 (consensus on standard EMS needed in sector) with the value of 0.60. Other correlations like V_7 (Society pressure) and V_6 (environmental culture among competitors), V_{12} (ISO 14001 certification) and V_2 (government pressure) have moderate high correlation, 0.44. Again, another correlation of 0.33 was observed between V_8 (legislature and legal compliance) and V_6 (environmental culture among competitors), V_8 (legislature and legal compliance) and V_1 (gaining competitive advantage), and V_{11} (Skilful policy procurement/environmental officers) and V_5 (consensus on standard EMS needed in sector). Between V_8 (legislature and legal compliance) and V_4 (Awareness of environmental impacts), there is a correlation of 0.39. Another correlation value of 0.22 was observed between V_4 (Awareness of environmental impacts) and V_1 (gaining competitive advantage). The correlation between V_{15} (reduce risk of consumer criticism) and V_{10} (desire to improve quality on performance) recorded the least value of correlation with a value of 0.02. Also, negative correlation exist between V_8 (legislature and legal compliance) and V_3 (investor pressure) with a value of -0.29. There is also a negative correlation of -0.10 between V_{10} (mode of dressing) and V_8

(legislature and legal compliance). Between V_{13} (desire to manage economic risk) and V_3 (investor pressure), there exist a negative correlation of -0.09.

Table 4.8 KMO and Bartlett's Test

Measure	value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.77
Bartlett's Test Critical Value	234.44
Bartlett's test degree of freedom	105
Bartlett's significant value	0.00

Source: Field Survey 2014

The KMO statistic varies between 0 and 1 with a value of zero indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion of pattern of the correlations and hence factor analysis is likely to be inappropriate (Gorsuch, 1983 and Field, 2005) A value close to 1.00 indicates that patterns of correlation are relatively compact and so factor analysis should yield distinct and reliable factors (Field, 2005). However, literature recommends that the KMO value should be greater than 0.50 if the sample size is adequate (Child, 1990 and Field, 2005). With the KMO value of 0.8, as indicated in table 4.20 above, it means that the factors are meritoriously adequate for factoring. This suggests that factor analysis is appropriate and correlation matrix is appropriate for factoring. The Bartlett's test of sphericity is also significant (a p - value of 0.00 at a large chi-square value of 234.44, this though relative, is large enough to warrant factor analysis. The correlation analysis, the KMO and the Bartlett's tests above suggest that, there are correlations among the indicator variables and hence, we can subject the original 15 indicators to a factor analysis procedure.

Table 4.9 Total Variance Explained

Component	Total	% of Variance	Cumulative %
1	4.85	28.56	28.56
2	2.98	17.55	46.11
3	1.98	11.62	57.73
4	1.39	8.20	65.93
5	1.29	7.57	73.50

Source: Field Survey 2014

Using the Eigenvalue greater than one rule, the first factor explains about 28.56% of the data. The second factor also explains about 17.55% of the data which was not explained by the first factor. The third factor explains about 11.62% of the data which was not indicated by the first and second factors. The fourth factor explains about 8.20% of the data which was not explained by the first three factors having about 65.93 cumulative percentages which is highly significant to explain the total variations in the data.

Scree Plot

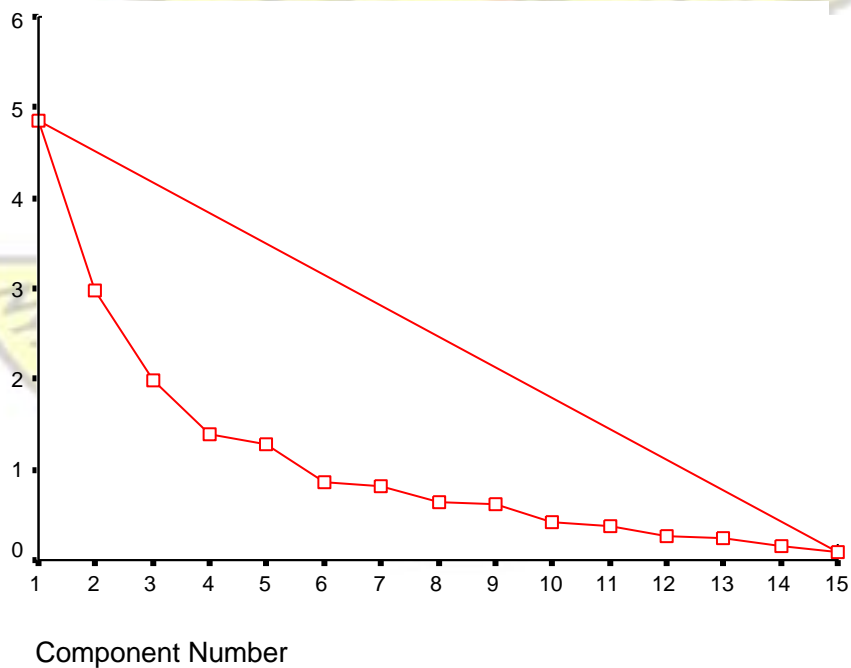


Figure 4.1 Scree Plot
Source: Field Survey 2014

From figure 4.3, it can be seen that the „elbow“ of the diagram occurs at the fourth component. This intends depicts that, the number of factors that must be considered for extraction is four (4) but must not exceed five.

Table 4.10 Rotated Factor Matrix

Code	Variable	Component			
		1	2	3	4
V1	Gaining competitive advantage	0.02	0.39	0.37	-0.80
V2	Government pressure	0.92	0.02	0.52	0.03
V3	Investor pressure	0.06	-0.04	-0.14	0.16
V4	Awareness of environmental impacts	0.24	0.21	-0.20	0.03
V5	Consensus on standard EMS needed in sector	0.36	1.09	0.07	0.24
V6	Environmental culture among competitors	0.13	1.22	0.18	-0.07
V7	Society pressure	-0.18	0.48	0.08	0.03
V8	Legislature and Legal compliance	-0.09	0.17	0.13	-0.09
V9	Develop good image	-0.25	0.28	0.60	0.04
V10	Desire to improve quality on performance	0.04	0.04	-0.42	0.05
V11	Skilful policy procurement/envirom officers	0.27	0.27	0.42	1.13
V12	ISO 14001certification	0.91	0.02	-0.18	-0.10
V13	Desire to manage economic risk	0.14	0.13	0.33	0.05
V14	Potential for receiving publicity	1.04	0.43	-0.67	0.25
V15	Reduce risk of consumer criticism	-0.03	0.03	0.00	0.09

Source: Field Survey 2014

Setting a cut-off point of 0.5, the following factor groupings were obtained. Table 4.10 above presents the results of the rotated component matrix. The interpretability of results can be improved through rotation (Norusis, 2000). The rotated factor solution is displayed by default and is essential for interpreting the final rotated analysis. Rotation suggests the behaviour of the variables under extreme conditions and maximizes the loading of each variable on one of the extracted factors whilst minimizing the loading on all other factors and it is best factor output solutions for interpreting factor analysis (Child, 1990). Upon critical examination of inherent relationships among the various factors identified, the various principal components

were named. The names of various principal components were formed based on the factors with the highest loadings and the understanding of the relevance of these factors in the context of the study. The various principal components with their respective factor loadings have been presented and discussed below:

4.5 Discussion of Components

4.5.1 Component 1: Leadership Influence

It was observed that, component one loads highly on V_2 (government pressure-0.92), V_{12} (ISO 14001 certification- 0.91) and V_{14} (potential for receiving publicity-1.04). Thus the factor here is named leadership influence. From Table 4.10, this cluster accounted for 28.56% of the variance. A significant body of research indicates that government pressure is a major driver for companies' environmental efforts (Walker et al. 2008, Adetunji et al., 2008, Varnas et al., 2008). According to Walker et al. (2008) government can play a leading role in driving environmental sustainability issues into the procurement process. This could be done by creating the opportunity in the form of procurement legislature and laws that allow for environmental sustainability issues to be incorporated into the construction procurement process for implementation at the district level. According to Walker (2008), ISO certification drives the incorporation of environmental issues into the procurement process. Literature agrees with the findings, that current procurement laws in Ghana addresses few sustainability issues (Boyefio, 2008), and that the government must take the lead in promoting environmental friendly practices.

4.5.2 Component 2: Environmental culture

Component two loads highly on V_5 (consensus on standard EMS needed in sector 1.09) and V_6 (environmental culture among competitors-1.22). Thus the factor here is named environmental culture. From Table 4.10, this cluster accounted for 17.55% of the

variance. These two factors indicate that to be able to incorporate environmental issues into construction procurement there is the need for Procurement Officers and District Engineers to develop an environmental culture and enabled by a common Environmental Management Standard available for implementation in the various districts. This would enable an effective Environmental Management System to be established among all the districts (Gonzalez-Benito and Gonzalez-Benito, 2005).

4.5.3 Component 3: Public Influence

The third component loaded highly on V₁₄ (potential for receiving publicity-0.67), V₉ (develop good image-0.6) and V₂ (government pressure-0.52), thus the factor is named public influence. From Table 4.10, this cluster accounted for 11.62% of the variance. This result agrees with literature. Walker (2008) observed that public awareness on environmental impact of construction activities is drastically increasing, and this generates pressure to improve environmental performance in the construction industry. Public pressure and stakeholders are causing firms to review their environmental supply practices (Delmas, 2001). Some non-governmental organisations (NGOs) are putting pressure on organisations to improve their environmental performance (Gabriel et al., 2000).

4.5.4 Component 4: Personal Skills

Component four loads highly on V₁₁ (Skilful policy procurement/enviro officers 1.13) and V₁ (gaining competitive advantage-0.80), thus the factor is named personal skills. From Table 4.10, this cluster accounted for 8.2% of the variance. This agrees with the observation of Drumwright (1994) that in order to incorporate environmental sustainability issues into construction procurement, personal skills of responsible officers is key. Improvement on the financial performance of the district

and reduction in cost of environmental impacts of construction procurement activities would enable the district to gain a competitive advantage over other districts, especially in competing for the national purse, but this can only be achieved through the personal skills of responsible officers for construction procurement at the various districts (Gonzalez-Benito and Gonzalez-Benito, 2005). This calls for the need to improve the skills of District Engineers and Procurement Officers in ways environmental sustainability issues may be incorporated in a contract and be made contractually enforceable.

Table 4. 11 Varimax Transformation Matrix.

Component	1	2	3	4
1	0.55	0.74	0.07	0.20
2	-0.67	0.40	0.47	-0.29
3	-0.21	-0.05	0.39	0.88
4	-0.38	0.04	-0.70	0.32

Source: Field Survey 2014

From table 4.11, it can be deduced that, the second component, „Environmental Culture“, is the first most important component since the second unrotated coincides with the first rotated one. The first component, „Leadership Influence“, is the next most important followed by the fourth component, „Personal Skills“. Finally the third factor „Public Influence“ is the fourth most important.

4.6 Challenges to the Incorporation of Environmental Sustainability Issues into Construction Procurement

Below, the descriptive analysis of the challenges facing the incorporation of environmental sustainability issues into construction procurement at the district level is presented. Respondents were asked to rank on a scale of 1 (Least) to 5 (Highest) the

significance of the various challenges to the incorporation of environmental sustainability issues into construction procurement at the district level. This was captured under Section 4.0 of the survey questionnaire.

Table 4.12 Descriptive Analysis of Challenges to the Incorporation of Environmental Sustainability Issues into Construction Procurement at the District Level CODE VARIABLE

X1	Difficulties in inserting environmental issues in a bid	
X2	Lack of consensus on EM standards within the sector	
X3	Lack of support from senior management team	
X4	Lack of support from other staff and workers	
X5	Lack of roadmap or strategy	
X6	Lack of management commitment	
X7	Other procurement targets	X8
Contractors' abilities		X9
Lack of knowledge/skills		
X10	Resource limitations	
X11	Poor communication	
X12	Weak processes	
X13	Cost reduction focus	
X14	Implementation costs are too high	
X15	Lack of training	
X16	Complex documentation processes/procedures	
X17	Loss of competitive edge	
X18	Focus on reducing cost at expense of environmentally	
X19	Resistance of employees' friendly practices	
X20	Lack of contractor awareness	X21
Costs of improvement are too high		
X22	Accounting methods limit green reporting	
X23	Pressure for lower prices environmental	
X24	Conflict with assembly's objective	
X25	Lack of understanding of how to insert issues in contracts	
X26	Reluctance to change from traditional practices	
X27	Shortage of personnel	
X28	Lack of tailor-made training	
X29	Lack of support from suppliers/ contractors	
X30	Lack of government guidance/support	
X31	Volume of sustainability information	
X32	Lack of supplier commitment	
X33	Language and cultural differences	
X34	Limiting standards	
X35	Competitive pressures	

X36	Lack of knowledge in the industry	
X37	Inhibits innovation	X38
Unwilling to exchange information		
X39	Contractors desire for lower prices	X40
Poor contractor/supplier commitments		

Table 4.13 challenges to the incorporation of environmental sustainability issues into construction procurement at the district level

Variables	Mean	Std. Deviation	Rank
X1	4.48	.651	4th
X2	3.12	1.195	30th
X3	4.18	1.255	9th
X4	4.07	.972	13th
X5	4.42	1.279	5th
X6	4.22	1.195	8th
X7	3.13	1.512	29th
X8	3.95	.872	17th
X9	4.37	1.025	7th
X10	3.37	1.262	25th
X11	2.75	.628	34th
X12	3.83	.867	20th
X13	4.60	.942	1st
X14	3.87	.873	19th
X15	4.38	.585	6th
X16	3.27	.446	27th
X17	2.73	1.247	35th
X18	4.58	.671	3rd
X19	2.08	1.078	40th
X20	4.02	.701	16th
X21	4.03	1.041	15th
X22	3.22	.825	28th
X23	4.05	.811	14th
X24	2.23	.831	39th
X25	4.15	1.132	10th
X26	4.10	1.145	11th
X27	3.05	1.358	32nd
X28	4.08	1.124	12th
X29	3.58	.869	22nd
X30	4.60	.494	2nd
X31	3.75	.474	23rd
X32	2.87	1.049	33rd
X33	2.43	1.079	38th
X34	2.55	.891	36th
X35	3.77	1.198	21st

X36	3.07	1.388	31st
X37	3.65	.547	24th
X38	2.47	1.127	37th
X39	3.37	1.314	26th
X40	3.88	1.180	18th

Source: Field Survey 2014

The above table, depict the mean and the standard deviation of the challenges to the incorporation of environmental sustainability issues at the District level. It can be seen that the factor X14 (“cost reduction focus”) recorded the highest mean value of 4.60 with a corresponding standard deviation of 0.492. X19(“resistance of employees”) recorded the least mean number of 2.08 and a corresponding standard deviation of 1.078. This explain that respondents rated it mostly under 1 and 2, implying that it is the least important when it comes to the challenges to the incorporation of environmental sustainability issues into construction procurement at the District level .

It can also be seen that factors such as X1 (difficulties in inserting environmental issues in a bid), X3 (Lack of support from senior Management team), X4 (lack of support from other staff and workers), X5 (lack of roadmap or strategy), X6 (lack of management commitment), X7 (other procurement targets), X9 (lack of knowledge or skills), X15 (lack of training), X18 (focus on reducing cost at the expense of environmentally friendly practices), X20 (lack of contractor awareness, X21 (cost of improvement are too high) X23 (pressure for lower prices, X25 (lack of understanding of how to insert environmental issues into a tender document, X26 (reluctance to change from traditional practices, X28 (lack of tailor-made training), and X30 (lack of government guidance) recorded high mean values. This suggests that they have been rated high by the majority of the respondents. When introducing environmental issues into construction procurement, public sector organizations, such as the district assemblies are often limited by international and national procurement laws. The

procurement law requires entities to have a transparent and non-discriminatory procurement process (Williams et al., 2007). These regulations do not allow procurement entities to introduce irrelevant pre-qualifications clauses to contracts (Williams et al., 2007). Often times, procurement entities are concerned that environmental sustainability would be considered an irrelevant pre-qualification. However, with careful wording and interpretation of the law, procurement entities can show that environmental sustainability is relevant to the contract (Williams et al., 2007).

Table 4.14 KMO and Bartlett’s Test

Measure	value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.78
Bartlett's Test Critical Value	670.72
Bartlett’s test degree of freedom	276
Bartlett’s significant value	0.00

Source: Field Survey 2014

The KMO statistic varies between 0 and 1 with a value of zero indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion of pattern of the correlations and hence factor analysis is likely to be inappropriate (Gorsuch, 1983 and Field, 2005) A value close to 1.00 indicates that patterns of correlation are relatively compact and so factor analysis should yield distinct and reliable factors (Field, 2005). However, literature recommends that the KMO value should be greater than 0.50 if the sample size is adequate (Field, 2005 and Child, 1990). With the KMO value of 0.8, as indicated in table 4.15 above, it means that the factors are meritoriously adequate for factoring. This suggests that factor analysis is appropriate and correlation matrix is appropriate for factoring. The Bartlett’s test of

sphericity is also significant (a p - value of 0.00 at a large chi-square value of 670.72, is large enough to warrant factor analysis. The correlation analysis, the KMO and the Bartlett's tests above suggest that, there are correlations among the indicator variables and hence, we can subject the original 40 indicators to a factor analysis procedure.

Table 4.12 Total Variance Explained

Component	Total	% of Variance	Cumulative %
1	9.90	24.76	24.76
2	8.06	20.14	44.91
3	7.71	19.28	64.18
4	5.59	13.98	78.16
5	4.84	12.09	90.25

Source: Field Survey 2014

Using the Eigenvalue greater than one rule, the first factor explains about 24.76% of the data. The second factor also explains about 20.14% of the data which was not explained by the first factor. The third factor explains about 19.28% of the data which was not indicated by the first and second factors. The fourth factor explains about 13.98% of the data which was not indicated by the first, second and third factors. The fifth factor explains about 12.09% of the data which was not explained by the first four factors having about 90.25 cumulative percentages which is highly significant to explain the total variations in the data.

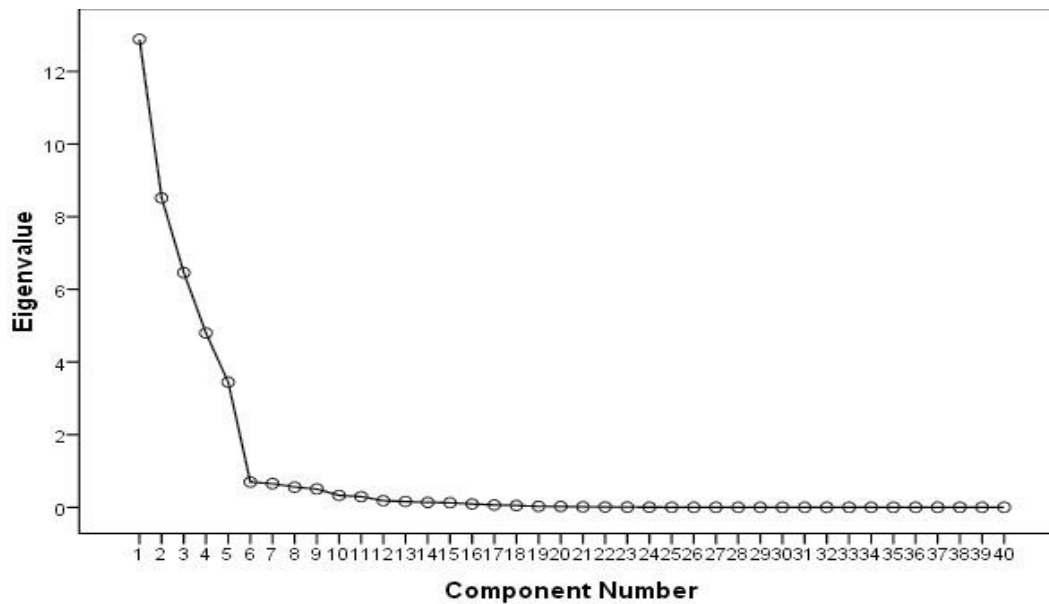


Figure 4.2 Scree Plot

Source: Field Survey 2014

From figure 4.5, it can be seen that the „elbow“ of the diagram occurs at the fifth component. This depicts that, the number of factors that must be considered for extraction is five (5) but must not exceed six.

Table 4.16 Rotated Component Matrix

Variables	Component				
	1	2	3	4	5
Difficulties in Setting Environmental Issues in a tender document			.591		.713
Lack of Consensus on EM Standards within the Sector			.661		
Lack of Support from Senior Management Team			.925		
Lack of Support from Other Staff and Workers		.519			
Lack of Road Map or Strategy		.870			
Lack of Management Commitment		.630	.660		
Other Procurement Targets	-.906				
Contractors Inabilities				.830	
Lack Knowledge or Skills		.714		.575	
Resource Limitations				.870	
Poor Communication				.890	
Weak Processes	.673				
Cost Reduction Focus			.630		

Implementation Costs are Too High			.693	
Lack of Training	.681		.596	
Complex Documentation Processes/Procedures				-.967
Loss of Competitive Edge				-.785
Focus on Reducing Cost at Expense of Environmentally Friendly Practices			.756	
Resistance of the Employees			-.782	
Lack of Contractor Awareness	.971			
Cost of Improvements are Too High		.553	.549	.566
Accounting Methods Limit Green Reporting		.830		
Pressure for Lower Prices			.626	.618
Conflict with Assemblies Objectives	-.840			

Source: Field Survey 2014

Table 4. 17 Rotated Component Matrix (continued)

Variables	Component				
	1	2	3	4	5
Lack of Understanding of How to Insert Environmental Issues in Contracts	.719	.539			
Reluctance to Change from Traditional Practices		.862			
Shortage of Personnel		-.544	-.596		
Lack of Tailor-made Training		.806			
Lack of Support from Suppliers/Contractors			.779		
Lack of Government Guidance/Support	.779				
Volume of Sustainable Information			.856		
Lack of Supplier Commitment		-.542	-.657		
Language and Cultural Differences		-.857			
Limiting Standards		-.855			
Competitive Pressures	.853				
Lack of Knowledge in the Industry	-.772				

Inhibits Innovation					.698
Unwilling to Exchange Information	-.631				
Contractors Desire for Lower Prices	.723			.562	
Poor Contractor/ Supplier Commitment	.939				

Source: Field Survey 2014

Setting a cut-off point of 0.5, the following factor groupings were obtained. Table 4.17 above presents the results of the rotated component matrix. The interpretability of results can be improved through rotation (Norusis, 2000). The rotated factor solution is displayed by default and is essential for interpreting the final rotated analysis. Rotation suggests the behaviour of the variables under extreme conditions and maximizes the loading of each variable on one of the extracted factors whilst minimizing the loading on all other factors and it is best factor output solutions for interpreting factor analysis (Child, 1990). Upon critical examination of inherent relationships among the various factors identified, the various principal components were named. The names of various principal components were formed based on the factors with the highest loadings and the understanding of the relevance of these factors in the context of the study. The various principal components with their respective factor loadings have been presented and discussed below:

4.7 Discussion of Components

4.7.1 Component 1: Lack of Awareness

It was observed that, component one loads highly on twelve factors. They are: other procurement targets, weak processes, lack of training, lack of contractor awareness, lack of understanding on how to insert environmental issues in a tender document, lack of government guidance, competitive pressures, lack of knowledge in the industry, and contractors' desire for lower prices, Conflict with Assemblies Objectives, Unwilling

to Exchange Information and Poor Contractor/ Supplier Commitment. This supports the observation by Adentunji (2008), Varnas et al. (2009) and Jaillon et al. (2009) that, procurement targets have largely been focused on price rather than issues concerning the environment. Ayarkwa et al. (2010) also identified lack of training and commitment by government hinders the implementation of environmental standards. These studies lead to the conclusion that there is serious lack of awareness on how environmental issues may be incorporated into construction procurement generally in the construction industry. It is therefore necessary to raise the awareness of all stakeholders in the construction industry on the need to include environmental sustainability issues into the construction procurement process at the district level.

4.7.2 Component 2: lack of strategy

The following eight (8) variables were loaded onto this principal component: Lack of Lack of Road Map or Strategy, Support from Other Staff and Workers, Lack of Knowledge or Skills, Accounting Methods Limit Green Reporting Reluctance to Change from Traditional Practices, Lack of Tailor-made Training, Language and Cultural Differences, and Limiting Standards. These findings agree with findings by other researchers that the government provides little support in areas of finance, and legal structure to promote sustainable issues into procurement (Ayarkwa et al., 2010). According to the Public Procurement Act, Act 663, (2003), it is mandatory for district assemblies to use the Standard Tender Documents issued by the Public Procurement Authority. This means that if sustainable issues are incorporated into these standard documents at the appropriate sections by the Public Procurement Authority, it would aid in promoting environmentally friendly practices. Some countries have a procurement strategy in place that includes sustainable procurement. The strategy

includes guide and checklist documents that procurement staff can refer to online (Driscoll et al., 2010).

4.7.3 Component 3: Poor Management Support

It was observed that, component three loads highly on twelve factors. They are: Lack of Support from Senior Management Team, Lack of Management Commitment, Lack of Consensus on EM Standards within the Sector, Cost Reduction Focus, Implementation Costs are Too High, Lack of Training, Resistance of the Employees, Pressure for Lower Prices, Shortage of Personnel, Lack of Support from Suppliers/Contractors, Volume of Sustainable Information, and Lack of Supplier Commitment. The findings of Carter et al., (1998) and Hanna et al., (2000) supports this outcome that, management support is positively related to environmental purchasing and environmental improvement.

4.7.4 Component 4: Poor Communication

It was observed that, component four loads highly on five factors. They are: Poor Communication, Contractors Inabilities, Resource Limitations, Focus on Reducing Cost at Expense of Environmentally Friendly Practices, and High Cost of Improvements. According to Vachon and Klassen (2006), firms are not willing to barter information for fear of exposing flaws leaking information to companies for competitive advantage. This was found to be true as some district engineers indicated that contractors do not share information on such issues. There is also poor communication between stakeholders that is, community members and the district assembly, as they are not able to leverage environmental sustainability issues by requesting and pressuring district assemblies to address environmental concerns in the various districts. Some countries have a procurement strategy in place that includes sustainable procurement. The strategy includes guide and checklist documents that

procurement staff can refer to online. For instance, Driscoll et al. (2010) found that within the sustainable strategy in London, are the “Energy & Sustainability Housing Checklist”, “Buying Green Does Not Cost the Earth, Supplementary Guidance I” and “Supplementary Guidance II” documents. The policy and strategy are both available to the public online. This can be replicated in Ghana by making sustainable information readily available online.

4.7.5 Component 5: Complex Documentation and Processes

It was observed that, component five loads highly on four factors. They are Complex Documentation Processes/Procedures, Difficulties in inserting Environmental Issues in a tender document, Loss of Competitive Edge and tendency to inhibit Innovation. The Public Procurement Act, Act 663, (2003), provides the tendering procedures and processes which is seem to be complex. The Standard Tender Documents provided by the Public Procurement Authority currently has no provision for sustainable issues and there are difficulties in inserting environmental issues in the tender document. Whilst the Procurement sector is often cited as a barrier to taking social and environmental issues into account when procuring, public authorities can incorporate various considerations within the procurement processes in order to ensure that the outcome is aligned with the basic procurement ethics (European Commission, 2011). Public procurement is a complex area which requires considerable legal assistance; there are permissive provisions so long as the procurement ethics are not breached. Special training and lessons from international procurement rules is recommended to incorporate environmental issues into tender documents and at the same time allow flexibility to use the innovative skill of implementers. It is strongly recommended that environmental officers are made an integral part of the whole procurement process at

the district level, purposely to leverage for environmental performance from contracts awarded by the district.

4.8 Summary of Chapter four

This chapter has presented the analysis and discussion of the results of the questionnaire survey that were conducted. Key results related to the factors driving environmental issues into construction procurement and challenges to the incorporation of environmental sustainability issues into construction procurement at the district level were analysed. This was done by analysing the survey responses using descriptive statistics and factor analysis. The survey responses showed that all the stages in the procurement process are potential areas to include environmental sustainability issues at the district level. In terms of the contract document, priority was given to the subject matter of the contract, the contract award criteria and contract performance clauses while contract award criteria were reported having a considerably low priority. The survey responses highlighted that all key stakeholders; namely district engineers, environmental officers, quantity surveyors and procurement officers, have a considerable role to play across all the stages in the construction process. From the survey results and analysis, the factors driving the incorporation of environmental sustainability issues into construction procurement were identified under four broad groups, namely: Leadership Influence, Environmental culture, Public Influence, and Personal Skills. The challenges to the incorporation of environmental sustainability issues into construction procurement were found to be under five broad groups, namely: Lack of Awareness, Lack of Strategy, Poor Management Support, Poor Communication and complex documentation and processes. The next chapter presents the conclusions of the study and its recommendations.

CHAPTER FIVE CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study focused on exploring factors driving the incorporation of environmental sustainability issues into construction procurement at the district level, with focus on the district assemblies. The main introduction to the research was covered in Chapter One. Chapters Two discussed the theoretical data related to construction procurement and environmental management in Ghana. In Chapter three, methodological issues were considered and appropriate research approaches were selected and justified. Chapter four presented analysis and provided detailed discussions on the results. In this last chapter, the research is brought to a close by summarizing the issues addressed throughout the study. The chapter concludes with recommendations for further research that can be conducted based on the conclusions and limitations of the study.

5.2 Review of Research Objectives

Recapping what was earlier discussed in Chapter One of this report, the aim of this research was to explore factors driving the incorporation of environmental sustainability issues into construction procurement at the district level. Four research objectives were set for this study.

Objective 1; to identify key legislation, regulations and standards relating to the environment that affect construction activities in Ghana

Chapter two of the study identified key legislature, regulations and standards relating to environmental management in Ghana. The literature review revealed a number of national laws including the constitution of Ghana that addresses ten key environmental

issues namely: Air Pollution, Coastal & Marine Environment, Energy and Mineral Resources, Flora and Fauna, Hazardous Substances/Chemical, Human Development and Settlement, Health and Safety, Land Management, Noise Control, Solid Waste Management, Water Management and Pollution. Also, it came out that the Environmental Protection Agency (EPA) provide capacity building training programmes for all district assemblies on how to input Strategic Environmental Assessment (SEA) needs into their Medium Term Development Plans. Also the EPA undertakes integrated district visits where they visit core environmentally sensitive communities in each district. The visits are normally carried out in conjunction with members of the District Environmental Management Committee. The Assemblies request contractors and suppliers bidding for contracts to be ISO14001 certified in donor funded projects. The research also identified that though each district assembly have bye laws that helps to protect the environment there is no definite method of incorporating them into the current procurement system.

Objective 2; to identify the current environmental sustainability practices in construction procurement at the district assembly level

The research sort to find out current practice in the District Assemblies with regards to how environmental sustainability issues are incorporated into construction procurement, it was noted from the responses discussed in chapter four that even though they actually agreed to the impact of construction activities on the environment such as; deforestation, high energy consumption, water quality impacts, construction waste generation, noise and vibration, air quality, and visual impacts little was done to mitigate this during the construction procurement process. Overwhelming number of the environmental officers indicated that the districts have environmental management plan but there is little avenue to incorporate them into construction

procurement. Almost all parts of the tender document as well as the construction procurement process were found to be relevant areas to incorporate environmental sustainability issues. Their input to construction procurement is minimal. As expected, the findings lean to the understanding that, though the respondents are aware of the impact of construction procurement activities on the environment they do not pay attention to it when procurement is being done. The only positive measure identified is the inclusion of environmental officers as part of the evaluation panel for certain isolated projects that are thought to have high environmental impacts.

Objective 3 to identify the factors driving the incorporation of construction environmental sustainability issues into public procurement at the district assembly level

Due to the relatively large number of the dependent variables (i.e. 15 factors driving the incorporation of environmental sustainability issues into the construction procurement process) involved in the study, it was possible that some of the variables would measure the same underlying effect. It was therefore deemed imperative to use data reduction technique, mainly factor analysis to establish which of the variables could be measuring aspects of the same underlying dimensions. The factors extracted were grouped into four and named as Leadership Influence, Environmental culture, Public Influence, and Personal Skills. In recent times, studies on environment have been popularized in academic literature and there has been a renewed emphasis to incorporate environmental sustainability issues into public procurement at the district assembly level and construction disciplines (*c. f.*

Ayarkwa, 2010; Walker, et al. 2007).

Objective 4 to identify the challenges facing the incorporation of environmental sustainability issues into the construction procurement operations at the District Assembly level

This objective was anchored in the notion that, despite the advances in procurement management and environmental management in Ghana, there are still bottlenecks hindering rapid growth in that sector. It was imperative to use data reduction technique, mainly factor analysis to reduce the forty variables into five components since they were found to be measuring aspects of the same underlying dimensions. The challenges to the incorporation of environmental sustainability issues into construction procurement were named as: Lack of Awareness, Lack of Strategy, Poor Management Support, Poor Communication and complex documentation and processes. On this note, the study has explored the contending challenges confronting the incorporation of construction environmental sustainability issues into the procurement operation at the District Assembly level. This calls for government to expedite efforts to review the current procurement documents to incorporate environmental sustainability issues into the public procurement system. This could be done by inserting an environmental requirement at the various sections of the tender document such as the Subject Matter, Technical Specification, Selection Criteria, Award Criteria and Performance Clauses or by providing room at these sections for the districts officers to insert their own environmental requirement.

5.3 Scientific Contribution

The scientific contribution of this research is in threefold:

The first is that it suggests that the identification and inclusion of environmental sustainability issues into construction procurement and tender documents are important factors in environmental management at the district level.

The second is that through this thesis, a new paradigm of environmentally friendly construction mind-set is suggested to be employed by the works department at the district assembly level in order to produce more environmental sustainable projects.

Finally, the last scientific contribution is the identification of the possibility of utilization of the knowledge of environmental officers within the structure of the local government system in the procurement processes for acquisition of added value environmental sustainable construction projects.

5.4 Limitations of the Study

Visits to some of the districts proved difficult and therefore the questionnaires were e-mailed. Thus there was no opportunity to explain certain portions of the questionnaires which were difficult to understand on first look.

5.5 Recommendations and Policy Implications

The following recommendations are therefore prescribed to planning, designing, and incorporating environmental sustainability issues into construction procurement at the district level in Ghana.

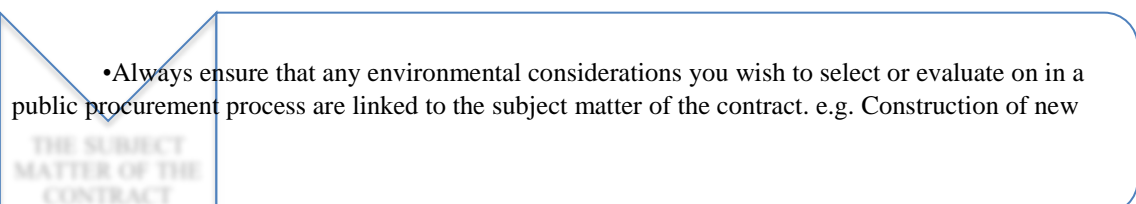
Recommendations to the Public Procurement Authority

There should be a new legislative instrument that will guide sustainable public procurement since the current procurement laws addresses few sustainable issues. This could be done by reviewing the current procurement law and documents issued by the PPA to include sustainability issues.

Recommendations to the District Authorities

- Contractors should be made to show their community environmental responsibility plan to the district authority and the community before contracts are awarded to them.
- Examine the costs of the impacts of the construction activity on the environment so that it is possible in the future to employ evaluation criteria that take into consideration these impacts in the project evaluation and identify measures to compensate them.
- There should be a monitoring body which also includes Chiefs, and community opinion leaders and environmental officers to ensure that construction firms comply with regulations and see to it that the work is done to the benefit of the entire community.
- Apply evaluation meetings instead of just informative meetings where tenderers can discuss about the client's perception over the environmental requirements of the project.
- Provide the opportunity to the bidders to get in contact with the project's environment in order to acquire more valuable information in respect to the impacts to the environment and thus produce design solutions that take into account the environmental context and increase the environmental responsibility of the community.

Below is the researcher's proposal on how environmental sustainability issues may be introduced into the tender documents for construction procurement:



roads, or renovation of existing roads, using environmentally sound construction methods and materials.

CONTRACT

•Ask for Energy efficiency training, Energy consumption standards

•Another example may be that a training session must be given to the building manager on the energy efficient use of the building following the completion of the construction/renovation works. The bidder must outline the content of the training.

•The tenderer must demonstrate technical capacity to take the necessary environmental management measures in order to ensure that the construction works are executed in an environmental sound way.

•e.g. He must demonstrate technical capacity to put into place certain environmental management measures that meet the following requirements: Ensuring effective protection

of harmful fauna, waste and flora and hazardous substances area and flows into its surroundings may adversely impact on the area.

Environmental management measures aimed at minimising waste production on the site, respecting noise regulations,

•Points must be awarded on the basis of a sliding scale between the best and worst bids. The contractor shall provide data on the content of the materials it is proposing to use. Contracting authorities will have to indicate in the contract notice and tender documents how many additional points will be awarded for each award criterion. Environmental award criteria may account for at least 10 to 15 % of the total points.

•cheating, g. Tenderers must submit ventilation specific in the proposals building for. Additional say achieving points energy will be efficient awarded lighting, for the proposed approach and the use of passive components (e.g. insulation, daylight use).

•Tenderers must provide a signed declaration indicating that their product satisfies environmental criterion.

•During both construction and maintenance phases, materials and design and obtained for the infrastructure should adhere to Sustainable principles to reduce

PERFORMANCE
CLAUSES the impact on the environment.

Figure 5.1 How to introduce environmental sustainability issues into the tender document

Below is the researcher's proposal on how environmental sustainability issues may be introduced into the construction procurement process:

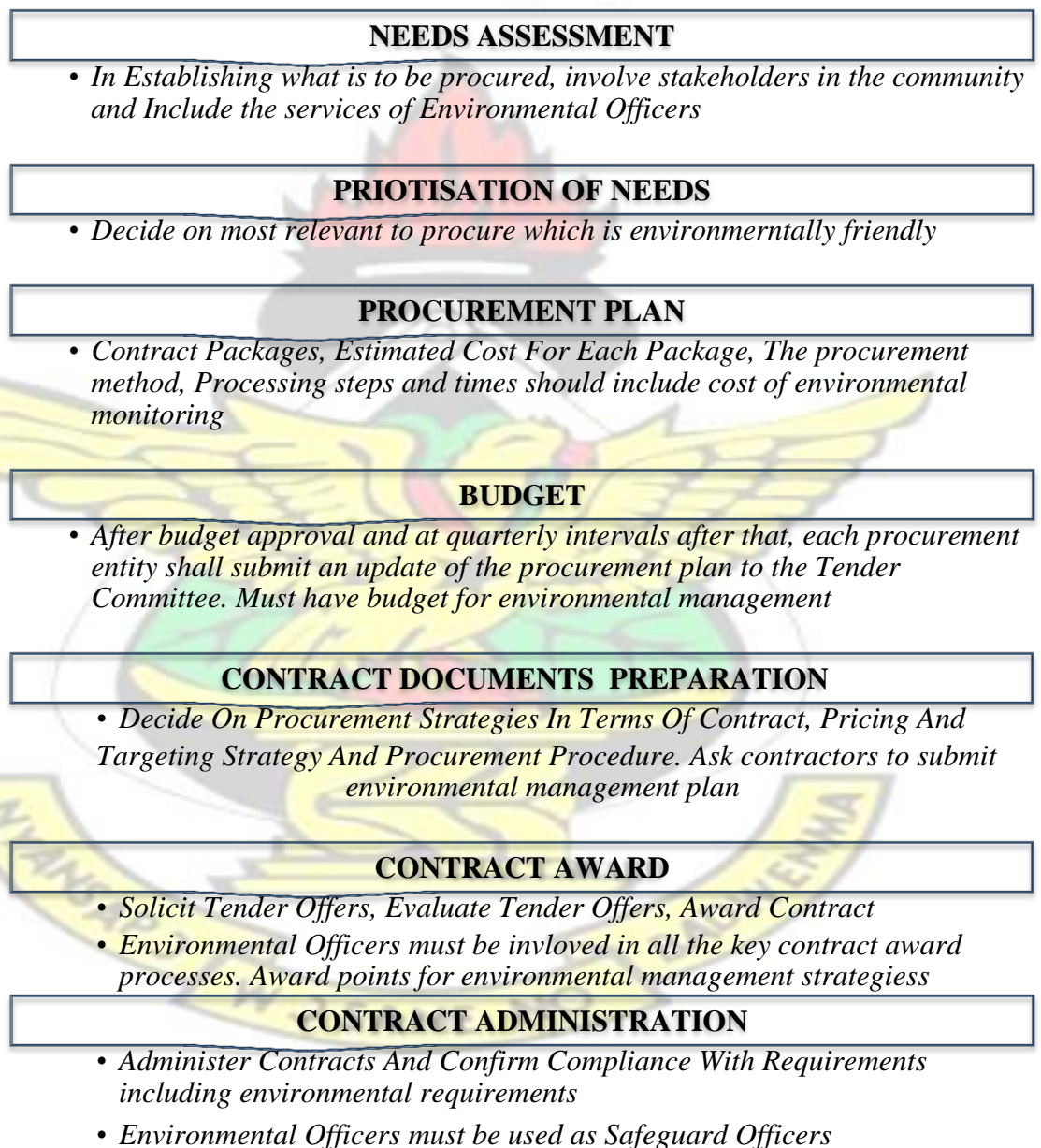


Figure 5.2 How to introduce environmental sustainability issues into construction procurement process

5.6 Further Research

There are a number of research opportunities to explore in the future based on this study:

Based on this research, a model of framework to incorporate environmental sustainability issues into public procurement could be developed.

Also the research focused on the Metropolitan, Municipal and district Assemblies but the situation could be compared to the private sector to determine whether it is the same factors and challenges the private sector encounters.

Finally, another research proposal could be the studying of the role of the environmental officer in construction procurement at the district level. Since the environmental officers responsible for environmental protection at the district level are sometimes trained as safeguard officers in donor funded projects there is a possibility to replicate this role in the districts own construction activities.

REFERENCES

- Adetunji, I., Price, A.D.F., And Fleming, P., (2008) Achieving Sustainability In The construction supply chain. In: Proceedings of the Institution of Civil Engineers:Engineering Sustainability, September 2008. pp. 161 – 172.
- Adjorlolo Ruth, (2014) “Vice President Amissah-Arthur calls for collaborative efforts to protect environment”, <http://www.gbcghana.com>, Retrieved 201404-20.
- Adu Sarfo P, (2011), Assessing the Effects of the Procurement Act (663) On Public Financial Management in Ashanti Region

- Agyekwena B., (2010), District Assemblies adopt SEA's in Medium Term Development Plans in Ghana
- Ahadzie, D.K. (2007) "A Model For Predicting The Performance Of Project Managers In Mass House Building Projects In Ghana", PhD thesis, University of Wolverhampton, UK: 2007.
- Allison, R. E. (1998) "Ethical Values as Part of Definition of Business Enterprise and Part of the Internal Structure of the Business Enterprise", *Journal of Business Ethics*, 17 (9/10), 1015–1028.
- Annandale. D., Morrison-Saunders. A., Bouma. G., (2002) The impact of voluntary environmental protection instruments on company environmental performance, *Business*
- Ayarkwa J, Ayirebi-Dansoh, Amoah P., (2010), Barriers to Implementation of EMS in Construction Industry in Ghana, *International Journal of Engineering Science*, Volume 2, Number 4, 2010
- Ball ,A, (2005), Environmental Accounting and Change in UK Local Government, *Accounting Auditing & Accountability Journal*, Vol. 18 Iss: 3, pp. 346-373
- Bansa (2007), Construction: Global Growth in Civil Engineering to Top 6 Percent, *Financial Time*.
- Begley, R., (1996) Is ISO 14000 Worth It? *Journal of Business Strategy*,(September/October), 50–55. *Strategy and the Environment* 13, 112
- Benneh, G, (1990) Land Degradation In Ghana. Commonwealth Secretariat University of Ghana
- Berger, A. and Udell, G. (1998) "The economics of small business finance: the roles of private equity and debt markets in the financial growth cycle", *Journal of Banking and Finance*, 22 (6-8), 613-73.
- Bernard, H.R., (2002) *Research Methods in Anthropology: Qualitative and Quantitative Approaches* 2nd ed. Walnut Creek, CA: AltaMira.
- Berry, C, McCarthy, S., (2011) *Guide to sustainable procurement in construction*, Published by CIRIA, Classic house, 174–180 Old Street, London, EC1V 9BP, UK
- Bodriguez, 2008, "Resource Mega Project Analysis And Decision Making", Victoria, BC: Institute for Research on Public Policy, Western Resources Program.
- Boyefio Gilbert, (2008), Ghana to adopt Sustainable Public Procurement. The Statesman. Accessed on 20th November 2012 from www.mordernghana.com

- Break Down Of Metropolitan, Municipal And District Assemblies In Ghana, www.ghanadistricts.com. Retrieved 2014-04-20.
- Brorson, T. and Larsson, G., (1999), *Environmental Management: How to Implement an Environmental Management System within a Company or Other Organization*, EMS AB, Stockholm.
- Bryman, A., (2008). *Social Research Methods*. 3rd ed. Oxford: Oxford University Press.
- Bryman, A., And Cramer, D., 2005. *Quantitative Data Analysis with SPSS 12 and 13*. East Sussex: Routledge.
- British Standards institution, BS 8903, 2010, *Principles and Framework for Procuring Sustainably*
- Carter, C.R., Dresner, M., (2001) Purchasing's role in environmental management: cross-functional development of grounded theory. *Supply Chain Management* 37 (3), 12–26.
- Chavan Meena, (2005) An appraisal of environment management systems, A competitive advantage for small businesses in *Management of Environmental Quality: An International Journal* Vol. 16 No. 5, , pp. 444-463, Emerald Group Publishing Limited
- Child (1999), "Research Design: Qualitative, Quantitative and Mixed Methods Approaches", 2nd Edition, Sage publications
- Child, D. (1990), "The Essentials of Factor Analysis", 2nd Edition, Cassel Educational Ltd, London.
- CIRIA (2006) Construction Industry Research And Information Association, Compliance, A Ciria Project, Waste. [Online]. [Viewed 14/04/2014]. Available From:[Http://Www.Ciria.Org.Uk/Complianceplus/4_Guidance2.Htm?G_Id=J](http://Www.Ciria.Org.Uk/Complianceplus/4_Guidance2.Htm?G_Id=J).
- Clements, R. B. (1996): *Complete Guide to ISO 14000*. Upper Saddle River, New Jersey: Prentice Hall.
- CLGF (Commonwealth Local Government Forum): *Local Government System in Ghana* (sine anno) <http://www.clgf.org.uk/userfiles/clgf/file/countries/Ghana.pdf>. Accessed 1/2/2014
- Constitution of the Republic of Ghana, (1992).
- Cooper, D. and Schindler, P., (2003). *Business research methods*, 8th Edition, Boston: McGraw-Hill.

- Cooper, R., Frank, G., Kemp, R., (2000). A multinational comparison of key ethical issues helps and challenges in the purchasing and supply management profession: the key implications for business and the professions. *Journal of Business Ethics* 23, 83–100. Correlation or misspecification? *Strategic Management Journal* 21 (5) 603-609
- Corbett C.J. And Kirsch D. A.,2001, “International Diffusion Of ISO Certification, Production And Operations Management, 10(3), 327-342
- Creswell, J. W. and Clark, V. L. P., 2007, *Designing and Conducting Mixed Methods Research* Ed. Calif., University of Nebraska-Lincoln: Sage Publications, Inc
- Cronbach, L.J., (1951) Coefficient alpha and the internal structure of tests. *Psychometrika* 16(3), 297 – 335.
- Delmas, M., (2001) Stakeholders and competitive advantage: the case of ISO 14001, *Production & Operations Management*, vol. 10. Production Operations Management Society, pp. 343–358.
- Denzin, N.K., and Lincoln, Y.S., (2000) *Handbook of Qualitative Research*. California: Sage Publications.
- Didenko, I. and Konovets, I., (2008). *Success Factors in Construction Projects: A Study of Housing Projects in Ukraine*. Pg. 31-46.
- Dolva Loland Christiane (2007) *Green Public Procurement, How widespread is Green Public Procurement in Norway, and what factors are seen as drivers and barriers to greener procurement practice? Emergent Methods in Social Research*. London: Sage Publications, pp.165-182.
- Driscoll T, Halliday A, Rastad J, and Stock R, (2010), *Green Procurement Practices in the London Borough of Croydon, An Interactive Qualifying Report Submitted to the Faculty of Worcester Polytechnic Institute*
- Elene, A. I. and Seaman, C. A.,(2007) Likert scales and data analyses. *Quality Progress* 40, 64 – 65.
- Elliehausen, G. and Wolken, J. (1993), “The Demand for Trade Credit: An Investigation of Motives for Trade Credit Use by Small Business”, Board of Governors of the Federal Reserve System, Washington, DC, September 1993.
- Environment: Veep calls for collaborative efforts to protect environment”, GBC.com. Retrieved 2014-04-20.
- Environmental Assessment Regulations, (1999) L.I. 1652
- Environmental Management Group (EMG), (2004) Background Paper on

Sustainable Procurement and Environmental Management Programs for the UN System, 8th Meeting of the Environmental Management Group UNEP Headquarters, Gigiri, Nairobi, Kenya.

EPA (1991): Ghana Environmental Action Plan (Vol.1). Environmental Protection Agency, Accra Ghana.

EPA (1994): Ghana Environmental Action Plan (Volume two) Technical Background Papers by the Six working Groups (Ed. Liang, E.) Environmental Protection Council, Accra

EPA (1995) Ghana: Industrial Waste Study-Progress Report, GOPA and Environmental Protection Agency, Accra Ghana.

EPA (1997) Newsletter Volume 1 Number 6, Environmental Protection Agency, Accra, Ghana.

EPA (1999) Proposed National Environmental Quality Standards and Monitoring Requirements for Industrial Effluents, Air and Noise Level Regulations, Environmental Protection Agency, Accra Ghana.

EPA (2001): Report on Ground Water Monitoring in the Western Region, Accra.

EPA (2002): State of Environment Report 2001. Environmental Protection Agency, Accra Ghana

European Commission (2004), Directive 2004/18/EC of the European Parliament and of the Council on the Coordination of Procedures for the Award of Public Works Contracts, Public Supply Contracts and Public Service Contracts.

European Commission (2011), "Buying- a handbook on environmental public procurement", Belgium http://ec.europa.eu/environment/gpp/pdf/buying_green_handbook_en.pdf, Retrieved 2014-04-24.

Farvacque-Vitkovic, Catherine, Madhu Raghunath, Eghoff, C, Boakye C. (2008) Development of the Cities of Ghana: Challenges, Priorities and Tools. Africa Region Working Paper Series No. 110. January 2008. World Bank.

Fellows, R., and Liu, A., (2008) Research Methods for Construction. 3rd ed. Oxford: Blackwell Publishers Ltd.

Ferguson, M.E., Toktay, L.B., (2006) The effect of competition on recovery strategies. *Production & Operations Management* 15 (3), 351–368.

Field, A. (2005), Factor Analysis Using SPSS: Theory and Application, Available from: <http://www.sussex.ac.uk/users/andyf/factor.pdf>, accessed on 25th March, 2010.

Fineman, S., (1997) Constructing the green manager. In: McDonagh, P., Prothero, A. (Eds.), *Green Management: A Reader*. Dryden Press, London.

- Fink, A., (2003) How to Ask Survey Questions. 2nd ed. Thousand Oaks, California and UK: Sage Publications.
- Fink, A., (2010) Conducting Research Literature Reviews: from the Internet to paper. 3rd ed. London: Sage Publications.
- Flower, F., (2002) Survey Research Methods. London: Sage Publications Ltd.
- Gabriel, Y., Fineman, S., Sims, D., (2000) Organizing and Organizations. Sage, London.
- Gamage, Inoka Shyamal Withana, (2011) A Waste Minimisation Framework for the Procurement of Design and Build Construction Projects, Retrieved from <https://dspace.lboro.ac.uk/> on 2014-04-24.
- Gay, I. R. (1990). Educational research, competencies for analysis and applications. Merrill Publishing Company.
- Gbedemah, F. S., Environmental Management System (ISO14001) Certification in Manufacturing Companies in Ghana: Prospects and Challenges
- Giannikis, Vyron, (2011), Value Based Tendering: A model for the contractor to provide added value on bid documentation and increase the chances of winning the tender
- Glaser, B.G., and Strauss, A.L., (1967) The Discovery of Grounded Theory: Strategies for Qualitative Research. Chicago: Aldine.
- Gonzalez-Benito, O, Gonzalez-Benito, J, (2005) The Role of Stakeholder Pressure and Managerial Values in The Implementation of Environmental Logistics Practices
- Gorsuch, R. L. (1983), "Factor Analysis", Lawrence Erlbaum, Hillsdale, NJ
- Government of Ghana (1999) Management and Reform Programme (PURFMARP), Accra: Ministry of Finance, Ghana.
- Government of Ghana (2003) Budget Statement, 2003, Accra, Ghana
- Government of Ghana (2003) country procurement assessment report .Accra, Ghana
- Government of Ghana (2003) Public Procurement Act, 2003 (Act 663) Accra, Ghana
- Green, K., Morton, B., New, S., (1996) Purchasing and environmental management: interactions, policies and opportunities. Business Strategy and the Environment 5, 188–197
- Hall, J., (2001) Environmental supply chain innovation. Greener Management International 35, 105–119.

- Handfield, R., Walton, S.V., Seegers, L.K., Melnyk, S.A., (1997) Green value chain practices in the furniture industry. *Journal of Operations Management* 15 (4), 293–315.
- Happold, Buro ,(2007) Construction environmental management plan (CEMP), Hayle Harbour Revision 01, Environmental Statement November 2007, Section17-11
- Harry, B.N.A. (2002), “Ghana’s mining sector: its contribution to the national economy”, and How to Influence It”, *Citizenship Studies*, 2 (2), 329-352.
- Hart, S.L., (1995). A natural resource based view of the firm. *Academy Management Review* 20 (4), 986-1014
- Helen Walker, Lucio Di Sisto, Darian McBain, (2008) Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors, *Journal of Purchasing & Supply Management* 14, 69–85 2008, Published by Elsevier Ltd
- Henriques, I., Sadorsky, P., (1999). The relationship between environmental commitment and managerial perceptions of stakeholder importance. *Academy of Management Journal* 42 (1) 87-99
- Hervani, A., Helms, M., (2005). Performance measurement for green supply chain management. *Benchmarking: An International Journal* 12 (4), 330–353.
- Hewitt, G. and Gary, R. (1998): *ISO 14001 EMS Implementation Handbook*, Butterworth- Heinemann Ltd, Oxford, U.K.
- HM Government, (2005), *Securing the future. The UK Government sustainable development strategy*:www.defra.gov.uk/sustainable/government/publications/ukstrategy/documents/SecFut_complete.pdf,
- Hydén, H, S, (2012), *Towards A Theory Of Law And Societal Development*, Lund University, Sweden
- Inno Mergi, (2005), *Assessment of the ISO 14001 Implementation Process in Estonian Certified Construction Companies*, Department of Civil and Environmental Engineering Water Environmental Technology Chalmers University of Technology
- International Organization for Standardization, ISO 10845-1 2010, *Construction procurement, Part 1 Processes, methods and procedures*
- International Organization for Standardization , ISO 14000 (n.d) *Environmental Standards: A Survey Of U.S. Corporations, Advances In Environmental Accounting & Management, Volume 1, Pages 123–140, Elsevier Science Inc.*

- International Organization for Standardization, ISO (1996): ISO 14001 EMS-Specifications with Guidance for Use International Organization for Standardization, Geneva.
- International Organization for Standardization, ISO (2003): ISO Survey: International Standards Organization, Ref.: 864
- International Organization for Standardization, ISO World (2004): The Number of ISO 14001 Certification of the World”.
- International Organization for Standardization, ISO (2011) : Ten good things for SME”s, Available at www.iso.org
- Jacoby, J., and Matell, M. S., (1971) Three-Point Likert scales are good enough. *Journal of Marketing Research* 8, 495 – 501.
- Jaillon, L., Poon, C.S., and Chaing, Y.H., (2009) Quantifying the waste reduction potential of using prefabrication in building construction in Hong Kong. *Waste Management* 29(1), 309 – 320.
- Jana Šelih, (2007) Environmental Management Systems And Construction Smes: A Case Study For Slovenia. *Journal Of Civil Engineering And Management*, 2007, Vol Xiii, No 3, 217–226, Retrieved From [Http://www.Jcem.Vgtu.Lt](http://www.Jcem.Vgtu.Lt)
- Katz, B. and Levin B., (1988) “Exploiting Lexical Regularities in Designing Natural Language Systems”, *Proceedings of the 12th International Conference on Computational Linguistics*, p316-323.
- Kein, A.T.T., G. Ofori and C. Briffett. (1999) ISO 14000: Its relevance to the Construction Industry of Singapore and Its potential as the Next Industry Milestone. *Construction*
- Kofi Matin (2009) “Effect Of Large Number On Productive”, (6), 329-352.
- Kuusi Suvi (2009) Aspects of Local Self-Government: Ghana. North-South Local Government Co-operation Programme, The Association of Finnish Local and Regional Authorities.
- Marsh D. and Stoker G. (2002) *Theories and Methods in Political Science*, 2nd Ed. Houndmills, UK: Palgrave, Macmillan
- Mcwilliams Abigail, And Siegel Donald, (2000) Corporate Social Responsibility And Financial Performance: Correlation Or Misspecification?. *Strat. Mgmt. J.*, 21:603-609. Doi: 10.1002/(SICI) 1097-0266(200005) 21:5<603::AIDSMJ101>3.0.CO;2-3
- Mitchell, 1996, Assessing the reliability and validity of questionnaires: an empirical example. *Journal of applied management studies* 5(2), 199 – 207.

- Ministry of Finance , (2014) Background to Ghana's Public Financial Management System, Retrieved From www.ghana.gov.gh
- Norusis, M. (2000), “The SPSS Guide To Data Analysis For SPSS-X.” SPSS Inc, Chicago
- Ofori, G. (1998). Sustainable Construction: Principles and a Framework for Attainment – Comment. *Construction Management and Economics*, 16(2): 141-145.
- Ofori, G., (1992), The environment: the fourth construction project objective? *Construction Management and Economics*, 10 (5): 369-395
- Opintan-Baah, Emmanuel, Yalley P. P., Kwaw P., Osei-Poku G, 2011, An investigation into Environmental Protection Agency in the Ghanaian construction Industry
- Owusu M. D. and Badu E., (2009) Determinants of contractors „capital investment finance strategy in Ghana. *Journal of Financial Management of Property and Construction*, Vol. 14 No. 1, 2009. Emerald Group Publishing Limited, 0007-070X.
- Poon, C.S., YU, A.T., and Jaillon, L., (2004b) Reducing building waste at construction sites in Hong Kong. *Construction Management and Economics* 22(5), 461–470.
- Ppa E- bulletin, (2013) retrieved on 20th November, 2013 from www.ppa.org
- DEFRA, (2006), Procuring the Future, Sustainable Procurement National Action Plan, Recommendations from the SP task force, Department of Environment Food and Rural Affairs (DEFRA), HM Government, London, UK
- Public Procurement Act, (2003) Act 663
- Public Procurement Manual, (2003)
- Pun K.F. Hui I.K and. Lee W.K, (2001) EMS approach to environmentally-friendly construction operations, *The TQM Magazine* Volume 13
- Pun Kit-Fai, Hui Ip-Kee, Lau Henry C.W., Hang-Wai Law, Lewis Winston G., (2002) Development of an EMS planning framework for environmental management practices Retrieved from www.emeraldinsight.com
- Rao, P., Holt, D., (2005) Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations & Production Management* 25 (9–10), 898–916.
- Robson, C., (2002) *Real World Research*. 2nd ed. Oxford: Blackwell Publications.

- Rodriguez-Rodriguez, O.M. (2011) “Firms as credit suppliers: an empirical study of Spanish Firms”, *International Journal of Managerial Finance*, 4 (2), 152173.
- Saunders, M., Lewis, P., and Thornhill, A., (2007) *Research methods for business students*. 4th ed. Harlow: *Financial Times Prentice*.
- Seneviratne Mario, (2011), *The Use of Green Building Materials in Construction and their Impact on Rating Systems*, Dubai, U.A.E. Presentation Copyrights - Green Technologies FZC
- Somiah M., K, (2014), *Factors That Account for Construction of Unauthorized Buildings in Ghana*, Mphil Thesis submitted to the Department of Building Technology, KNUST
- Spence, R Mulligan,H, (1995), *Sustainable Development And The Construction Industry*, Pg 297
- Strandberg Coro, (2002), *The Future Of Corporate Social Responsibility*, Report For Vancity Credit Union, Vancouver, B.C.
- Streubert, H.J. and Carpenter, R.D. (1999) *Qualitative Research in Nursing: Advancing the Humanistic Imperative*. 2nd Ed. Philadelphia: Lippincott Williams & Williams
- Tan, W., (2002) *Practical Research Methods*. Singapore: Pearson Education Asia Pte Ltd.
- Tabachnick, B,G and Fidell L, S, (1996) *Using Multivariate Statistics*, Vol 1, HarperCollins College Publisher
- Theyel, G., (2001) *Customer and supplier relations for environmental performance*. *Greener Management International* 35, 61–69.
- Trowbridge, P., (2001) *A case study of green supply chain management at advanced micro devices*. *Greener Management International* 35 (Autumn), 121–135.
- Tse, R.Y.C. (2001). *The Implementation of EMS in Construction Firms: Case Study in Hong Kong*, *Journal of Environmental Assessment Policy and Management*, 3(2): 177-194
- UNCHS, (1996) *An Urbanising World: Global Report On Human Settlements 1996*. United Nations for Settlements (Habitat), Nairobi
- United Nations, (1999) *United Nations guidelines for consumer protection*. Retrieved on 20th November, 2013 from www.un.org
- Vachon, S., Klassen, R., (2006) *Extending green practices across the supply chain: the impact of upstream and downstream integration*. *International Journal of Operations & Production Management* 26 (7), 795–821.

- Varnas, A., Balfors, B., Faith-Ell, C., (2009) Environmental consideration in procurement of construction contracts: current practice, problems and opportunities in green procurement in the Swedish construction industry, *Journal of Cleaner Production* 17 (1), 1214 – 1222
- Vaus, D.A.D., (1995) *Survey in Social Research*. Melbourne: Allen and Unwin.
- Walker, D. H. T., and Hampson K. D., (2003) *Implications of Human Capital Issues, Procurement Strategies: A Relationship Based Approach*, Oxford, Blackwell Publishing 258-295.
- Walker, D.H.T, and Nogeste, K., (2007) “Performance measures and project procurement”, Derwal Publishers, Australia Pp 177-210.
- Walker, H, Di Sistob L, and McBainc D, (2008), *Drivers and Barriers to Environmental Supply Chain Management Practices: Lessons from the Public and Private Sectors*, *Journal of Purchasing & Supply Management*, 69–85, available online at www.sciencedirect.com
- WCED (World Commission on Environment and Development). , (1987), *Our common Future*. Oxford University Press
- Wickenberg, Bjorn (2004), *Translation of Sustainability into Public Procurement Practices in Swedish Municipalities*, Master’s Thesis Lund University
- Wikipedia (January 2014): *Environmental Management Systems*. Accessed on 20th January 2014 from www.wikipedia.org.
- Wikipedia (January 2014): *Sustainable Procurement*. Accessed on 20th January 2014 from www.wikipedia.org.
- Williams, S., Chambers, T., Hills, S., & Dowson, F., 2007, *Buying a Better World: Sustainable Public Procurement*. Retrieved from <http://www2.aashe.org/heasc/documents/BuyingaBetterWorld.pdf>
- Wycherley, I., (1999) *Greening supply chains: the case of the Body Shop International*. *Business Strategy and the Environment* 8, 120–127.
- Yeboah Kofi & Tutuah Mensah Angelina Ama, (2014) “40 Years of environmental protection in Ghana: Footprints from EPC to EPA”. *Daily Graphic / Ghana*, Retrieved on Thursday, 30 January 2014 12:20 Published in [features](#)
- Yin, R. (1993) *Application of case study research*. Newbury Park, CA: Sage Publishing.
- Zabihollah Rezaee and Joseph Z. Szendi, (2000), *An Examination Of The Relevance Of ISO 14000 Environmental Standards: A Survey Of U.S. Corporations Advances In Environmental Accounting & Management*, Volume 1, Pages 123–140, Elsevier Science Inc.

Zhu, Q.H., Sarkis, J., Geng, Y., (2005). Green supply chain management in China: pressures, practices and performance. *International Journal of Operations & Production Management* 25 (5-6), 449–468.

APPENDIX I

INCORPORATING ENVIRONMENTAL SUSTAINABILITY ISSUES INTO CONSTRUCTION PROCUREMENT AT THE DISTRICT LEVEL IN GHANA

Dear Sir/Madam,

My name is Harold Adjarko and I am a postgraduate student from Kwame Nkrumah University of Science and Technology. I am currently undertaking a Masters in Procurement Management and as part of my program I am writing my thesis on **‘INCORPORATING ENVIRONMENTAL SUSTAINABILITY ISSUES INTO CONSTRUCTION PROCUREMENT AT THE DISTRICT LEVEL IN GHANA’**.

The purpose of my thesis is to create awareness for public procurement entities, encouraging them to include environmental sustainability issues into tender bids and encourage contractors to comply and abide by local environmental regulations. I would be grateful if you could find time to complete the attached questionnaire. Your thoughts and ideas on the issues are very important and would provide great value for my thesis. Each district will be treated anonymously and the data will be used only for my research. If you feel you are not the relevant person to answer this questionnaire, I would be very thankful if you could forward it to the right person. If you have any question you may contact me on haroldadjarko@gmail.com. If you would like to have a short summary of my thesis including the questionnaire findings, I am happy to send them to you when the research is completed in June. Many thanks in advance for your time and consideration.

Yours Faithfully,

Harold Adjarko

Part 1. General Information

1.1. Please indicate which of the following best describes your position.

Chief executive	District	<input type="checkbox"/>	Engineer	<input type="checkbox"/>
Procurement Officer	Quantity	<input type="checkbox"/>	Surveyor	<input type="checkbox"/>
Development Officer		<input type="checkbox"/>	Environmental Officer	<input type="checkbox"/>
Head of stores	Project	<input type="checkbox"/>	Manager	<input type="checkbox"/>
Other _____		<input type="checkbox"/>		<input type="checkbox"/>

1.2. What is the size of your organization?

Micro (1 – 9 employees)	<input type="checkbox"/>
Small (10 – 49 employees)	<input type="checkbox"/>
Medium (50 – 249 employees)	<input type="checkbox"/>
Large (More than 250 employees)	<input type="checkbox"/>

1.3. Which of these classifications of contractors do you normally deal with?

a) Class D1 & K1	<input type="checkbox"/>
b) Class D2 & K2	<input type="checkbox"/>
c) Class D3 & K3	<input type="checkbox"/>
d) Class D4 & K4	<input type="checkbox"/>

1.4. For how long have you been in professional practice?

a) <5 years	<input type="checkbox"/>
b) 5-10 years	<input type="checkbox"/>
c) >10 years	<input type="checkbox"/>
Other.....	<input type="checkbox"/>

1.5. How many new projects have your district undertaken within the last two years?

a) 1 – 5 Projects	<input type="checkbox"/>
b) 6 – 10 Projects	<input type="checkbox"/>
c) 11 – 15 Project	<input type="checkbox"/>
d) 16 and above	<input type="checkbox"/>

1.6. What kind of construction projects have your district undertaken within the period in question 5 above?

- a) Large scale Residential houses (not including storey type)
- b) Large scale residential houses (only storey type)
- c) Large scale residential houses (all types)
- d) Office accommodation
- e) Hostels, Hotels etc.
- f) Industrial buildings
- g) Institutional buildings e.g. School, hospitals etc.
- h) Self-occupying housing
- i) Others (Please specify).....

2. 0 Questionnaire concerning the current EM practices by district assemblies. For Each question please answer with a tick (✓) or circle out the relevant response boxes.

2.1. Please indicate the following impacts that you think your construction procurement activities have on the environment. (You can choose more than one answer)

Impact of Construction Activities on the Environment

- | | | |
|--------------------------------|-----|--------|
| a) Noise and vibration impacts | Low | Medium |
| High | | |
| b) Air quality impacts | Low | Medium |
| High | | |
| c) Visual impacts | Low | Medium |
| High | | |
| d) Water quality impacts | Low | Medium |
| High | | |
| e) Construction waste impacts | Low | Medium |
| High | | |
| f) High energy consumption | Low | Medium |
| High | | |
| g) Deforestation | Low | Medium |
| High | | |
| h) Other _____ | Low | Medium |
| High | | |

2.2. What are the environmental objectives that you think are relevant and are actually included in the contract documents for the past two years?

Please rate 1-5 your agreement level Please tick (..) what are actually included in a tender
 (1 strongly disagree 2 disagree 3 neither agree/disagree)

4 agree 5 strongly agree)

Energy usage 1 2 3 4 5
 Air pollution control 1 2 3 4 5
 Material recycling 1 2 3 4 5
 Noise control 1 2 3 4 5
 Waste disposal control 1 2 3 4 5
 Water pollution control 1 2 3 4 5
 Others (Please specify) 1 2 3 4 5

Energy usage
 Air pollution control
 Material recycling
 Noise control
 Waste disposal control
 Water pollution control
 Others (Please specify)

None



2.3. Please provide the percentage of environmental objectives that have been met since

The last five years.

- a) Below 50%
- b) 50% - 80%
- c) Above 80%

2.4. Indicate at which part of a tender document that environmental sustainability issues are incorporated?

Please rate 1-5 your agreement level in a tender

Please tick (..) what are actually included

(1 strongly disagree 2 disagree 3 neither agree/disagree

agree 5 strongly agree)

4



- | | | | |
|-----------------------------------------------------------|---------|---------------------------------------------------------------|---------|
| 1. The subject matter of the contract | 1 2 3 4 | 5. The contract performance clauses. | 1 2 3 4 |
| 5 | | 5 | |
| 2. Technical specifications for the product/work/service; | 1 2 3 4 | 1. The subject matter of the contract; | |
| 5 | | 2. The technical specifications for the product/work/service; | |
| 3. The selection criteria for candidates | 1 2 3 4 | 3. The selection criteria for candidates; | |
| 5 | | 4. The contract award criteria; | |
| 4. The contract award criteria; | 1 2 3 4 | 5. The contract performance clauses. | |

2.5. Indicate at which stage of procurement that environmental sustainability issues are incorporated?

Please rate 1-5 your agreement level Please tick (..) what are actually included in a tender

(1 strongly disagree 2 disagree 3 neither agree/disagree 4 agree 5 strongly agree)

- 1) Establishing what is to be procured 1 2 3 4 5
- 2) Decision on procurement strategies in terms of contract, pricing and targeting strategy and procurement procedure; 1 2 3 4 5
- 3) Soliciting tender offers; 1 2 3 4 5
- 4) Evaluation of tender offers; 1 2 3 4 5
- 5) Award of contract; and 1 2 3 4 5
- 6) Administering contracts & confirmation of compliance with requirement 1 2 3 4 5

- 1) Establishing what is to be procured;
- 2) Decision on procurement strategies in terms of contract, pricing and targeting strategy and procurement procedure;
- 3) Soliciting tender offers;
- 4) Evaluation of tender offers;
- 5) Award of contract; and
- 6) Administering contracts and confirmation of compliance with requirement

3.0 Factors driving the incorporation of environmental sustainability issues into the procurement system at the district level.

3.1 How significant would you rate the following factors in driving environmental sustainability issues into the procurement system at the district level? (5: Most significant; 1: Least significant)

External Driving factors	level				
	1	2	3	4	5

Government pressure					
Society pressure					
Client/government requirement					
Awareness of environmental impacts					
Consensus on standard EMS needed in sector					
Environmental culture among competitors					
Efficient documentation process					
Legislature and Legal compliance					
Develop good image					
ISO 14000 certification					
Gaining competitive advantage					
Improve performance					
Stakeholders encouraging environmental strategy					
Potential for receiving publicity					
Reduce risk of consumer criticism					
Pressure by environmental advocacy groups					

(5: Most significant; 1: Least significant)

Internal Driving factors	level				
	1	2	3	4	5
Skillful policy procurement/envirom officers					
Desire to manage economic risk					
Desire to improve quality					
Desire to improve government's values					
Values of managers improving position in office					
Employee involvement					
Desire to reduce costs					
Investor pressure					

3.4.0. Challenges to the incorporation of environmental sustainability issues into construction procurement at the District level

3.4.1. What challenges are there in the incorporation of sustainable issues into public procurement? (5: Most significant; 1: Least significant)

External challenges	level				
	1	2	3	4	5
Lack of government guidance/support					
Lack of support from suppliers/ contractors					

Lack of tailor-made training					
Volume of sustainability information					
Language and cultural differences					
Lack of supplier commitment					
Limiting standards					
Contractors desire for lower prices					
Competitive pressures					
Lack of knowledge in the industry					
Inhibits innovation					
Unwilling to exchange information					
Poor contractor/supplier commitment					

Internal challenges	level				
	1	2	3	4	5
Difficulties in inserting environmental issues in a bid					
Lack of consensus on EM standards within the sector					
Lack of support from senior management team					
Lack of support from other staff and workers					
Lack of roadmap or strategy					
Lack of management commitment					
Other procurement targets					
Contractors abilities					
Lack of knowledge/skills					
Resource limitations					
Weak processes					
Poor communication					
Cost reduction focus					
Implementation costs are too high					
Costs of improvement are too high					
Complex documentation processes/procedures					
Loss of competitive edge					
Resistance of employees					
Focus on reducing cost at expense of environmentally friendly practices					
lack of contractor awareness					
Lack of training					
Accounting methods limit green reporting					
Pressure for lower prices					
Shortage of personnel					
Lack of understanding of how to insert environmental issues in contracts					
Reluctance to change from traditional practices					
Conflict with assembly's objective					

3.4.2. Please use this space to outline any other challenge you think is not listed above.

3.4.3. Please attach a copy of your organizations environmental policy if any when you return the questionnaire.

Future trend

5.1 Since 2008, the Ghana government has recommended sustainable issues into public procurement.

Do you think this has caused a change to the procurement at the district level? (Please tick one box)

No change Insignificant change Moderate change
Significant change Major change

5.2. Kindly mention two current environmental regulations you know.

a.

b.

5.3. Which environmental regulations have you been complying with?

a. []

b. []

5.4. Kindly give suggestions to improve environmental sustainability issues into contracts in Ghana

a..... []

b..... []

5.5 Please use the space below to add additional comments regarding the trend in construction procurement.

.....
.....
.....

Thank you.

Thank you very much for your time. Your responses are much appreciated. Please kindly contact Harold Adjarko at haroldadjarko@gmail.com or call 0543 719 709 if any question