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TECHNOLOGY, KUMASI, GHANA

Enhancing Environmental Sustainability within the Construction Procurement Process in Ghana

KNUST

by

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A Thesis submitted to the Department of Building Technology,
College of Architecture and Planning
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

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DECLARATION AND CERTIFICATION

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

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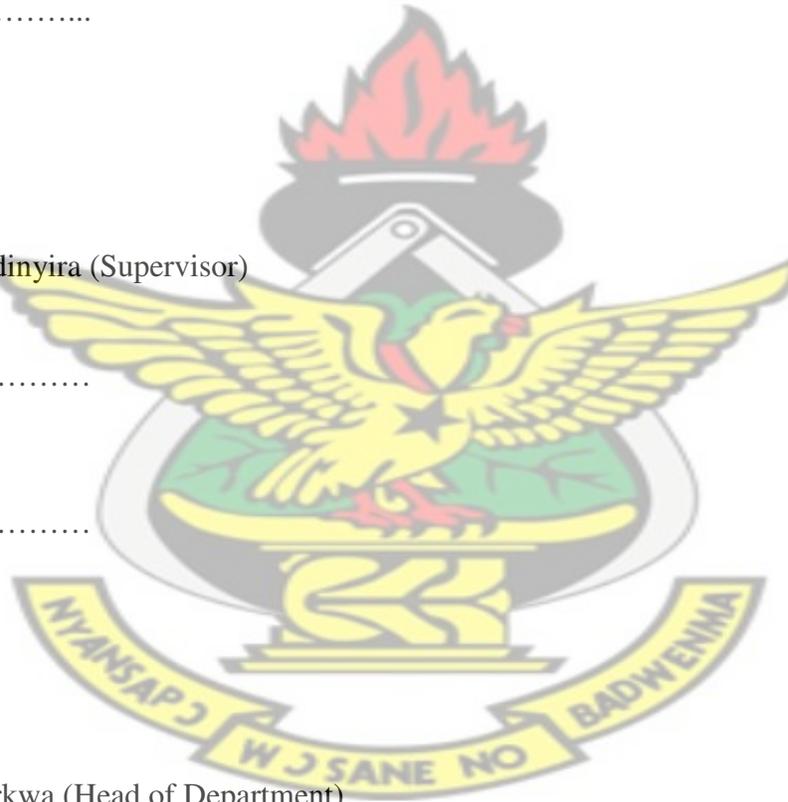
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Prof. Joshua Ayarkwa (Head of Department)

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Date



DEDICATION

I dedicate this work firstly to the Almighty God for the gift of life and how far he has brought me.

It is also to my dear wife, Beatrice Aba Larnyoh, and my children, Manuel Asheley Larnyoh and Mary-Ann Amoakoa Larnyoh.

God bless you all.

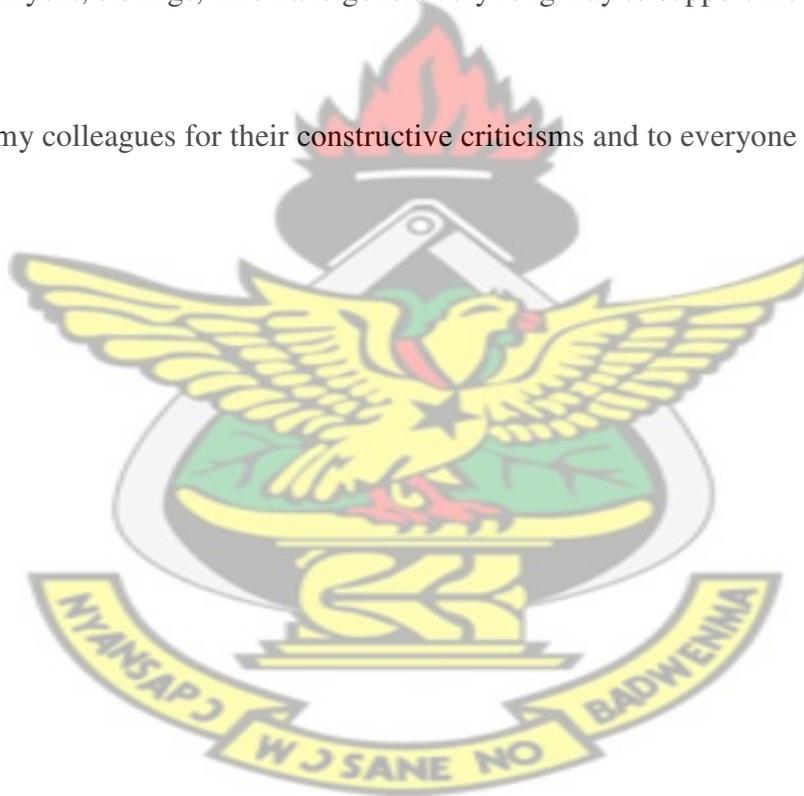
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Finally, I thank my colleagues for their constructive criticisms and to everyone who helped made this a success.



ABSTRACT

New trends in the field of procurement require embedment of environmental sustainability principles in the way the entire procurement process is executed. Construction is known to have a major impact on the environment and despite the recognition that environmental issues are important to the survival of the construction industry, the industry continues to degrade the environment, exploiting resources and generating waste. The industry is slow to change its conventional practices to incorporate environmental sustainability matters as part of its procurement decision making process. With increased awareness and knowledge of these impacts, efforts are being made to avoid these adverse effects and to work towards impact mitigation. The aim of the study is to assess how environmental sustainability within the construction procurement process can be enhanced. The objectives of the study among others included the assessment of the level of knowledge of environmental sustainability among construction procurement practitioners; identify challenges in integrating environmental sustainability and measures in integrating environmental sustainability into the construction procurement process. The main tools for the collection of data included questionnaires and interviews. The target population for the data collection included architects, quantity surveyors, engineers, procurement officers. Statistical package for social scientists version 20 was employed to analyze data obtained. Mean score rankings was adopted to analyze data on knowledge and barriers to implementation of environmental sustainability. Weighted average and relative importance index were adopted to analyze data on environmental sustainability integration measures. Air pollution, wear and tear of existing roads, destruction of virgin land, and high consumption of electricity power, noise pollution and waste of portable water were the major concern of professionals on environmental sustainability. The structured questionnaire survey showed the existence of some level of

awareness among professionals about environmental sustainability in construction procurement. Lack of stringent policies and laws, higher initial associated costs, lack of support from top management, lack of technical and management capacity and lack of public education were considered as the six major barriers that hinders the implementation of environmental sustainability into construction procurement process. The research recommended that policies and measures that could monitor, evaluate, and track construction works for the attainment of environmental sustainability should be incorporated in the construction procurement process. Finally, areas for further research were identified.



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CHAPTER ONE

INTRODUCTION

1.1 GENERAL INTRODUCTION

In the next 40 years, the world's population is likely to double (Berry and McCarthy, 2011). This in theory is good news for the construction industry because all those extra people will need homes, schools, work places and infrastructure. But the world is of finite resources and within years many of the natural resources such as oil, water, timber, some metals and minerals will be in short supply. As a result of the finite resources of the planet, there has been growing concerns about its ability to cope with the negative effects of the growth of human population and their practices on these resources. As a result, there is the need for an intervention to control the alarming rate of depletion of the earth's resources (LPR 2008, 2010).

In 2015, the global construction and engineering industry is expected to be worth over \$3 trillion. This value is expected to increase over 30% in a five-year period. The industry is primarily involved in the construction of new structures such as housing, factories, schools, bridges, and roads and the setting up of new sites, repair, maintenance and modification of existing structures (Report Linker, 2014). Despite its importance, the global construction and engineering industry consumes majority of the world's energy. When compared with other sectors such as transportation and industry, it uses an estimated more than 40%, and a third of global greenhouse gas emissions in developed and developing countries (UNEP, 2009).

According to GSS (2014), the contribution of the construction industry in Ghana to Gross Domestic Product (GDP) in 2013 was 11.8% compared to 8.8% in 2009. This shows a significant growth in construction sector of the Ghanaian economy within the last five years. Taken as a whole

the construction industry utilizes 50% of all materials extracted from the earth's crust (Shakantu et al., 2007). As a result, there is a need to take responsibility for the effect of the construction industry on society and the environment and appropriately address those issues in a positive manner.

1.2 BACKGROUND

As a major construction client, the Government of Ghana has an important role in driving the sustainability agenda by improving its own performance and translating that into its demand on suppliers. The Public Procurement Act 2003, Act 663, requires all public procurement to secure a judicious, economic and efficient use of state resources (value for money). Value for money is the optimum combination of whole life costs and quality to meet the user's requirement.

Although the primary aim of procurement must always be the achievement of value for money and not the delivery of policies such as environmental sustainability, there is much that can be done on sustainability issues within the value for money approach.

GCCP (2002) explained sustainable construction as the set of processes by which a profitable and competitive industry delivers built assets (buildings, structures, supporting infrastructure and their immediate surroundings) which:

- Enhance the quality of life and offer customer satisfaction
- Offer flexibility and the potential to cater for user changes in the future
- Provide and support desirable natural and social environment
- Maximize the efficient use of resources.

It is possible to set sustainability goals in the procurement process of all built assets (buildings and infrastructure). Sustainable public procurement is a process whereby public institutions meet their needs for goods, services and works in a way that achieves value for money on a whole life cycle basis in terms of generating benefits not only to the organization but also to society and the economy, while minimizing damage to the environment (GCCP, 2000). Traditional procurement has focused on value for money only while sustainable procurement focuses on achieving value for money on a whole life basis by considering the economic, environmental and social issues associated with the goods, works and services procured, with the goal of reducing possible adverse effects.

1.3 PROBLEM STATEMENT

Sustainable development involves the integration of economic, social and environmental factors in order to promote a better quality of life now and for future generations (Tensey et al., 2004). However our current public procurement processes seem not to lay much emphasis on sustainability. There is the need to have a relook at our current construction procurement process and how environmental sustainability issues can be incorporated into it to enhance better quality of life now and for future generations.

1.4 RESEARCH QUESTION

To help achieve the objectives, the following questions were asked;

- Do procurement practitioners in the Ghanaian construction industry understand Sustainable Procurement?
- What factors militate against the practice of Sustainable Procurement in the Ghanaian construction industry?
- How can Sustainable Procurement be integrated into the construction procurement process?

1.5 AIM

The aim of the study is to assess how environmental sustainability within the construction procurement process in Ghana can be enhanced.

1.6 OBJECTIVES

To help achieve the aim, the following objectives were set;

- To assess the level to which construction procurement practitioners in Ghana understand and embrace environmental sustainability.
- To identify challenges in integrating environmental sustainability issues into the construction procurement structure of Ghana.
- To assess how environmental sustainability can be integrated into the construction procurement process in Ghana.

1.7 SIGNIFICANCE OF STUDY

A review of literature indicates that majority of research has been conducted in the area of value for money approach to construction procurement. However the practice of procurement in Ghana seems to have neglected sustainability considerations (Mensah and Ameyaw, 2012). Ghana's Public Procurement Act 2003, Act 663, as it stands now seems to address only a few of the sustainability issues.

The challenge is to define how to possibly include economic, social and environmental considerations in the construction procurement process while ensuring that government decisions are fair and transparent. It is within this framework that environmental issues should be taken forward within the construction procurement process in the country. As a result, this study seeks to enhance environmental sustainability within the construction procurement process in Ghana.

1.8 BRIEF METHODOLOGY

The design approach for this research was quantitative. Data was collected primarily by administering questionnaire to procurement practitioners such as project managers, architects, engineers, planners, quantity surveyors and procurement officers / assistants. Literature from other secondary sources like books, journals and internet was also used. Data collected was analysed using basically descriptive statistics and conclusions and recommendations were made based on the findings.

1.9 SCOPE

The study could have been conducted at all Metropolitan Municipal and District Assemblies (MMDAs) in Ghana, however, time constrained the researcher to focus on MMDAs in the Greater Accra Region. The study focused on public works procurement officials within the region since the region is the major hub of construction activities in the country. The study covered the process and procedures captured under the Public Procurement Act, 2003, Act 663, and on environmental sustainability in the procurement process of construction works. Data collection was limited to the construction and procurement professional in the various MMDAs.

1.10 RESEARCH OUTLINE

This study was organized into five chapters as follows;

Chapter one: Introduction: this chapter shows the main aim and objectives of research, statement of the problem and scope of the research; **Chapter two:** Literature review: this chapter shows a historical review from previous studied environmental sustainability within the construction procurement process, challenges in integrating environmental sustainability issues into the construction procurement and integrating environmental sustainability into construction procurement; **Chapter three:** Methodology: this chapter shows the main methodologies used in previous studies and the methodology used in this research in order to achieve the required objectives. It also covered the study area, the study population, the sampling procedure, data sources, instrumentation and data analysis; **Chapter four:** Results analysis: this chapter shows analysis, description and discussion of research results; **Chapter five:** Conclusion, summary, recommendations and areas for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 THE GHANAIAN CONSTRUCTION INDUSTRY

The construction industry has made significant contribution to both industrial output and overall Gross Domestic Product (GDP) in Ghana over the years. With reference to available country-wide statistics, the impact of the built environment sector as a whole is much greater; including segments of the manufacturing, mining, quarrying, electricity and water sectors (Osei, 2013). The importance of the construction industry needs to be discussed in order to establish the need for the continuous improvement of the industry.

2.1.1 IMPORTANCE OF THE GHANAIAN CONSTRUCTION INDUSTRY

Construction is a key sector of the economy of every country (Hillebrandt, 2000). In Ghana the construction industry plays an essential role in the socio economic development of the country. There are many reasons for the industry's importance.

The activities of the industry have a lot of significance to the achievement of national development goals of providing infrastructure such as schools, hospitals, townships, offices, houses and other buildings; urban infrastructure (including water supply, sewerage, drainage); highways, roads, ports, railways, airports; power systems; irrigation and agricultural systems; telecommunications etc. (Osei, 2013). The quality of the design and construction of these facilities has an impact on the efficiency with which the productive activities and provision of services can be achieved and can also affect the ability of the nation to attract foreign investment.

According to Ghana Statistical Service, GSS (2014), the construction industry's contribution to gross domestic product (GDP) rose from 8.8% in 2009 to 11.8% in 2013. This constitutes a large part of the economy. Owing to its large size, the construction industry has the potential to contribute directly to the growth of the national economy. At the same time, a period of low construction output can adversely affect the growth of the economy. The rapid expansion of infrastructure by both government and the private sector has triggered off construction activities and fuelled demand in many key sectors like cement, steel, paints and chemicals, glass, timber and earth moving equipment and machinery. The construction sector is a crucial industry having strong backward and forward growth linkages.

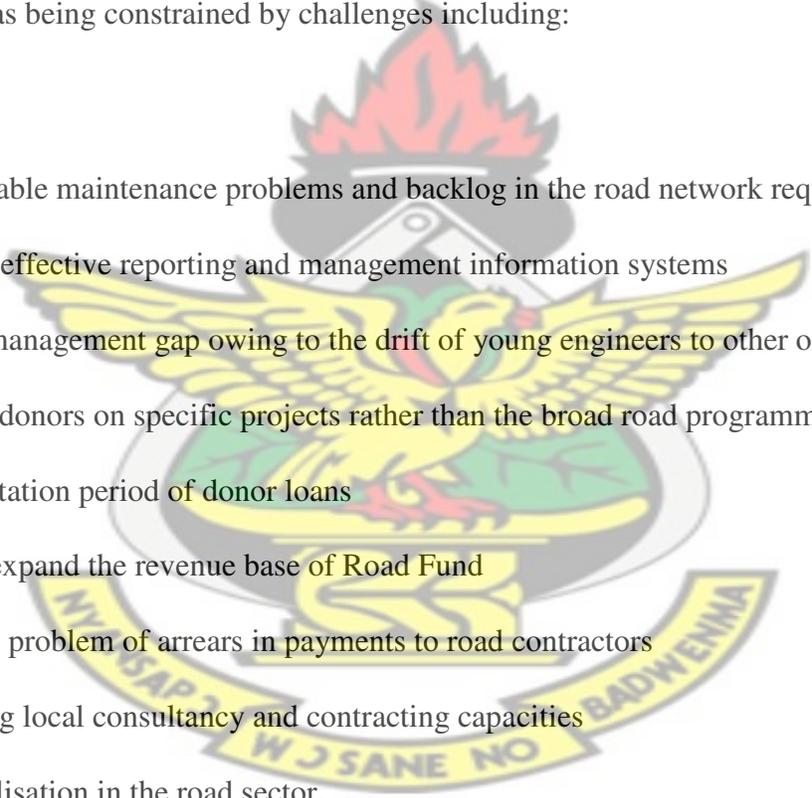
Besides, the construction industry generates substantial employment and provides a growth impetus to other sectors. For example, construction uses materials and components made by the manufacturing sector. These inputs are supplied by the commerce and services sector. Construction also relies on financial services, as well as the legal, accountancy and other relevant professional services from this sector. It must also be noted that, at one time or another, enterprises in all sectors will require some construction. Thus, the linkage is two-way; construction affects the other sectors, and vice-versa (Ofori, 2012).

2.1.2 PROBLEMS OF THE INDUSTRY

The problems facing the construction industry in Ghana are similar to those which are commonly seen in reports on the industries in other developing countries (Ofori, 2012). The sector is not planned in a holistic manner, but rather, operates with fragmented and often conflicting components resulting in wastage, inefficiency and inability to plan for total development. In fact,

one of the main reasons for these inefficiencies is related to the multi-sectoral nature of the construction industry which requires sound planning. The management of the improvement of the construction industry has not received direct continuous attention from a single organisation. Aspects of the industry are under the purview of several ministries, and in particular, the Ministry of Transport and Ministry of Water Resources, Works and Housing.

The problems and issues are well exemplified by those which were highlighted in Government of the Republic of Ghana (2000) report on the roads sector of the industry. In that report, the roads sector was seen as being constrained by challenges including:

- 
- Considerable maintenance problems and backlog in the road network requiring attention
 - Need for effective reporting and management information systems
 - Serious management gap owing to the drift of young engineers to other organisations
 - Focus of donors on specific projects rather than the broad road programme
 - Long gestation period of donor loans
 - Need to expand the revenue base of Road Fund
 - Perennial problem of arrears in payments to road contractors
 - Improving local consultancy and contracting capacities
 - Decentralisation in the road sector.

Whereas the issues in the preceding paragraph, are relevant only to the roads sector, the problems highlighted are shared by building segment of the industry. According to the same government report, national road contractors face the following problems “regardless of their financial class”:

- Inability to secure adequate working capital

- Inadequate management
- Insufficient engineering capacity
- Poor workmanship.

Osei (2013) also identified some of the problems facing construction industry in Ghana as follows:

- Land tenure issues
- Lack of technology and preference for imported raw materials
- Payment delays
- Financial constraints

2.1.3 USERS AND CONSUMERS OF THE BUILT ENVIRONMENT

The government is a major user and consumer of the built environment in the form of infrastructure, housing and tertiary buildings.

Private sector users include:

- A growing number of home owners as individuals become land and home owners in their own right outside of traditional ownership patterns.
- Business and industry interests requiring production, sales and office facilities.
- Non-governmental and civil society organizations developing their own health, education and welfare facilities.
- Unregistered businesses, mainly traders or craftsmen, informally developing workshops and stalls.
- Unregistered residents, informally developing housing.

In conclusion, Changes in the environment in which the construction industry operates make it necessary for practitioners to update their knowledge periodically. In particular, the growth of information and communication technology will continue to have a major impact on many aspects of construction. It will influence the nature of buildings and items of infrastructure; as well as the way in which they are designed and constructed considering sustainability issues. Ghanaian construction practitioners must acquire knowledge of this technology, and proficiency in its application. Materials and other technologies adopted in construction are also undergoing change at a fast pace, and practitioners must keep up with these trends. As a result the construction industry is coming under pressure from governments, investors, clients and concerned citizens to take up sustainability issues serious (Kwakye, 2006).

2.2 IMPACT OF CONSTRUCTION ACTIVITIES AND BUILDINGS ON THE ENVIRONMENT.

Construction of infrastructural facilities such as buildings and roads are very useful for society. The proliferation of these structures means progress to any city as it increases the quality of life of the people as well as enhances the economy of the nation. There are, however, externalities that we need to consider and cannot be ignored because of the magnitude of the amount of pollutants emitted during construction and use of buildings. Effective protection of the environment is critical to sustainable development. Identification of possible impacts of building construction projects on the environment is a task that needs to be accomplished for the realization of an effective environmental protection.

Buildings consume space and natural resources. They require cement and other building materials, some of which are extracted from quarries (aggregate, sand). Building materials are hauled long distances exerting pressure on the road network. During construction, workers are exposed to a wide range of pollutants (particulates) and noise. Nearby residents also are subjected to extensive noise and air pollution. A typical example of this was experienced in Accra during the construction of the Kwame Nkrumah Circle to Ofankor Road where due to dust pollution during construction, many shops and organisations along the road had to either shut down or relocate. A popular radio station along the road, Peace F.M. had no option than to relocate due to the dust pollution. Many residents also reported sick during the construction period due to the dust pollution.

Occupants of building consume water and generate wastewater and solid waste. Buildings also consume energy and release carbon dioxide. Ultimately, if and when buildings are demolished, rubble and debris are hauled away and disposed at sea or in abandoned quarries. Table 1 summarizes the key environmental impacts associated with the construction sector.

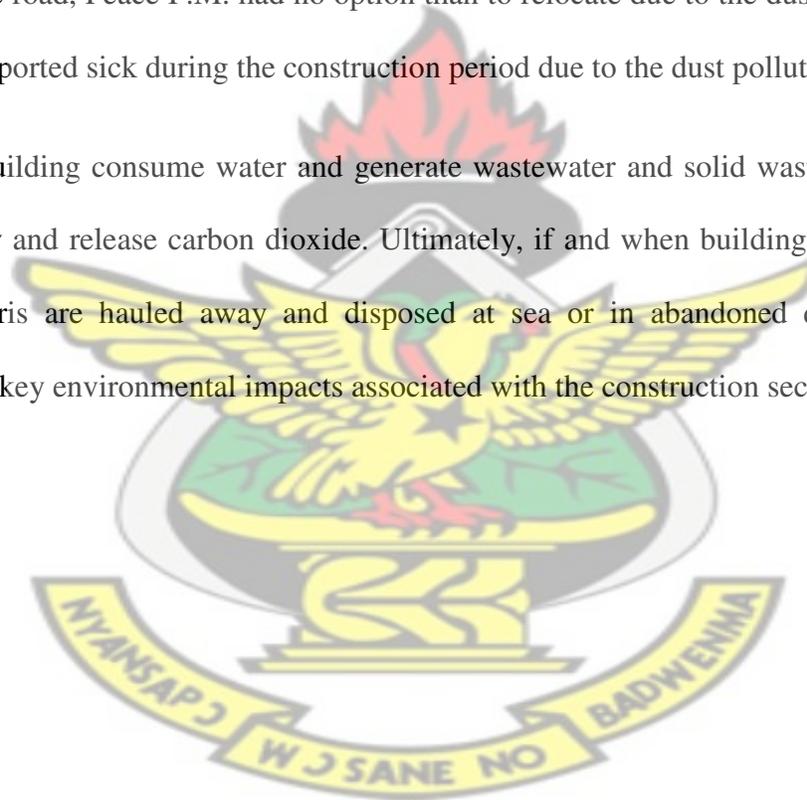


Table 2.1: Environmental Impacts of Buildings and Construction Activities

Environmental Impacts	Description	Potential Impacts on		
		Air	Water	Soils and land cover
Extracting raw materials	Sand and gravel	Particulate emissions	Water courses near quarries are altered	Landscape degradation
Manufacturing building materials	Cement production	Particulate emissions CO, Sox and NOx	–	Deposition of dust
Constructing buildings	Transporting materials	NOx and CO2 emissions	–	Taking up new areas of land
	Building sites	Noise, particulate emissions	–	–
Using buildings	Energy Consumption	CO2 emissions	–	–
	Water consumption	–	Wastewater discharges containing detergents and organic matter	–
	Wear and tear of materials	Asbestos fibres, indoor radon emissions	–	–
Demolishing buildings		Noise, particulate emissions	–	Demolitions waste to be land filled or reused for sea reclamation

Source: Majdalani et al, 2006

2.3 AN OVERVIEW OF PUBLIC PROCUREMENT IN GHANA

Public procurement in Ghana is guarded by the Public Procurement Law, 2003 (Act 663), a comprehensive legislation designed to eliminate the shortcomings and organizational weaknesses which were inherent in public procurement in Ghana. The government of Ghana, in consultation with its development partners had identified the public procurement system as an area that required urgent attention in view of the widespread perception of corrupt practices and inefficiencies, and to build trust in the procurement system (Ameyaw, Mensah and Osei-Tutu, 2012). A study by the

World Bank (2003) reported that about 50-70% of the national budget (after personal emoluments) is procurement related. Therefore an efficient public procurement system could ensure value for money in government expenditure, which is essential to a country facing enormous developmental challenges.

To ensure sanity and value for money in the public procurement landscape, the government of Ghana in 1996 launched the Public Financial Management Reform Programme (PUFMARP). The purpose of the programme was to improve financial management in Ghana. PUFMARP identified weaknesses in the procurement system. Some of these weaknesses included: lack of comprehensive public procurement policy, lack of central body with technical expertise, absence of clearly defined roles and responsibilities for procurement entities, absence of comprehensive legal regime to safeguard public procurement, lack of rules and regulations to guide, direct, train and monitor public procurement. The programme also identified that there was no independent appeals process to address complaints from tenderers. These findings led to the establishment of the Public Procurement Oversight Group in 1999. The aim of this group was to steer the design of a comprehensive public procurement reform programme which led to the drafting of a public procurement bill in September 2002 that was passed into law on 31 December 2003.

The object of the Public Procurement Law 2003, Act 663 is to harmonise the process of public procurement in the public service to secure a judicious, economic and efficient use of state resources in public procurement and ensure that public procurement is carried out in a fair, transparent and non-discriminatory manner.

2.4. SUSTAINABLE PROCUREMENT

Sustainable procurement plays a key role in contributing to sustainable development.

Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission of Environment and Development/The Brundtland Commission, 1987)

Sustainable public procurement is a process whereby public institutions meet their needs for goods, services and works in a way that achieves value for money on a whole life cycle basis in terms of generating benefits not only to the organization, but also to society and the economy, while minimizing damage to the environment (Aurora Energy System, 2008; DEFRA, 2006). Sustainable procurement is all about taking social and environmental factors into consideration alongside financial factors in making purchasing decisions. It involves looking beyond the traditional economic parameters and making decisions based on the whole life cost, the associated risks, measures of success and implications for society and the environment. Making decisions in this way requires strategically setting environmental factors into a broader procurement context that includes value for money, performance management and corporate and community priorities (UNDP Practice Series, 2008):

- Value for money considerations such as, price, quality, availability, functionality;
- The entire life cycle of products;
- Environmental aspect – the effects on the environment that the goods, services and civil works have over the whole lifecycle (green procurement); and

- Social aspects, such as sustainable supply chains and the effects of issues such as labour conditions, including child labour provision, occupational health and safety and compliance with relevant industrial and environmental regulations.

Procurement can make a significant contribution to the policy goals of sustainable development and efficient resource usage by ensuring that the suppliers, contractors and the goods and services purchased achieve optimum environmental performance. In addition, sustainable procurement plays a role in minimizing any reputation risk of social exploitation within the supply chain.

According to UNDP Practice Series (2008) sustainable procurement seeks to incorporate a number of safeguards and checks in the procurement process that will assist in guarding against the inadvertent infringement of:

- Labour rights
- Adverse environmental impacts
- Supporting local entrepreneurship
- Gender and the empowerment of women
- Poverty eradication
- Governance

Traditional procurement focuses upon value-for-money considerations. The aim and challenge of sustainable procurement is to integrate environmental and social considerations into the procurement process with the goal of reducing adverse impacts upon health, social conditions and the environment, thereby saving valuable costs for organizations and the community at large. Sustainable procurement forms a key part of an overall push for sustainable development.

2.4.1 SUSTAINABILITY PRINCIPLES FOR BUILDING AND CONSTRUCTION

Sustainability objectives will be achieved only if they are implemented in all stages of the procurement process. Sustainability principles should be incorporated into the design and then carried through the construction procurement process to realize the concept. Environment Agency (2002) cited the six main principles for sustainable construction as follows:

- i. Minimization of resource consumption
- ii. Maximization of resource reuse
- iii. Use renewable and recyclable resources
- iv. Protect the natural environment
- v. Create a healthy and non-toxic environment
- vi. Pursue quality in creating a healthy environment

2.4.2 BENEFITS OF SUSTAINABLE PROCUREMENT

UNDP Practice Series (2008), outlined the following as some of the potential benefits of sustainable procurement:

- Long-term efficiency savings;
 - more efficient and effective use of natural resources and the environmental effects of obtaining those resources
 - reducing the harmful impact of pollution and waste
 - eliminating or reducing toxic materials entering the environment thereby reducing the impact of hazardous substances on human health and the environment

- encouraging innovation
 - reducing waste and landfill through purchasing recycled content products and products that create less waste
 - providing strong signals to the sustainable products market
 - expressing the organisation's commitment to sustainable development
 - saving money through re-using materials and products
 - helping to 'close the loop' to make recycling viable
 - saving water
 - reducing greenhouse gas emissions
 - preserving the natural habitat for flora and fauna
- Making more efficient use of public resources;
- reducing costs through greater energy efficiency, reduced waste disposal, reduced risk management
 - lowering costs for some products and services
 - increasing productivity and reduced time lost from illness because of the improved work environment
- Stimulating the market to innovate and produce more sustainable options;
- increasing the availability of green products at cost-effective prices
 - expanding the market for green products, as well as for products with reduced packaging
 - improving the level of information available to buyers about the content and performance of products making it easier to buy green

- Demonstrating to industry and the community that the UNDP is serious about sustainability;
 - procuring green provides leadership to governments, industry and community at large and demonstrates social and environmental responsibility
 - Reducing the potential negative publicity associated with the use of products, services and suppliers with poor environmental records; and
- Improves working conditions and productivity
 - less exposure to toxic materials and emissions through use of more benign products for cleaning, pest control, building and fleet maintenance and
 - more comfortable energy-efficient working environments

The benefits of adopting a sustainable procurement approach are numerous. The receiver of the benefits can be the purchaser, the market (or supplier) or the community. Some benefits can apply to all these groups. Australian Government, Department of Sustainability (2013) also cited the following benefits:

Benefits to the purchaser can include:

- securing best value for money and achieving a more efficient use of public resources
- generating financial savings through greater energy efficiency; reduced waste disposal (including reduced packaging to waste); reduced water use; and reusing materials and products, thereby lowering the cost of a product over its life cycle
- achieving positive publicity associated with the purchase and use of products, services and suppliers with good environmental and social responsibility records
- providing government leadership to the community in demonstrating social and environmental responsibility through the purchase of sustainable products and services.

Benefits to the market can include:

- increasing the availability of sustainable products and services at more cost-effective prices
- expanding the market for sustainable products and services, with potential benefits for local businesses
- expanding market opportunities gained from stronger product and service differentiation
- reducing transport-related costs such as fuel, vehicle maintenance and road congestion
- Supporting and encouraging innovation through demonstrating preference for more sustainable products and services.
- encouraging industry to develop capacity to operate in a clean, green economy.

Benefits to the community can include:

- reducing adverse environmental and social impacts arising from procurement decisions
- reducing waste to landfill, saving water and reducing greenhouse gas emissions
- reducing air and water pollution
- reducing consumption of both natural and processed resources
- promoting health, safety and equality in the community
- influencing purchasing decisions to support issues such recognising equality and diversity; increasing employment and skills; and developing local communities and their physical infrastructure
- improving social inclusion and cohesion through creating employment and business opportunities for disadvantaged or marginalised groups.

2.4.3 BARRIERS TO SUSTAINABLE PROCUREMENT

There are certain factors that militate against the successful implementation of sustainable procurement. These barriers need to be overcome in order to attain sustainability in a procurement system.

Mensah and Ameyaw (2012) and Cheri and Chiriseri (2014) identified the following as some of the barriers to sustainable procurement:

- Higher initial associated costs
- Lack of government interest
- Lack of social drive / responsibility
- Lack of public education
- Lack of adequate supervision during construction
- Lack of technical and management capacity
- Lack of support from top management
- Lack of understanding of the sustainable procurement concept
- Lack of basic education about sustainable procurement
- Lack of political will
- Sustainable methods are more expensive than traditional construction methods
- Low stakeholder education
- Lack of training and education about sustainable design
- Lack of stringent policies and laws
- Lack of interest in the adoption of innovative practices
- Lack of capacity of suppliers / contractors

- Uncertainty of benefits to the client
- Corruption existing among procurement practitioners

2.5 IMPLEMENTING SUSTAINABILITY IN THE CONSTRUCTION PROCUREMENT PROCESS

Public procurement accounts for at least 15 percent of the world's gross domestic products and even more in African countries (World Bank, 2013). In Ghana the magnitude of resources involved in public procurement in 2007 was estimated at over 17 percent of gross domestic product and around 80 percent of tax revenue (World Bank, 2010). These figures show the country spends a lot on procurement, hence making purchases more environmentally-friendly can have a major effect on sustainable development.

2.5.1 THE PROCUREMENT PROCESS

All procurement is based on obtaining the best value for money for the country. Sustainability fits into this by considering whole life costs and quality to meet the needs of the country. Consideration of sustainability, especially during the early stages of the procurement process can often deliver best value option.

Like all other procurements, the integration of environmental sustainability considerations within the procurement process must ensure that the principles of fairness, integrity, transparency and competition are not compromised.

University of Reading (2009) outlined the following guideline on how to implement sustainability in the procurement process:

❖ Project scoping

i. Identifying the need

The first stage of any procurement process is to identify a need. In order to achieve sustainability through the procurement process, there must be an element of challenge to the decision to procure. In order to do this it is helpful to ask the following questions:

- Is the purchase essential?
- Can the item be re-used after its original use?
- Are the quantities required accurate?
- Can the requirement be aggregated with other supplies, service or work requirements?
- Does the supply, service or work have to be purchased outright or can it be rented or shared?
- What is the energy consumption?

ii. The business case

Once a need has been identified then a business case should be prepared. When pursuing sustainable procurement it is important to include all stakeholders in the development of the business case.

iii. Market Analysis

It is important to investigate what sustainable works are available. These alternatives are often not as obvious as the traditional works that are procured. A market analysis provides with more information about how the market could potentially fulfill the needs, what alternatives are available and the price that will be expected to pay. It is essential that the analysis is fair and open ensuring that bidders are treated equally.

iv. Risk Assessment

There are environmental or ethical risks associated with the procurement of some works. It is important to think about these risks before any procurement takes place.

v. Aggregation

Aggregate contracts wherever possible. Not only is this necessary under the procurement law, it is also good procurement practice.

vi. Choosing an environmental title for the contract

Clearly labelling a proposed contract with an environmental title makes it easier for potential bidders to quickly identify what might be required and conveys the message that the environmental performance of the works will play an important role in the award of the contract. E.g. Request for Proposal for the Design and construction of an energy efficient building

❖ Contract preparation

Contract Preparation is the key stage when achieving sustainability in procurement. The specification is the tool used to define what is required and where the most important impact can be made with regard to sustainable procurement.

i) Specification

It is very important that the specification incorporates sustainability, otherwise, after this stage it is too late and the tender cannot be evaluated on its sustainable contribution. Specification stage can be used to consider and include such aspects as quality, price, technical merit, functional and environmental characteristics, running costs, whole life costs and delivery times.

There are three types of specifications: technical, performance and functional. Technical specification allows the client to define the technical and physical characteristics to be used and can therefore specify say, recyclable products. Performance and functional specifications help achieve sustainability by encouraging suppliers to be more innovative and minimise the impact of procurement on the environment. Protection of the environment may be taken into account by using environmentally friendly products or services, defined by their environmental performance and the production method used. For some specific types of works contracts, it is an obligation for an environmental impact assessment to take place; these assessments can lead to more environmentally sound requirements in the execution of works

ii) Setting the Evaluation Criteria

It is during the contract preparation stage that evaluation criteria must be set. There are two ways in which tenders can be evaluated, either by lowest price or by MEAT (most economical

advantageous tender). In order to achieve sustainability in procurement, tenders should be evaluated by MEAT. As the words describe, evaluating a tender by the lowest price means that you can only consider the price aspects of a tender, whereas using MEAT the client can consider such aspects as quality, price, technical merit, functional characteristics, environmental characteristics, running costs, whole life costs, technical assistance and delivery times to name but a few.

iii) Method Statements and Case Studies

As part of the tender documents it can be useful to ask bidders to complete a method statement or case study. These allow bidders to demonstrate their understanding of sustainability issues and the way in which they would deal with them in a contract. For example, how they may identify environmental impacts and how they would go about minimising them.

iv) Variants or Alternatives

These can be a useful way of achieving improved environmental performance of a contract as they encourage bidders to be innovative. Bidders are also the experts in their field and by using variants, ideas are often put forward that the client may not be aware of or have not thought about. The use of variants and alternatives are accepted in the procurement process but only if the contract documents state what the minimum requirements are. If they are used then the bid must be evaluated by using MEAT.

❖ Letting the Contract

i) Advertisement

Contract adverts should be issued by electronic means; not only does it save on paper, it also reduces the timescales.

ii) Pre-Qualification

During pre-qualification, there are a number of ways in which bidders can be assessed on their sustainability, these are:

- Technical capacity
- Past experience
- Environmental technical competence
- Educational and professional qualification

iii) Tender Evaluation

When evaluating tenders, there are certain rules that should be observed. Firstly never duplicate the criteria assessed at the pre-qualification stage and secondly assess bids by:

MEAT (most economical advantageous tender) or Lowest price.

Sustainability can be considered when evaluating tenders if:

- The evaluation criterion is MEAT
- It is linked to the subject matter of the contract
- The environmental award criteria are “adequately specific and objectively quantifiable”
- The criteria is not discriminative

iv) Whole Life Costs

Assessing a tender by whole life costs is a good way of securing sustainability. Whole life costs are the costs incurred by the client, from the beginning of a contract and run through to the disposal.

Therefore they include:

- Running costs
- Efficiency
- Cost effectiveness
- Direct running costs
- Spending to save
- Product maintenance
- Disposal and recycling

It is good procurement practice to consider all of the costs associated with procuring and not just the initial cost of a purchase.

v) Contract Award

After a contract has been awarded, bidders should be provided with feedback on their tenders, this is not only a necessity, but also good procurement practice. In respect of sustainability it can be a useful tool in developing bidders' understanding of the client's needs, although the client must be mindful that sustainable issues can only be considered when they form part of the evaluation criteria.

❖ Managing the Contract

Achieving sustainability through procurement does not end when the contract has been awarded.

Working with bidders forms an important part of achieving sustainable objectives.

A development plan encourages bidders to be innovative, providing solutions to environmental and social problems, which can then in turn be used in future procurements.

❖ Contract Review

When a contract has completed it is good practice to share any successes and failures, these can include sustainable issues

2.6 CHAPTER SUMMARY

Sustainable procurement plays a key role in contributing to sustainable development. Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. This chapter reviewed literature on the environmental sustainability in construction procurement in Ghana. It further reviews barriers in sustainable procurement and integration of environmental sustainability in the construction procurement process.

CHAPTER THREE

METHODOLOGY

3.1 RESEARCH DESIGN

Research design is a set of advance decisions that make up the master plan specifying the methods and procedures for collecting and analyzing the needed information (Dyslex,2011). A research design is based on the research questions and can be considered a “blue print” which indicates how data relating to a given problem should be collected and analysed. There are two types of research design, qualitative and quantitative.

According to Dyslex (2011), the following are the essential components of a basic research design, irrespective of its qualitative or quantitative nature.

➤ Research instrument

- Design and development of research instrument
- Questionnaire development
- Survey designing
- Formulating interview
- Sample selection and designing
- Defining and finalizing variables

➤ Data: observations and measures

- Data collection
- Data analysis

➤ Conclusions

- Deriving results
- Testing against hypothesis
- Stating limitations

This study employed a quantitative research approach and it is largely descriptive in nature. A descriptive research presents facts concerning the nature and status of a situation, as it exists at the time of the study and also describes present conditions, events or systems based on the impressions or reactions of the respondents of the research (Bryman and Bell, 2007). The major tool used in collecting data in this research is questionnaires.

3.2 POPULATION

A population refers to the complete set of cases or elements from which a sample is taken (Bryman & Bell, 2007). The population of this research is all professionals who play a role in the construction procurement process in the nineteen (19) metropolitan, municipal and district assemblies of the Greater Accra Region of Ghana. There are approximately 160 professionals including architects, engineers, quantity surveyors, planners, procurement officers etc.

Due to the difficulty in collecting data from this large population, lack of resources and time constraint, a sample size was drawn in order to carry out this research.

3.3 SAMPLE AND SAMPLING TECHNIQUES

Sampling is defined as a process of selecting a section to represent a whole. It is mostly impractical to conduct a census as conducting a census could be very expensive and time consuming. The sampling technique employed in this study is simple random. The core principle is that, the sample size should have features which reflect the entire population, such that conclusions can be generalized for the entire population. Based on the Yamane Taro's formula below the sample size for the study was determined;

$$n = \frac{N}{1 + N\alpha^2}$$

Where; n=Sample Size, N=Sample Frame (Professionals in all 19 assemblies-160)

α = margin of error (which will be 10% or 0.1).

$$n = \frac{160}{1 + 160(0.1)^2} = 61.53$$

A sample size of 62 professionals was obtained from using the formula. Questionnaire were given to all 62 professionals, but the researcher was able to retrieve 41 questionnaire for the analysis.

3.4 SOURCES OF DATA

The study used primary sources of information. The primary sources of data included information that was gathered from the questionnaires that were administered to the respondents. Primary data is more reliable since they come from the original sources and were collected exclusively for the purpose of the study.

3.5 DATA COLLECTION INSTRUMENT

Questionnaire was prepared to aid in the data collection. The questionnaire was designed specifically to solicit responses from professionals who are engaged in the construction procurement process in the various assemblies in the Greater Accra Region.

The questionnaire was developed from the literature review based on the research questions proposed for the study and was administered by people who had at least 1st degree.

The questionnaire had four parts. The first part was about the background of the respondents (respondent's profile). The second part sought information on the knowledge and concern of respondents of environmental sustainability within the Construction procurement process, while the third part focused on challenges in implementing environmental sustainability into the construction procurement process. The last part dealt with integrating environmental sustainability into the construction procurement process.

3.6 RELIABILITY AND VALIDITY

Validity is concerned with whether the findings are really about what they appear to be about, while reliability is the extent to which data collection method or methods accurately measure what they were intended to measure (Saunders et. al., 2007). There are three prominent factors related to considering whether a measure has reliability: stability, internal reliability and inter-observer consistency. In this study, internal reliability was considered. In order to reduce the possibility of getting incorrect answers, attention was paid to issues of validity and reliability.

3.7 DATA ANALYSIS

According to Saunders et. al (2007), data analysis consists of three concurrent flows of activity: data reduction, data display and conclusion drawing/verification. Data collected for this research was edited, coded and analysed based on these three steps and according to the research question and literature review. The data was analysed using frequencies and percentages, with the use of Statistical Package for Social Science (SPSS) Version 20 and adopted the relative importance indices to find and rank the critical factors among all the factors articulated from the literature review.



CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

This chapter reports and discusses the survey findings. After the questionnaire survey was carried out, data collected was statistically analysed and interpretation drawn from it to address the key research objectives and questions captioned in chapter 1, using various methods described in the research methodology.

4.2 NATURE OF SURVEY AND RESPONSE OF RESPONDENTS

In reference to Chapter 3 on targeted sample size of 62 professionals to be identified through purposive sampling, the data collection involving the administration of the questionnaires started from 28th July, 2014 and ended on 18th August, 2014. In all a total of 62 respondents were reached across the 19 metropolitan, municipal and district assemblies (MMDAs) in the Greater Accra Region. A total of 41 questionnaires were received out of the 62 respondents constituting a response rate of 66%. This response rate is high compared to a similar study done by Mensah and Ameyaw (2012) which had a response rate of 60%.

4.3 DATA ANALYSIS

The data analysis was carried out in four parts. The first part concentrated on the background of the respondents which was based on information carried in the part 1 (general information) of the questionnaire, part 2 comprises the knowledge and concern of respondents of environmental sustainability within the Construction procurement process, whiles part 3 focus on challenges in

implementing environmental sustainability into the construction procurement process and the last part comprised an analysis on integrating environmental sustainability into the construction procurement process.

4.4 PRESENTATION OF RESULTS AND DISCUSSIONS

On the first part of the analysis, descriptive statistics were obtained on the responses given on the variables in part 1. This involved the frequency and percentage of responses to each of the variables. The questions centered on their occupation, experience, level of education, involvement in construction procurement process and issues addressed by sustainable procurement. This helped to assess and increase the validity, reliability and precision of the responses and result of the main research. The result is summarized in Table 4.1.

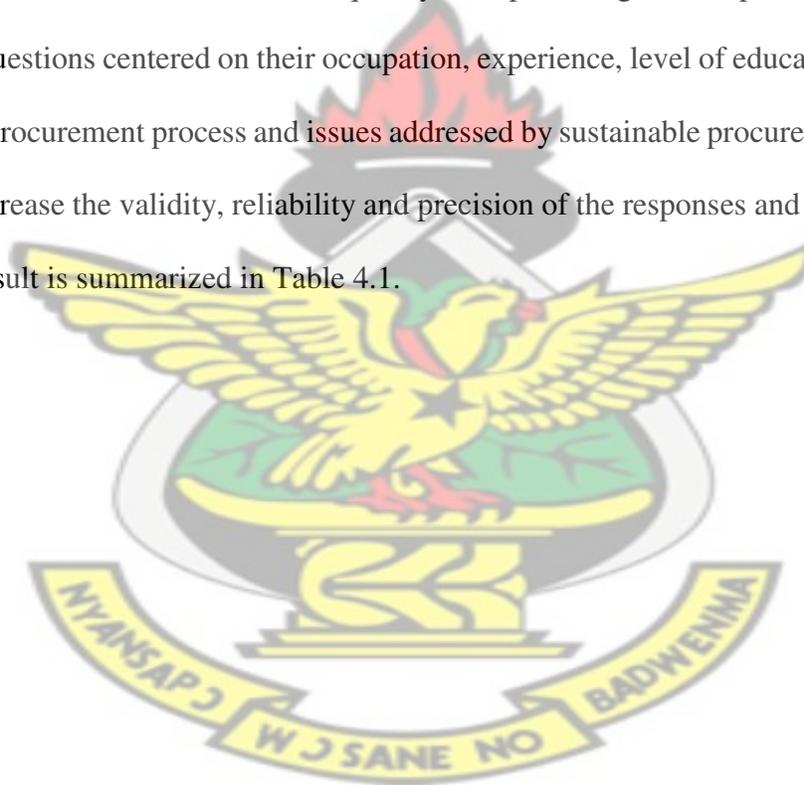


Table 4.1: Characteristics and Analysis of the Demographic Data

VARIABLES		FREQUENCY	PERCENTAGE
Occupation	Architect	4	9.8%
	Engineer	9	22%
	Quantity Surveyor	17	41.5%
	Procurement Officer	11	26.8%
Educational Level	GCE A' Level/SSCE or equivalent	2	4.9%
	Higher National Educational Diploma	8	19.5%
	Bachelor Degree	21	51.2%
	MBA/MSc	10	24.4%
Years of Experience	1-5years	15	36.6%
	5-10years	16	39%
	10-20years	9	22%
	Over 20years	1	2.4%
Involvement in Construction Procurement Process	Yes	33	80.5%
	No	8	19.5%
Knowledge about Sustainable Procurement	Yes	29	70.7%
	No	12	29.3%
Issues addressed by Sustainable Procurement	Social Issues	2	4.9%
	Economic Issue	4	9.8%
	Environmental Issues	8	19.5%
	Social, Economic and Environmental Issues	27	65.9%

Source: Field Data

From Table 4.1 above, on the occupation of the respondent, architects and quantity surveyors who answered the questionnaires constituted 9.8% and 41.5% respectively, while 22% and 26.8% of the professional are made up of engineers and procurement officers. This also indicates that the responses of the respondents are of high level reliability, validity and precision. This is because the greater level of involvement in construction suggests that they are more likely to understand the subject matter, give right interpretation to the variables and as such give accurate answers to the variables.

Fifty-one percent of the respondent hold bachelor's degree, while 24.4% hold MBA/ MSc degree in their respective profession. The study further showed that 19.5% and 4.9% of the respondent holds Higher National Diploma (HND) certificates and GCE A' Level/SSCE or equivalent certificate respectively (Table 4.1). In the area of experience, 16 (39%) respondents out of the 41 respondent population had 5-10 years' experience whereas, 15 (36.6%) had experience below 6 years (1-5years). In addition 22.0% of respondents with experience from 10-20 years and 2.4% of the respondent had 20years and above of experience also confirm that the respondents have adequate experience on the subject matter and are more likely to give accurate answers to the variables. Also the respondent level of involvement in sustainable procurement, with 80.5% involved in the construction procurement process, also on the knowledge of sustainable procurement, 70.7% of the respondent had adequate knowledge about sustainable procurement which gives a fairly balanced ratio in the attempt to establish the knowledge and involvement of the respondent about sustainable procurement in the construction industry.

On issues addressed by sustainable procurement, 65.9% agreed that Social, Economic and Environmental issues are addressed by sustainable procurement whiles, 19.5%, 9.8% and 4.9% are of the view that sustainable procurement addresses Environmental issues only, Economic issues only and Social issues only respectively.

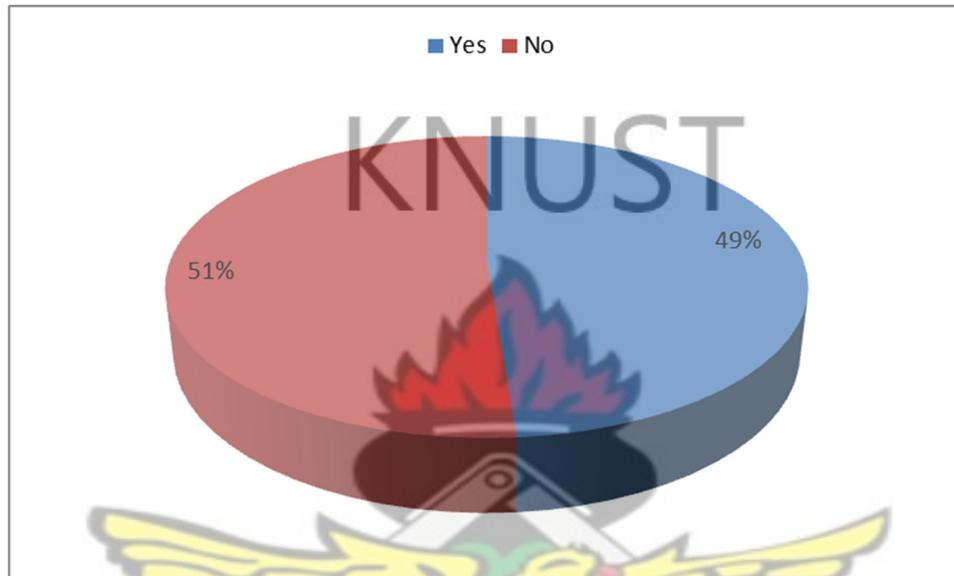


Figure 4:1 Policies on Sustainability/ Environment in Procurement

Figure 4.1 shows that fifty-one percentage of the organization have formal sustainability/ environmental policy on procurement whiles the remaining 49% do not have any policy on sustainability/ environmental procurement in their organization.

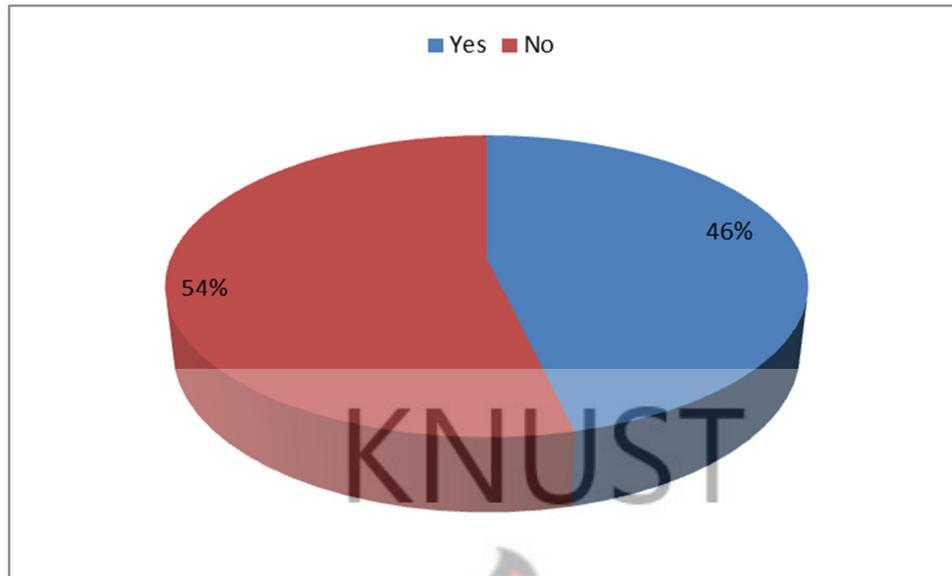


Figure 4:2 Environmental Sustainability Issues in Bidding Documents

On the inclusion of environmental sustainability issues in bidding documents for procurement of works, 54% of the organization said “Yes” while the remaining 46% said “No”.

4.4.1 ENVIRONMENTAL SUSTAINABILITY

The respondents were asked about their knowledge and concerns of Environmental Sustainability in the construction procurement process. When the responses of the professionals (architect, engineers, quantity surveyors and procurement officers) on their knowledge and concern of environmental sustainability in the construction procurement process were compared, the results showed no significant difference at 5% significance level. Hence, all the data were pooled together (Table 4.2). The mean scores of all the 13 variables evaluated are greater than the neutral value of 3.0 for all the respondents as shown in Table 4.2

Table 4.2: Environmental Sustainability

Variables	Mean	Std. Deviation	Ranking
Air Pollution E.g. Dust, Smoke Etc.	3.8537	1.17390	1 st
Wear And Tear of Existing Roads	3.8293	1.02231	2 nd
Destruction Of Virgin Lands	3.7317	1.04939	3 rd
High Consumption of Electricity Power	3.5854	1.02410	4 th
Noise Pollution	3.5366	1.14231	5 th
Waste Of Portable Water	3.4878	1.09822	6 th
Landscape Degradation	3.4634	1.12021	7 th
Unclaimed Landsite	3.3659	1.08986	8 th
Wastewater Discharge Into The Environment	3.3659	1.08986	9 th
Diversion Of Water Courses	3.2927	.87304	10 th
Depletion Of The Ozone Layer	3.1463	1.10817	11 th
Too Much Power Consumption	3.1220	1.16609	12 th
Heat Emission	3.0244	.98711	13 th

Source: Field Data

It can be seen from the results in Table 4.2 that ‘Air pollution eg dust, smoke etc’, ‘Wear and tear of existing roads’, ‘Destruction of Virgin Land’, ‘High Consumption of electricity power’, ‘Noise pollution’ and ‘Waste of Portable Water’ are the major concern of professionals of the effect of construction on the environment. The results further revealed that ‘Landscape degradation’, ‘unclaimed landsite’, ‘Wastewater discharge into the environment’, ‘Diversion of water courses’ and ‘Depletion of the Ozone layer’ are other important major concern of professionals of the effect of construction on the environment.

The results confirm findings in literature in which ‘Air pollution’, ‘Destruction of virgin lands’, ‘High consumption of electricity power’, ‘Wear and tear of existing roads’, ‘Noise pollution’ and ‘Waste of portable water’, were listed as the causes of environmental impact in the construction process (Majdalani et al, 2006; Aurora Energy System, 2008; DEFRA, 2006).

4.4.2 CHALLENGES IN IMPLEMENTING ENVIRONMENTAL SUSTAINABILITY

Respondents were asked to score the major challenges in the implementation of environmental sustainability into the construction procurement process. When the responses of the professionals (architect, engineers, quantity surveyors and procurement officers) on the challenges in the implementation of the environmental sustainability were compared, the results showed no significant difference at 5% significance level. Hence, all the data were pooled together (Table 4.3). Table 4.3 below shows that the mean scores of all the 17 factors evaluated are greater than the neutral value of 3.0 for all the respondents (architect, engineers, quantity surveyors and procurement officers). The results in Table 4.3 above reveal that all the seventeen factors are major challenges in the implementation of environmental sustainability into the construction procurement process.

The results further revealed that 'Lack of stringent policies and laws', 'Higher Initial Associated Costs', 'Lack of Support from Top Management', 'Lack of Technical and management capacity' and 'Lack of Public Education' are considered as the first five major challenges in the implementation of environmental sustainability into the construction procurement process.

Other equally important challenges in the implementation of environmental sustainability into the construction procurement process from the analysis are 'Lack of training and education about sustainable design', 'Lack of Social drive/responsibility', 'Low Stakeholder Education' 'Lack of Understanding of the sustainable Procurement Concept' 'Sustainable methods are more expensive than traditional construction methods', 'Lack of Political Will', 'Lack of Adequate Supervision during construction', 'Lack of interest in the adoption of innovative practices', 'Lack of Government Interest', 'Lack of Basic Education about Sustainable Procurement', 'Corruption existing among procurement practitioners' and 'Uncertainty of benefits to the client'

Table 4.3: Barriers to Implementing Environmental Sustainability

BARRIERS TO ENVIRONMENTAL SUSTAINABILITY	Mean	Std. Deviation	Ranking
Lack of stringent policies and laws	4.1220	1.00487	1 st
Higher Initial Associated Costs	3.9756	1.12889	2 nd
Lack of Support from Top Management	3.9024	1.11366	3 rd
Lack of Technical and management capacity	3.9024	1.04415	4 th
Lack of Public Education	3.8537	1.06210	5 th
Lack of training and education about sustainable design	3.8049	0.98029	6 th
Lack of Social drive/responsibility	3.8000	0.88289	7 th
Low Stakeholder Education	3.7805	0.98773	8 th
Lack of Understanding of the sustainable Procurement Concept	3.7317	1.02529	9 th
Sustainable methods are more expensive than traditional construction methods	3.7317	1.07295	10 th
Lack of Political Will	3.7317	1.20467	11 th
Lack of Adequate Supervision during construction	3.6829	1.08257	12 th
Lack of interest in the adoption of innovative practices	3.6585	0.79403	13 th
Lack of Government Interest	3.6585	1.23713	14 th
Lack of Basic Education about Sustainable Procurement	3.6098	0.99695	15 th
Corruption existing among procurement practitioners	3.3171	1.23367	16 th
Uncertainty of benefits to the client	3.2927	1.12347	17 th
Lack of capacity of suppliers / contractors	3.2927	1.03063	18 th

Source: Field Data

The above results in Table 4.3 confirm that in literature which ‘Lack of stringent policies and laws’, ‘Higher Initial Associated Costs’, ‘Lack of Support from Top Management’, ‘Lack of Technical and management capacity’, ‘Lack of Public Education’, as the major challenges in the implementation of the environmental sustainability into construction procurement process (Tansey et. al., 2004; Mensah and Ameyaw, 2012; Australian Government, Department of Sustainability, 2013; Cheri and Chiriseri., 2014)

4.4.3 INTEGRATING ENVIRONMENTAL SUSTAINABILITY INTO THE CONSTRUCTION PROCUREMENT PROCESS

On measures which would integrate environmental sustainability into the construction procurement process in Ghana, mean scores of 13 measures investigated and their rankings are presented in Tables 4.4 for professionals (architect, engineers, quantity surveyors and procurement officers) working in MMDA's in Ghana. Mean scores of all the measures to integrate environmental sustainability are greater than the neutral value of 3.0, indicating that they are all important for integrating environmental sustainability into the construction procurement process.

At the contract preparation stage of the procurement process, the first two most important measures to integrate environmental sustainability are 'Set Evaluation Criteria Based On Most Economic Advantageous Tender (Meat) And Not Lowest Price' and 'Set Environmental Technical, Performance And Functional Specification To Encourage Innovation In Bidders', while at letting the contract stage 'Include Whole Life Costs In Evaluation' and 'Evaluate Tenders Using Most Economic Advantageous Tender (Meat)' are the two most important. However, 'Share Any Success Failures upon Completion of Contract Including Sustainable Issues' and 'Oblige Contractors to Respect All Environmental Performance Clauses in the Contract' are the other major measures under the contract review and contract management stages of the procurement process respectively.

The other measures considered important such as 'Undertaken a risk assessment of the works' sustainability' and 'Challenge the decision to procure' are also ranked in Table 4.4

Table 4.4: Integration of Environmental Sustainability

VARIABLES	WEIGHTING	RII	RANKING
Identifying a Need			
Challenges the decision to procure	157	0.77	9 th
Undertaken a risk assessment of the works' sustainability	166	0.81	8 th
Contract Preparation			
Set Environmental Technical, Performance And Functional Specification To Encourage Innovation In Bidders	173	0.84	4 th
Request For Variants Or Alternatives From Bidders	152	0.74	11 th
Include Contract Conditions Which Requires Bidders To Improve Their Environmental Performance	171	0.83	6 th
Set Evaluation Criteria Based On Most Economic Advantageous Tender (Meat) And Not Lowest Price	184	0.90	1 st
Request Method Statement And Case Studies From Bidders	152	0.74	10 th
Letting the Contract			
Advertise Electronically	148	0.72	12 th
Environmental Technical Competence Of Bidders	165	0.80	8 th
Evaluate Tenders Using Most Economic Advantageous Tender (Meat)	181	0.88	3 rd
Include Whole Life Costs In Evaluation	178	0.87	2 nd
Contract Management			
Oblige Contractors To Respect All Environmental Performance Clauses In The Contract	170	0.83	7 th
Contract Review			
Share Any Success Failures Upon Completion Of Contract Including Sustainable Issues	172	0.84	5 th

Source: Field Data

4.5 SUMMARY OF CHAPTER

It is important for public institutions to meet their needs for goods, services and works in a way that achieves value for money on a whole life cycle basis in terms of generating benefits not only to the organization but also to society and the economy, while minimizing damage to the environment. The challenge is to define how to possibly include economic, social and environmental considerations in the construction procurement process while ensuring that government decisions are fair and transparent. The discussions from the data analyzed revealed that 'Air pollution', 'Wear and tear of existing roads', 'Destruction of Virgin Land', 'High Consumption of electricity power' emerged as the critical environmental impact of construction activities.

Again, though several assertions have been given against the barriers to implementing environmental sustainability within the construction procurement process 'Lack of stringent policies and laws', 'Higher Initial Associated Costs', 'Lack of Support from Top Management', 'Lack of Technical and management capacity', 'Lack of Public Education', are the major challenges.

Lastly, the factor analysis revealed main principal measures for the thirteen (13) identified measures to integrate environmental sustainability in construction procurement, which shows a high level of agreement between the professional (architect, engineers, quantity surveyors and procurement officers).

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter concludes the report by summarizing the issues, objectives addressed and lessons exposed throughout the study. Exposition is given on how the key research objectives were met. This is then followed by the main conclusions of the research findings. The chapter is subsequently brought to a close with recommendations for the adoption of the findings, entrenching its practice and preposition for future research.

5.2 REVIEW OF AIM AND OBJECTIVES

The main objective of this research, as noted earlier [see chapter 1, section 1.4], was to assess how environmental sustainability within the construction procurement process in Ghana can be enhanced. Subsequently a number of research objectives were developed to collectively enhance and satisfy this main objective. At this section, the research objectives are revisited to highlight the extent to which they were accomplished through the various phases of the research.

5.2.1 LEVEL OF KNOWLEDGE OF ENVIRONMENTAL SUSTAINABILITY AMONG PRACTITIONERS

In line with this objective, there was an extensive review of literature on the level of awareness and knowledge of construction procurement practitioners (architect, engineers, quantity surveyors and procurement officers) on environmental sustainability [see Chapter 2]. The concept of ‘environmental sustainability’ is now being incorporated into construction procurement , as the study shows that firms have adopted environmental sustainability policies and practices in their bidding document.

The study confirmed previous findings that construction procurement practitioners have a low level knowledge in environmental sustainability and its impact on the construction process. The study also identified ‘air pollution’, ‘wear and tear of existing roads’, destruction of virgin Land’, ‘high consumption of electricity power’, ‘noise pollution’ and ‘waste of portable water’ as the major concern of professionals on environmental sustainability within the construction procurement process.

5.2.2 CHALLENGES IN IMPLEMENTING ENVIRONMENTAL SUSTAINABILITY

It was realized from the study that MMDA’s in the Greater Accra region have several challenges in its implementation of environmental sustainability. The result from the study revealed that ‘lack of stringent policies and laws’, ‘higher initial associated costs’, ‘lack of support from top management’, lack of technical and management capacity’ and ‘lack of public education’ were considered the major challenges in the implementation of the environmental sustainability into construction procurement process.

The results further revealed that ‘lack of training and education about sustainable design’, ‘lack of social drive/responsibility’, ‘low stakeholder education’ ‘lack of understanding of the sustainable procurement concept’ ‘sustainable methods are more expensive than traditional construction methods’, ‘lack of political will’ were the other important challenges in implementing environmental sustainability into construction procurement.

5.2.3 INTEGRATION OF ENVIRONMENTAL SUSTAINABILITY INTO THE CONSTRUCTION PROCUREMENT PROCESS

The results also show the measures in the integration of environmental sustainability into the construction procurement process. Though thirteen (13) measures were identified from literature, this was summarized into five main cluster components as itemized in Table 4.4. That is for effective integration of environmental sustainability into the construction procurement process. The main areas thoroughly considered were ‘identifying a need’, ‘contract preparation’, ‘letting the contract’, ‘contract management’ and ‘contract review’.

The result further revealed that ‘Set evaluation criteria based on most economic advantageous tender (meat) and not lowest price’, ‘Include whole life costs in evaluation’, ‘Evaluate tenders using most economic advantageous tender (meat)’, ‘Set environmental technical, performance and functional specification to encourage innovation in bidders’ and ‘Share any success failures upon completion of contract including sustainable issues’ were the major measures in the integration of environmental sustainability into construction process. Other measures include contract conditions which require bidders to improve their environmental performance, oblige contractors to respect

all environmental performance clauses in the contract and environmental technical competence of bidders.

5.3 CONCLUSIONS

The primary aim of this research, to assess how environmental sustainability within the construction procurement process in Ghana can be enhanced, has been achieved. There is a worldwide trend in environmental sustainability assessment away from purely the qualitative descriptions of environmental sustainability practices towards a more comprehensive, quantitative interpretation of environmental sustainability performance within the construction procurement process.

Again, knowledge of environmental sustainability is very much important for enabling the appropriate allocation and integration. Against this background, the findings of this research is essential for procurement practitioners, to adopt and develop policies and measures that could be monitored, evaluated and tracked for the attainment of environmental sustainability in their construction works.

From the findings, it has become evidently clear that, there is the urgent need for the injection of environmental sustainability into the construction procurement process since more than forty percent of practitioners do not have any policy on the sustainability/environmental procurement or include environmental sustainability in their bidding document for works.

Lack of stringent policies on environmental sustainability is a major challenge to the construction procurement process. This is also supported by the position of Mensah and Ameyaw (2012) and

Cheri and Chiriseri (2014) that a stringent policy on environmental sustainability is important. It has also been noted from the findings of this study that, higher initial associated costs, lack of support from top management, lack of technical and management capacity and 'lack of public education as recounted by Tansey et. al., (2004) are major challenges to environmental sustainability. It is also noted from the findings of this study that, the country does not have any policy to enhance environmental sustainability within the construction procurement process.

Sustainable development is of growing importance to the world because the current exploitation and uncaring use of resources, together with the pollution generated, cannot continue at present rates. If environmentally sustainable construction is to be achieved, it has to adopt more long-term sustainable strategies at the feasibility stage of a building project to promote environmental protection and conservation. These strategies must focus on continual improvement through the construction procurement decision process. In order to integrate environmental sustainability into the construction procurement process, there is the need to evaluate the environmental sustainability issues from the stage of identifying a need through to the review of the contract stage.

This study demonstrates that incorporating environmental sustainability into the construction procurement process is important in achieving sustainable performance of construction project. These should be considered in the future decision-making processes of construction work.

5.4 LIMITATIONS OF THIS RESEARCH

The research carried out in this thesis is significant and the findings from the study are useful for procurement practitioners, helping them to incorporate environmental sustainability into the

procurement process. However, there are limitations associated with this study. These principally relate to construction procurement practitioners in MMDA's in the Greater Accra Region.

The study should have covered all Metropolitan Municipal and District Assemblies (MMDA) throughout the country. Also further study can look at the environmental sustainability within the construction industry in Ghana. It is also acknowledged that there was time and administrative constraints. However, the importance of the study remains, for the limitations do not detract from them, but merely provide scope for further research.

5.5 RECOMMENDATIONS OF THE RESEARCH

The following highlight the major recommendations of this research:

- To achieve sustainable performance of construction projects the research proposes the integration of environmental sustainability into the construction procurement process. This could be achieved through the development of policies and measures that could monitor, evaluate, and track construction works for the attainment of environmental sustainability.
- In order to promote environmental protection and conservation, it is recommended that long-term sustainable strategies be adopted from the feasibility stage of construction projects to the review of the contract stage. In furtherance of this recommendation, the research proposes the amendment of the public procurement act to include environmental sustainability issues in the construction procurement process, thus, making it mandatory and not optional.

REFERENCES

- Ameyaw, C., Mensah, S. and Osei-Tutu, E. (2012). Public procurement in Ghana: The implementation challenges to the Public Procurement Law 2003 (Act 663). *International Journal of Construction Supply Chain Management* vol. 2, no. 2 pp55-65.
- Aurora Energy (2008) Principles of Sustainable Procurement, Policy and procedure Statement vol3, pp. 1 – 11
- Australian Government, Department of Sustainability (2013) Sustainable Procurement Guide. Department of Sustainability, Environment, Water, Population and Communities. Available at www.secure.environment.gov.au (accessed on 15/07/14)
- Berry, C. and McCarthy, S. (2011) Guide to sustainable procurement in construction, CIRIA, Classic house, London.
- Chari, F. and Chiriseri, L. (2014) Barriers to Sustainable Procurement in Zimbabwe. *Greener Journal of Business and Management Studies*. Vol 4(1) pp 014-018.
- Cochran, W.G. (1963) Sampling Techniques, 2nd Ed., New York: John Wiley and sons, Inc.
- DEFRA (2006), Procuring the Future – The Sustainable Procurement Task Force
- Dyslex, A. (2011) Research Design. Available at www.writeawriting.com/academic-writing/research-design (Accessed on 08/08/14).
- Environment Agency (2002) Sustainable Procurement Guide. Environment Agency, United Kingdom. Available at www.environment-agency.gov.uk (accessed 10/07/14)
- GCCP, (2002) Achieving sustainability in construction. Available from: http://www.constructingexcellence.org.uk/pdf/document/ogc_sustainability.pdf (Accessed 16/08/14).

Ghana Statistical Service, GSS (2014). Gross Domestic Product.

Government of the Republic of Ghana (2000) Highway Network Master Plan, 2001-2020: Draft

Final Report, Executive Summary. Accra.

Hillebrandt, P.M. (2000) Economic Theory and the Construction Industry, 2nd Edition.

Macmillan, Basingstoke.

Kwakye, A.A. (2006). The Quantity Surveyor (Official Magazine of the Quantity Surveyors

Division of the Ghana Institution of Surveyors): Issue 3 (July – Sept.).

Living Planet Report (LPR) (2010). Biodiversity, Biocapacity, and Development. Available at:

http://awsassets.panda.org/downloads/wwf_lpr2010_lr_en.pdf. Assessed 2 July 2014.

Living Planet Report (LPR) (2008). Living Planet Report 2008. Available at:

www.footprintnetwork.org/docs/Energy%20report1.pdf. Assessed 2 July 2014.

Majdalani Z., Ajam M., Mezher T. (2006); Sustainability in the construction industry: a

Lebanese case study. Available at <http://www.gpc.brandtologie.com> accessed on 5th July, 2014.

Mensah, S. and Ameyaw, C. (2012) Sustainable procurement: the challenges of practice in the

Ghanaian construction industry In: Laryea, S., Agyapong, S.A., Leiringer, R. and

Hughes, W. (eds) Procs 4th West Africa Built Environment Research (WABER)

Conference, 24-26 July 2012, Abuja, Nigeria. pp 871-880.

National Action Plan, DEFRA, London

OECD (2007) Integrity in public procurement, good practice from A-Z. Available from

<http://www.oecd.org/dataoecd/43/36/38588964.pdf> (Accessed 16/09/13).

Ofori, G. (2012). Developing the construction industry in Ghana: the case for central agency. A paper to the contribution to the deliberations in Ghana on how to improve the performance of the local construction industry.

Osei, V., (2013) 'The construction industry and its linkages to the Ghanaian economy – Policies to improve the sector's performance'. International Journal of Development and Economic Sustainability, vol 1, no. 1, pp 56-72.

PPA (2003) Public Procurement Act 2003, Act 663 of Ghana.

Report Linker (2014). Construction and Building Industry Market Research & Statistics. Available at: <http://www.reportlinker.com/ci02286/Construction-and-Building.html>. Assessed 30 October 2014.

Shakantu, W.M., Tookey, J.E. and Chileshe, N. (2007) 'Optimisation of construction logistics: a core competence for a future construction industry?' journal of construction, vol 1, no 1, pp 12-19.

Tansey, P., Murray, M. and Langford, D. (2004) 'Key drivers of sustainable construction' In: Project procurement for infrastructure construction, Kalindi, S.N. and Varghese, K. (eds) Narosa publishing house, New Delhi.

Taro, Y. (1967). Statistics: An Introductory Analysis, 2nd Ed., New York: Harper and Row.

UNDP Practice Series (2008). UNDP Environmental Procurement Practice Guide Vol 1.

Available at www.undp.org/procurement accessed on 14th July, 2014.

University of Reading (2009) Guide to Sustainable Procurement, Issue 2. Available at

www.reading.ac.uk/web/FILES/procurement/MASTER_guide_to_sustainable_procurementv2.pdf (Accessed on 15/07/14)

World Bank (2010) Ghana: Assessment of stage 1 – World Bank – use of country systems in Bank Supported Operations. Draft Report.

World Bank (2013) Ghana's comprehensive approach to public procurement reform. Available at www.worldbank.org/en/news/feature/2013/02/04/ghana-8217 (Accessed on 15/07/14)



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APPENDIX: QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF BUILDING TECHNOLOGY
MSc. PROCUREMENT MANAGEMENT

Confidential survey questionnaire

Topic: ENHANCING ENVIRONMENTAL SUSTAINABILITY WITHIN THE CONSTRUCTION PROCUREMENT PROCESS IN GHANA.

KNUST

Introduction:

I am a post-graduate student at the Kwame Nkrumah University of Science and Technology studying for a Master of Science Degree in Procurement Management. As part of successful completion of this programme I am conducting a research into how environmental sustainability can be enhanced within the construction procurement process in Ghana.

Your response to this research will be confidential and will be used exclusively for academic purposes. The questionnaire is divided into three main parts.

Thank you in anticipation of your cooperation.

Please return or direct any enquiries to:

Emmanuel Ablade Larnyoh

P.O.Box OS 2266 Osu-Accra

Tel: 0266001303

E-mail: ealarnyoh@gmail.com

PART 1 – RESPONDENT PROFILE

Please tick answers where applicable for the following questions:

Q.1 What is your Occupation?

- | | | |
|------------------------|---|---|
| A. Architect | [|] |
| B. Engineer | [|] |
| C. Quantity Surveyor | [|] |
| D. Procurement Officer | [|] |
| E. Others (Specify) | [|] |

Q.2 What is your highest educational level?

- A. GCE A'Level / SSSCE or equivalent []
- B. Higher National Diploma (HND) []
- C. Bachelor Degree []
- D. MBA / MSc []
- E. Others (Specify) []

Q.3 How many years now have you been working in your present capacity?

- A. 1 – 5years []
- B. 5– 10years []
- C. 10 – 20years []
- D. Over 20years []

Q.4 Are you involved in the construction procurement process in your organisation?

[Yes] [No]

Q.5 Do you know about sustainable procurement? [Yes] [No]

If yes briefly explain what sustainable procurement is?

.....

.....

Q.6 Which of the following do you agree is addressed by sustainable procurement?

- A. Social issues []
- B. Economic issues []
- C. Environmental issues []
- D. Social, Economic and Environmental issues []
- E. None of the above []

Q.7 Does your organization have a formal sustainability / environmental policy on procurement?

[Yes] [No]

Q.8 Does your organization include environmental sustainability issues in bidding documents for procurement of works?

[Yes] [No]

PART 2 – ENVIRONMENTAL SUSTAINABILITY

The subsequent questions require your knowledge and concerns of Environmental Sustainability in the construction procurement process. Each question has its rankings with their meanings. Kindly tick your answers accordingly.

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

		1	2	3	4	5
Q.9	Rank the following according to the negative effect of construction activities and buildings on the environment.					
	a. Air pollution eg dust, smoke etc					
	b. Noise pollution					
	c. Wastewater discharge into the environment					
	d. Destruction of virgin lands					
	e. Landscape degradation					
	f. Diversion of water courses					
	g. Unclaimed landsite					
	h. Wastage of portable water					
	i. Wear and tear of existing roads					
	j. Too much power consumption					
	k. Depletion of the ozone layer					
	l. Heat emission					
	m. High consumption of electricity power					

PART 3 – CHALLENGES IN IMPLEMENTING ENVIRONMENTAL SUSTAINABILITY INTO THE CONSTRUCTION PROCUREMENT PROCESS

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

		1	2	3	4	5
Q.10	<p>What do you think are the primary challenges to the effective implementation of environmental sustainability into the construction procurement process?</p> <ul style="list-style-type: none"> a. Higher initial associated costs b. Lack of government interest c. Lack of social drive / responsibility d. Lack of public education e. Lack of adequate supervision during construction f. Lack of technical and management capacity g. Lack of support from top management h. Lack of understanding of the sustainable procurement concept i. Lack of basic education about sustainable procurement j. Lack of political will k. Sustainable methods are more expensive than traditional construction methods l. Low stakeholder education m. Lack of training and education about sustainable design n. Lack of stringent policies and laws o. Lack of interest in the adoption of innovative practices p. Lack of capacity of suppliers / contractors q. Uncertainty of benefits to the client r. Corruption existing among procurement practitioners 					

PART 4 – INTEGRATING ENVIRONMENTAL SUSTAINABILITY INTO THE CONSTRUCTION PROCUREMENT PROCESS

1 = Strongly not important 2 = Not important 3 = Neutral 4 = Important 5 = Very important

Q.12	Rank the following according to their relative importance in integrating environmental sustainability into the construction procurement process?	1	2	3	4	5
	➤ <u>Identifying a need.</u>					
	a. Challenge the decision to procure					
	b. Undertake a risk assessment of the works’ sustainability					
	➤ <u>Contract Preparation.</u>					
	c. Set environmental technical, performance and functional specification to encourage innovation in bidders.					
	d. Request for variants or alternatives from bidders.					
	e. Include contract conditions which require bidders to improve their environmental performance.					
	f. Set evaluation criteria based on Most Economic Advantageous Tender (MEAT) and not lowest price.					
	g. Request method statement and case studies from bidders					
	➤ <u>Letting the Contract</u>					
	h. Advertise electronically					
	i. Environmental technical competence of bidders					
	j. Evaluate tenders using Most Economic Advantageous Tender (MEAT)					
	k. Include whole life costs in evaluation.					
	➤ <u>Contract Management</u>					
	l. Oblige contractors to respect all environmental performance clauses in the contract.					
	➤ <u>Contract Review.</u>					
	m. Share any success or failures upon completion of contract including sustainable issues.					

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