ASSESSING THE ROLE OF PROJECT MANAGERS IN THE PROMOTION OF SUSTAINABLE PROCUREMENT IN DESIGN-BUILD PROJECTS IN GHANA

By

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

Infrastructural development has a reputation of doing irreparable damage to the environment. The quest for meeting human development requirements whilst simultaneously sustaining the ability of our eco systems to provide natural resources for the dependence of current and future generations is of the outmost concern. This study was conducted with the aim of assessing how Project Managers involved with design- build (DB) projects; which is fast becoming the second most popular project sourcing; can contribute to the promotion of sustainable procurement (SP) throughout the project management phases. The objectives of this study which was necessary in the realization of the research aim were: to assess the level of knowledge of Project Managers on the concept of SP, to identify the measures that Project Managers employ in promoting the implementation of SP on DB projects, identify the challenges encountered by project managers in the promotion of the concept and to ultimately identify the underlying role of project managers in their advocacy to promote SP on DB projects. The researcher adopted the survey method strategy and used questionnaires as the major tool for the collection of primary data. A total number of sixty (60) questionnaires were retrieved out of the one hundred and forty-five (145) that was administered online to Project Management Professionals of the Project Management Institute. With the adoption of purposive sampling, 39 of the responses were deemed valid and the sample size was validated by employing the Central Limit Theorem. Data gathered was analysed using descriptive statistics. Findings from the study indicated to that fact that most of the Project Managers with experience with design-build projects were aware of the concept of SP and mostly, have made efforts to promote the concept even though organisations they belong to did not have policies on SP. The major challenges encountered by them whilst implementing it on design-build projects were negative perception about sustainability being more expensive, project stakeholders not having in-depth knowledge of SP, lack of organizational policies on SP among others. Providing education to project participants about the potential social, economic and environmental benefits and encouraging organizations to implement policies enforcing the implementation of SP on DB projects was seen as an effective strategy to actively promote SP. Recommendation was made for conducting of educational outreach programmes by necessary bodies to create awareness for the concept which will make it easier for Project Managers to obtain stakeholder support for its implementation on projects.

KEYWORDS: Design-Build Projects, Ghana, Project Mangers, Promotion, Sustainable Procurement

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LIST OF ABBREVIATIONS

DB …… Design- Build

KPI …… Key Performance Index

MTF-SPP ……. Marrakech Task Force on Sustainable Public Procurement

PM …….Project Manager

PMBOK …… Project management Body of Knowledge

PMI ……Project Management Institute

PMP ……...Project Management Professional

PPA ……Public Procurement Authority

PPSD …… Project Procurement Strategy for Development

RFQ …….. Request for Quotation

SP ……. Sustainable Procurement

SPP ……Sustainable Public Procurement

SPTF …… Sustainable Procurement Task Force

VfM …… Value for Money

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DEDICATION

This dissertation is dedicated to my mother, Cecilia Owusu-Acheaw and my late grandmother, Selina Gyimah.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The design and build (DB) system of project delivery gained popularity as an alternative to the conventional system of project procurement, providing solutions to the numerous problems that plagued the traditional system. DB project delivery method brings various design disciplines and construction together, and this is supposed to minimize incidents of re-works that result in cost and time savings for the owner (Gudienė et al,2013). Strong and effective project managers are essential to producing optimal results on design and build projects. Project Management as a distinct management concept has been used as a management tool by organisations across industries to achieve a broad spectrum of objectives (Venter, 2005). In many developing countries such as Ghana, project management theory has gained enough attention and popularity as a useful means for achieving project success (Ahadzie et al, 2012). Project Managers (PM) have been attributed to the success and failures of projects (Kissi, 2013). Their possible involvement with the project throughout the project life cycle including feasibility, planning, design, production, turnover and startup, puts them in a strategic position to affect project outcomes. The project manager has the primary duty of achieving project objectives thus meet stakeholder expectations.

One important area of project management required to achieve project objectives; project procurement management; which according to the PMBOK (2017), is the processes essential to purchasing or acquiring products, services or results required from outside the project team. Procurement is the formal process by which many organizations obtain goods and services (Mulcahy,2009). The procurement process required for identifying and acquiring resources for construction projects sourced through the conventional method or other modern methods such

as design-build, develop-construct etc., had previously focused mainly on the principles of best value for money, competition, transparency and fairness of the process. The general goal was obtaining goods, services and works at a reasonable cost through a process carried out in a fair, transparent and non-discriminatory manner. The concerns over the negative effect of human activity on the environment resulted in plans and strategies to achieve sustainable development which was elaborated by Brundtland (1987) as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Effective sustainable procurement supports sustainable development (The World Bank, 2019). Therefore, implementing sustainable procurement system has become inevitable goal of developing countries (Haider et al, 2018). Potential benefits such as positive impact to the society and minimal negative impact to the environment led Ghana to be signatory to numerous international conventions (Graphic online, June 2014) promoting sustainable procurement such as the Swiss-Ghana Sustainable Public Procurement Project. The implementation of the Public Procurement (amendment) Act, 2016 (Act914) made provision for carrying out of procurement in an environmentally and socially sustainable manner to address concerns for issues of sustainable development, procurement, consumption and production. Sustainable procurement is when institutions or establishments buy assets, supplies or services whilst considering some factors including: value for money considerations, the entire life cycle of products, environmental aspects, effects on social issues such as poverty eradication, inequality in the distribution of resources, labour conditions, human rights, fair trade (Interagency Procurement Working Group, 2006). The concept of Sustainable Procurement (SP) incorporates the consideration of criteria beyond the usual economic parameters and making decisions based on life-cycle costs, potential environmental and social risks and benefits (Mensah and Ameyaw, 2012).

A sizable number of Project Managers usually are involved with projects from initiating through execution to closing and are mostly informed about current trends such as sustainability strategies, product development, technical support tools etc. and how they may impact on their projects. Whilst the Project Manager might not be a trained expert in procurement, his understanding and familiarity with the process allows for its facilitation through activities such as the creation of a plan for how the procurement process will proceed and creating a procurement statement of work; a description of the work to be done by a seller (Mulcahy, 2009).

This study therefore seeks to explore their contribution to the promotion of the concept of sustainable procurement in the execution of projects sourced through the design-build method.

1.2 PROBLEM STATEMENT

Ghana's population, at a current annual growth rate of 2.15% is projected to be around 40 million before 2035 (world population review, 2019). In theory this is good news for the construction industry because all those extra people will need homes, schools, workplaces and infrastructure (Berry and McCarthy, 2011). However, research has shown that the construction industry has a major irreparable effect on the environment across a broad range of its activities during the off-site, on site and operational activities, which affects the environment (Ametepey and Ansah, 2015). Individual Construction projects can have a significant impact on local environments and nature (ESUB, 2017). In Ametepey and Ansah's research on the environmental impact of construction activities in Ghana, resource consumption under environmental impacts was rated highest among the group of environmental impacts. There is the need to take responsibility for effects of these projects on the society and environment and find solutions to addressing these matters in a positive manner. The Government of the Republic of Ghana took a significant step in December 2010 when it made a public commitment to

developing a Sustainable Public Procurement (SPP) policy as part of its national strategy for sustainable development (Kwadzo, 2014). Berry and McCarthy (2011) outlined some requirements and responsibilities necessary to promote sustainable procurement outcomes from construction projects: the role of the buyer to procure sustainable solutions that offer equal or better value over their life than traditional alternatives; understanding the Client's sustainability ambitions and the project's unique circumstances and developing meaningful and objective measures to address them. One of the key drivers towards achieving sustainable procurement is providing procurement practitioners with the necessary training and supervision to understand sustainable procurement and the ability to access the cost of an asset over its whole life (Interagency Procurement Working Group, 2006).

Based on this, the study will seek to determine how Project Managers; who have the overall responsibility for the successful initiation, planning, design, execution, monitoring, controlling and closure of a project (Thom, 2009); are promoting the concept of Sustainable Procurement (SP) and what challenges they encounter in their advocacy for the concept.

1.3 RESEARCH QUESTIONS

In order to obtain clarity on what role exactly Project Managers play in the promotion of sustainable procurement on design-build projects, the under listed hypothesis needs to be tested:

i. What is the level of knowledge and awareness of the concept of sustainable procurement by Project Managers involved with Design -build projects?
ii. What measures have they put in place to promote the concept?
iii. What challenges do they face in the promotion of the concept?
iv. What role can project managers play in promoting the concept?

1.4 AIM

The aim of this study is to assess how project managers involved with design-build projects can contribute to the promotion of sustainable procurement from planning to execution and closing stages of projects.

1.5 OBJECTIVES

The following objectives were set:

i. To assess the level of knowledge of Project Managers on the concept of sustainable procurement;
ii. To identify factors that Project Managers use in promoting the concept of sustainable procurement on design-build projects;
iii. To identify the challenges encountered by Project Managers in attempt at promoting sustainable procurement on design-build projects; and
iv. To identify the underlying role of Project Managers in promoting sustainable procurement in design-build projects

1.6 JUSTIFICATION

According to Mensah and Ameyaw (2012), lack of understanding of sustainable procurement concept is the main challenge affecting the implementation of SP in Ghana; procurement participants lack in-depth understanding and awareness of the environmental, economic and social concerns of sustainable procurement. Whilst there is adequate literature on factors that promotes or inhibits the concept in Ghana and worldwide, information which details out the exact contribution or lack thereof of Project Managers towards the promotion of SP on projects is lacking. Findings from the study will provide adequate knowledge on the level of awareness of the concept and challenges affecting its implementation by Project Managers. Subsequently, the outcomes from this study will serve as basis for possible further studies on how other project

participants can promote the concept on projects procured through other project delivery methods.

1.7 SCOPE OF THE STUDY

The study was focused on Project Managers who have been involved with projects sourced through the design-build method in Ghana. Due to time constraints, the target respondents were Project Management Professionals (PMP) of the Ghana Chapter of the Project Management Institute (PMI).

1.8 RESEARCH METHODOLOGY

To achieve the objectives set out in this research, the survey method strategy was adopted. The major tool that was used in the collection of primary data was questionnaires. Structured close-ended questionnaires with a list of pre -determined answers were distributed mostly online to respondents to gather primary data on the role of the Project Manager in promoting sustainable procurement practices on design-build projects. Additionally, there was a desktop survey of existing literature such as articles, journals, reports, textbooks, internet among others for secondary data. The purposive sampling technique was adopted to target participants for the study. The study was focused on Project Managers with some level of experience with design-build projects.

1.9 ORGANIZATION OF STUDY

This research work was structured in five chapters with a preliminary section which contains the title page, declaration page, certification, dedication page, abstract, acknowledgement, table of contents, list of tables etc. Chapter One (1) outlines the background of the study, problem statement, research questions, aim and objectives of the study, justification and scope of the study. Chapter Two (2) provided the reviewed literature on sustainable procurement practices in Ghana and across the world. The literature also comprised of definitions, concepts, details of

legal provisions and detailed account of related and existing relevant literature on sustainable procurement on design build projects in Ghana. It also examined the work of Project Managers with regards to their promotion of sustainable procurement and previous researches carried out on the subject. Chapter Three (3) provided details on the methodology that was adopted for the study including data collection methods, sample size determination, data processing methods and analysis, etc. Chapter Four (4) consists of presentation, analysis and discussion of the study's findings. Chapter Five (5) concludes the report and presents conclusions and recommendations which is based on the findings and accomplishments of the study objectives.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews earlier published literature on the concept of sustainable procurement, the role of Project Managers and design-build projects. The literature review provides response to queries outlined in the objectives of the study. The chapter provides overview of sustainable procurement and the practice of the concept in Ghana on design-build projects. Furthermore, the role of Project Managers in the promotion of sustainable procurement and challenges encountered during the project life cycle were discussed.

2.2 OVERVIEW OF SUSTAINABLE PROCUREMENT

Traditionally, procurement processes either by a public or private entity has centered mostly on the following principles: best value for money, transparency and fairness of the process, and competition (Interagency Procurement Working Group, 2006). The general goal of the process was to obtain goods, services or works at a reasonable cost through a transparent process with the aim of aligning the procurement function with the procuring entity's development strategy. The emergence of improved awareness of relations between organisations, the environment and society attracted the attention of both academia and practitioners in the early 1990's (Cousins et al., 2004). Emphasis was placed on the following dimensions of sustainability: economic, social, environment and resource utilization themes. Organisations saw the need to obtain goods, works, services and utilities through means which allowed them to obtain the most worth for their money on a whole-life cycle by providing benefits to both the economy and society whilst reducing the negative impact it will have on the environment. Beyond the initial cost of obtaining a product or service, other costs such as maintenance cost and cost associated with

the end of service time such as disposal were assessed. Sustainability emerged because it was believed the current development model was unsustainable (Berry and McCarthy, 2011). Sustainable procurement has become one of the key channels through which Governments are advancing their pursuit for sustainable development.

The definition of sustainable procurement varies based on the procuring organizations' requirements and values. However, there are underlying principles which all these definitions tend to fulfill: environmental and social sustainability and positive economic performance.

The Sustainable Procurement Task Force (SPTF) of the United Kingdom defines sustainable procurement as: a process whereby organisation satisfy its requirement for goods, services, works and utilities in a way that results in value for money on a whole life basis by providing benefits not only to the organisation, but also to society and the economy, whilst minimising the negative impact on the environment (CIPS, 2009).

Sustainable procurement has been defined by the Interagency Procurement Working Group (2006) as the process by which organisations buy assets, supplies or services by taking into account a number of factors including: value for money considerations, such as price, quality, availability, functionality; the entire life cycle of products; the effects on the environment that the assets, supplies and/or services have over the whole lifecycle; effects on issues such as poverty eradication, inequality in the distribution of resources, labour conditions, human rights, fair trade; and sustainable or recycled materials or products.

Procurement is termed sustainable when it integrates necessities, specifications and standards that are well-matched and in favour of the safety of the environment, social improvement and in provision of fiscal growth, specifically through search of resource effectiveness, enhancing the excellence of goods and services and eventually improving costs (UNGM, 2016). Sustainable procurement is the pursuit of sustainable development objectives through the purchasing and supply process, and involves balancing environmental, social and economic

objectives (Walker and Phillips, 2009). It considers the effects of procurement on the environment, its social impact on the both sellers and buyers of a product or service and the community as a whole.

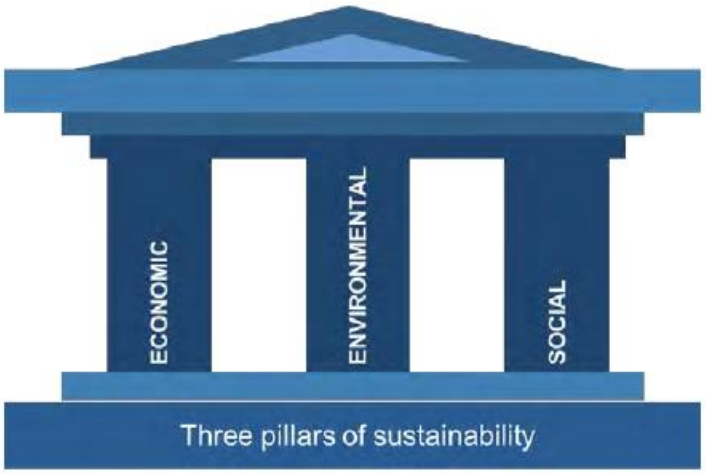

Figure 0.1: The three pillars of sustainability
Source: The World Bank (2019)

2.2.1 Sustainable Procurement in the Project Management life cycle

While most sustainable procurement guidelines primarily focus on incorporating sustainable considerations directly into the project procurement management process, the success rate of achieving the SP objectives of projects can be greatly enhanced through integration of sustainable considerations in the entire project management process and phases of a project through the consideration of the following as outlined in Meehan and Bryde (2014):

- Promotion of awareness of the importance and benefits of sustainable procurement among Project Stakeholders, mainly, to Stakeholders involved with decision making such as Project Sponsor, Project Team Members, End Users etc.
- Include the essential elements of the objectives and features of sustainable procurement within the organisation's broader corporate goals, plans and corporate performance indicators,

- Determine relevant demand management strategies which helps with identifying more sustainable alternatives or reduce consumption levels or possibly negate the need to conduct procurement,
- Consideration of the benefits of SP in project selection criteria,
- Compilation of a lessons learnt repository to be used in future planning,
- Sustainable considerations during requirements identification and refining.

As stated by Interagency Procurement Working Group (2006), it is necessary to translate performance criteria for sustainable projects or products into specific requirements and outcomes. There are some essential factors to consider for each specific criteria to arrive at specifications that meet desirable outcomes. In addition to the social and environmental criteria outlined in Table 2.1 below, Adjei (2010) listed the following sustainable issues under the economic criteria that should be incorporated during the procurement process:

- Life cycle costs: initial cost including operational cost, maintenance costs and cost of final disposal;
- Economic benefit to society: increasing the wealth of the society that produces the sustainable products and the society that provides the market base for sustainable goods; and
- Value for money: obtaining products that satisfies agreed specifications for the least acceptable price.

Table 0.1: Illustrates the criteria for accessing the environmental and social impact of the procurement process during the requirements definition stage.

Criteria	**Factors to consider**
Social Criteria	
Health and safety standards	These should never be ignored and it's advisable to evaluate multiple products with qualified health and safety personnel. Examples include electrical equipment, vehicles, cleaning chemicals and furniture.
Local production	Procuring from local vendors means that the economic benefits can be felt in the communities in which members of the procuring entity reside and work. This inward investment will assist in ensuring the economic sustainability of the locality through the creation of jobs.
Ethical sourcing	Ensure that products procured were not produced through the exploitation of child labour and they meet internationally recognized and accepted fair trade standards wherever possible.
Environmental Criteria	
Fit for purpose and value for money	Ensure that the project under consideration is capable of doing the needs of its potential users including special needs users where appropriate.
Biodegradability	Some products maybe suitable for biological decomposition. Products of such mature must be composed of materials that can easily and safely breakdown.
Designing for disassembly	Products which are made up of different types of components of different materials such as plastics and metals should be designed such that parts can easily be taken apart or disassembled for repairs, refurbishment or recycling. This is relevant for products such as electronics, pre-fab shelters etc.
Minimum use of non-renewable materials	The use of recycled or re-used materials needs to be promoted and encouraged since they generally have minimal negative impact on the environment. Wherever possible, the use of rapidly renewable materials should be encouraged. Examples include bamboo, cork etc.
Resource efficiency	Operational or running costs of projects or products must not be ignored during the plan procurement process. Checks must be made to ensure that the project or product does not require the using of more resources to function e.g. specifying paper towels over hand-driers may increase the volume of paper you dispose of, which also has a cost.
Fault controls to prevent unnecessary waste	Specify plants or equipment with metering and monitoring equipment to provide alerts when there are issues with its use to help reduce running costs and other problems such as spills and waste management.
Maximum durability,	Seek durable products with long-life that can withstand being mishandled, can be repaired for reuse and recycled. It is essential that that these projects or products allows for

reparability, reusability, recyclability and upgradeability	upgradeability. This allows for improvement of performance of the existing product instead of have to invest in a new product to perform the same function.
Reduce packaging	Most products come delivered with excessive packaging, either to protect the product from damage during handling or add cosmetic value to it. The cost of disposing off the packaging after it has performed its function usually becomes the responsibility of the buyer and not the vendor or manufacturer.
Maximum use of postconsumer materials	Encourage the use of materials that have been used once and are being used to perform the same or new function, rather than materials that have been recycled from the waste of a manufacturing process which has never been used by the consumer
No or Reduced environmental Pollution	Encourage minimal use of toxic chemicals and other pollutants by choosing low-polluting alternatives which has less impact on the environment.

Source: Interagency Procurement Working Group (2006)

2.2.2 Sustainable Procurement in the Procurement management process

The sustainable procurement process is similar in many ways to the traditional method of procurement which involves the process of needs identification, planning, defining and documenting the procurement requirements, determining the source, solicitation and acquisition, monitoring and controlling performance. The additional processes that differentiate it from traditional procurement activities are the initial assessment of the overall positive effect of the procurement activity on the environment and society and the concluding monitoring and evaluation of procurement outcomes to determine if they meet the desired outcome and or putting in measures to mitigate the undesired outcomes. Environmental and social performance criteria are translated to specific specifications of requirements against which desired outcomes are measured.

Sustainability considerations should be introduced throughout all the stages of the procurement process from planning to the conduct of procurement (Meehan and Bryde, 2014).

Key sustainable considerations during the procurement process as proposed by the World Bank has been summarized and presented in Table 2.2 below.

Table 0.2: Stages in Procurement: Key sustainability considerations at each stage of the procurement process

Key stages in procurement	Sustainability considerations
Stage 1: Identification	Initial considerations: • Borrower's sustainability policies, strategies and priorities • Community needs and expectations • Naturally arising environmental risks • Environmental and social impact assessments • Prioritization of sustainability needs
Stage 2: Analysis	Market Research and Planning: • What are the expected Sustainability benefits? • Is the market able to deliver new or customized sustainable solutions? • What are the anticipated costs and what is the value for money (VfM) proposition? • How will the procurement strategy address sustainability? • Develop Project Procurement Strategy for Development (PPSD)
Stage 3: Requirements	Procurement Process Design: • Request for Quotation (RFQ), Request for Bids (RFB) or Request for Proposal (RFP) Selection Method? • Use Prequalification or not? • Specifications: conformance or performance? • Identify relevant sustainability standards and classifications • Assess sustainability priorities throughout the life-cycle • Develop Sustainability criteria, including rated criteria and weightings, if applicable • Check if contract terms reflect sustainability priorities, as appropriate
Stage 4: Source	Sourcing Process: • Advertise the opportunity to attract interest from suitable vendors • Evaluate bids/ proposals • Assess quality of sustainable solutions • Asses bidder's/ proposer's sustainability credentials and track records • Assess and compare whole-of-life costs • Evaluate VfM including quality and cost of sustainable solutions • Select the most advantageous bid/ proposal • Agree key performance indicators

	• Contract terms: bonus/ penalty incentives and value engineering clause
Stage 5: Implement	Contract Implementation: • Contract management plan • System to monitor delivery of sustainability priorities • System to report against delivery and outcomes being achieved • Assess delivery against KPIs sustainability measures • Value engineering to improve sustainability outcomes
Stage 6: Check	Check: • Assess sustainability outcomes and benefits achieved • Assess VfM over the whole-of-life • Review usefulness of sustainability KPIs • Review effectiveness of sustainability monitoring and reporting • Identify lessons learned • Share learning

Source: The World Bank (2019)

2.2.3 Potential benefits of Sustainable Procurement

According to CIPS (2009) sustainable procurement is a powerful driver for delivering improved economic, environmental and social outcomes, and underpins the achievement of cost effective, leading practice procurement. There are numerous potential benefits attributed to the effective implementation of sustainable procurement. Largely, in addition to the economic benefits the procuring organization accrues, there is a greater environmental and social benefit to the community. Considerations of positive environmental, social and economic impact (triple baseline) in addition to the primary evaluation criteria of price and quality provides for various potential benefits as outlined below:

Potential Economic benefits

- Reduction of cost of purchasing a product, works or service, the running costs, maintenance costs and cost of disposal by using whole life costs
- Sustainable production process of sustainable products can lead to lower upfront costs.

- Encourages markets to move towards cleaner technologies resulting in income generation, encourages competitiveness among suppliers which eventually results in lower cost due to economies of scale.
- Increases the consumer base that supports achievement of social objectives
- Increase access to markets; promotion of small and medium scale enterprises and service provider diversity

Source: Roos (2012)

Potential Social benefits

- Improve compliance with social and labour laws: agreements which enforces the ban of forced or child labour, establishing and encouraging the right to freedom of association and collective bargaining, and eliminating discrimination in terms of employment and occupation
- Improve living conditions: promoting voluntary social standards such as Fair Trade which helps with poverty reduction
- Improve social justice: integration with persons with disability or improve gender and ethnic impartiality

Source: Roos (2012)

Potential Environmental benefits

- Reducing the emission of toxic gases and improve the efficient use of energy
- Providing non-toxic products and creating healthy conditions for people
- Promoting positive response to climate change, dilapidation of soil and biodiversity loss
- Providing access to fresh water; encouraging reusing and recycling which will ultimately reduce the amount of waste water going into landfills

Source: Roos (2012)

Potential benefit to the operations of an organization which adopts the concept includes:

- Compliance with legislation and regulations governing sustainability standards
- Organisations obtain better understanding of risks in the supply chain
- Improvement in the quality and performance of the staff of the procuring
- Contribution to the sustainable organizational strategy
- Existence of a define sustainable procurement strategy
- Effective evaluation of proposals and bids
- Increases “sustainable” sources of supply
- Building an improved sustainable platform which achieves savings yearly

Source: CIPS (2009)

2.2.4 Barriers of Sustainable Procurement

Regardless of the numerous potential benefits to be derived from practicing of sustainable procurement, there are still some militating factors which tend to affect its implementation. Reviewed literature provided insight to these barriers which are either based on perception or lack of familiarity with the concept and its requirement. Chari and Chiriseri (2014) identified some of these barriers as follows:

- Lack of organizational policies on sustainable procurement which will enforce the practice
- Lack of support from senior management: There was no effort by senior management to prioritize policies promoting sustainable procurement
- Perception that sustainable products are more expensive
- Lack of in-depth knowledge and understanding of the concept

2.2.5 Drivers for promoting Sustainable Procurement

To promote and improve participation in the practice of sustainable procurement to realise its goals, the following measures have been recommended by Interagency Procurement Working Group (2006):

- Implementation of a policy that requires organizations both public and private to enforce it practice
- Education for Practitioners
- Support and education for suppliers or creation of market for suppliers of sustainable products
- Organisations must implement policies which commits them to sustainable development
- Application of whole life costing approach in procurement

2.3 SUSTAINABLE PROCUREMENT IN GHANA

2.3.1 The practice of Sustainable Procurement in Ghana

Procurement process in Ghana previously had mostly been based on procuring based on cost, quality and time of delivery. Ghana since becoming a member of the Marrakech Task Force on Sustainable Public Procurement (MTF-SPP) has made strides to towards the promotion of Sustainable Public Procurement (SPP). The establishment of the National Task force on Sustainable Public Procurement in 2010 and the subsequent enactment of the Public Procurement Amendment 2016 Act 914 to include provisions for sustainability are all measures implemented by government for the advancement of the concept. There are plans to develop a government policy on SPP, modify the standard tender documents, train practitioners among others. There has been measures by the Public Procurement Authority (PPA) to provide education on the concept through seminars, awareness programmes, stakeholder consultations etc.

2.3.2 Challenges facing Sustainable Procurement in Ghana

Ghana like other developing countries trying to implement the concept of SP, is burdened with some challenges which threatens the promotion of the practice. Mensah and Ameyaw (2012) in their research outlined the lack of understanding and familiarity with the concept and the associated higher initial costs as major challenges to the practice concept of SP practice in the Ghana. Lack of support from major stakeholders such as Government, absence of suppliers of sustainable products and services, practitioners lacking the requisite technical capacity are other identified challenges facing the promotion of the practice.

2.4 DESIGN AND BUILD PROJECTS IN GHANA

Factors such as: sources of funding, the nature of a project, expected benefit to be derived from the chosen procurement route, the level of quality required, previous experiences, the level of financial commitment for a proposed project among others, affects the choice of procurement method for projects in countries such as Ghana (Osei-Tutu, 1999). Design and build as a project delivery method is a fundamental change in procurement strategy compared with the traditional methods. It places the responsibilities for both design and construction on to the contracting side of the industry, i.e. the main contractor (Boudjabeur, 1997). It is an undeniable fact that the conventional method of project procurement system still remains the most popular and preferred in Ghana. Approximately 90% of infrastructural projects were delivered through this method (Buertey et al, 2016) but subsequent research by Adamu et al (2017) has revealed that most construction industry stakeholders recognized design and build as a more suitable procurement method for complex multistory projects in Ghana. Respondents acknowledged how greater integration and teamwork were enhanced through the adoption of this method. The Design and Build system is appropriate for standard industrialized buildings such as warehouse, office

facilities, multi-level residential structures, educational and/or institutional buildings (Adamu et al, 2017).

With study showing that very few local firms have the expertise to embark on design and build (Coles, 2009) and only 2% of projects procured with this system in Ghana (Buertey, 2015), the early involvement of the builder with the design process has been recognized as very important (Adamu et al, 2017) which tends to add value to a project.

2.5 THE ROLE OF THE PROJECT MANAGER ON DESIGN AND BUILD PROJECTS

The Project Manager is responsible for his/her team's project outcome. They are usually involved with the project from its initiation to closing with some even playing a pre-initiation role where there are involved with activities such as identifying business need, providing input on improving the purchasing organisation's performance. The Project Manager's role on a project may vary depending on the organization's needs. The role of the Project Manager on a design and build project is based on which variant of this project delivery method would be adapted; novation, turnkey, direct design and build, package deal etc. They participate in the project either as the Project Sponsors' appointed Project Coordinator helping to define Sponsor/Stakeholder requirements, with the authority to determine the procurement system to be adapted to deliver the project or as the performing organization's (Contractor) Project Manager responsible for directly applying resources to achieve project objectives. The Project Manager becomes the bridge between the Client and the Project Team, and is responsible for controlling, planning and coordinating the efforts of the Project Team to achieve the project objectives (Kwakye, 1997). The role of the Project Manager throughout the phases of project management in PMBOK (2017) has been summarized in Table 2.3 below.

Table 0.3: Role of Project Managers on Design-Build Projects

Process Group	Potential Tasks
Initiating	• Identify project requirements • Identify the necessary project stakeholders and the level of their influences on the project Source: PMBOK (2017)
Planning	• Define project requirements • Preparation of procurement strategy • Preparation of stakeholders' engagement strategy • Defining the work scope and determining the resource requirements • Identifying potential project risks and planning mitigation measures • Estimate project budget • Estimate project duration • Plan communication strategy to be used in the dissemination of information to project participants Source: PMBOK (2017)
Executing	• Obtain resources required to complete the objectives • Apply mitigation measures to identified risks • Managing communication between the design and build teams; between the project sponsor and the project team • Coordinates activities of various project team members Source: PMBOK (2017)
Monitoring and controlling	• Monitor project activities to ensure that they conform with expected project objectives • Monitor project expenditure and control spending • Monitor progress of the project Source: PMBOK (2017)
Closing	• Document lessons learnt from project • Return resources to its original sources • Transfer completed project to the end users Source: PMBOK (2017)

On design-build projects, Project Managers are required to employ all the three key skill sets illustrated in the PMI Talent triangle: technical project management, strategic and business management and leadership skills (PMBOK, 2017) in the execution of their duties. As indicated in Smith et al (2003), the role of the PMa is being involved in all facets of a project. The various relationships among project participants indicating the Project Manager's role on different variants of design-build projects has been captured in Figure 2.2 and Figure 2.3.

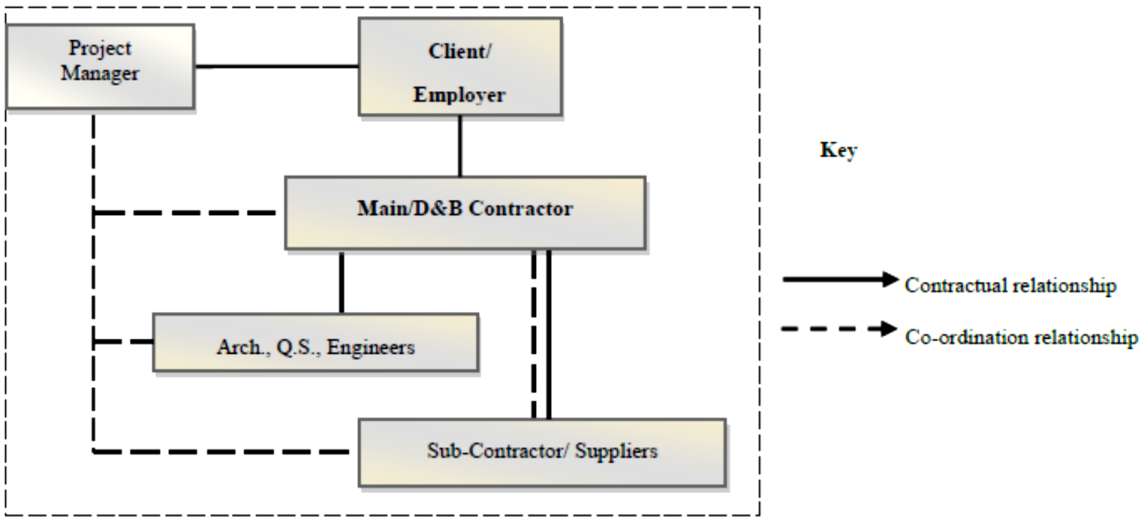

Figure 0.2: Contractual and co-ordination relationship of a Design-Build project
Source: Adamu et al (2017)

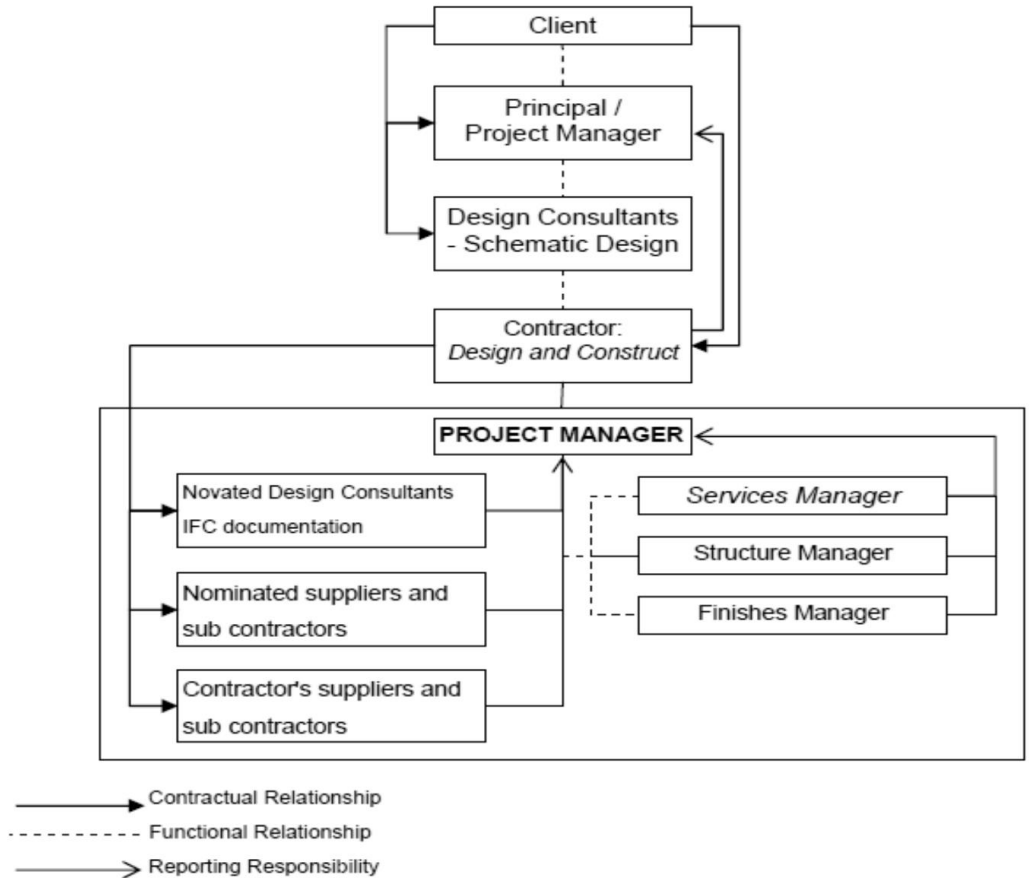

Figure 0.3: Design-build organisational arrangement showing contractual and functional relationships

Source: Smith et al (2003)

2.6 JUSTIFICATION FOR THE PROMOTION OF SUSTAINABLE PROCUREMENT BY PROJECT MANAGERS IN DESIGN-BUILD PROJECTS

The success of a project has been defined by the metrics of time, scope, cost, quality and the ultimate achievement of the project objectives to the satisfaction of project stakeholders. However additional benefits such as revenue growth, risk reduction, cost reduction etc. can be accrued through the introduction of sustainable procurement practices to the project management process. The consideration of the social, environmental and economic impact of design and build projects has a greater goal of ensuring resources for future generations are not compromised. A well implemented sustainable procurement strategy ensures the sponsoring

organization achieves greater value from its project outcomes. According to RICS (2016) the benefits be realized from the understanding and promotion of SP includes: reduction in risk exposure through the identification and avoidance of exploitative, unethical and environmentally harmful behaviours ; reduction in maintenance, operational and disposal costs which benefits project users in the long term; increase the value of the projects for the end users; innovative, safer and greener built environment; future generations benefiting from resource efficiency; improvement in the local economy of the project location. Though there are some barriers to the implementation of the concept such as the perceived initial high costs, Project Managers should promote the concept by encouraging and educating stakeholders of the added value it adds to projects.

2.7 THE ROLE OF THE PROJECT MANAGER IN PROMOTION OF SUSTAINABLE PROCUREMENT ON DESIGN-BUILD PROJECTS

The Project Manager performs a very crucial role in the leadership of a project team in order to achieve the project objectives (PMBOK, 2017). As noticed by Yadollahi (2014), today's Project Managers not only fulfill the traditional roles of project management but also must manage the project in the most efficient and effective manner with respect to sustainability. Their role as enablers and quality of those enablers as noted by Koh et al (2011), is what contributes to successfully implementing the sustainable procurement processes. The Project Manager can make the most impact in the promotion of sustainable procurement if he is involved with evaluation and analysis activities prior to project initiation. This provides him with the opportunity to consult with the Sponsors, Steering committees or Project Management Offices (PMO) in an attempt to influence the organization's strategies and policies to include sustainability into its goals. The best way to obtain a sustainable outcome in the project procurement process is embedding it in the project objectives. There are numerous opportunities

for the Project Manager to promote and incorporate sustainable considerations into the project management processes throughout the project life cycle once it forms part of the project objectives approved by stakeholders. The Project Manager must maintain a strong advocacy role within the performing organization. Activities which can be employed to promote sustainable procurement throughout the phases of project management on projects has been summarized from various literature and presented below in Table 2.4.

Table 0.4: Activities to promote sustainable considerations

Process Group	Activities
Initiating	• Encourage project sponsor to amend organizational policy to include sustainable strategies (The World Bank, 2019) • Where there are already in place organizational processes and structures, encourage senior level support and provide education on the potential benefits (UNEP, 2011) • Perform social and environmental impact assessment of potential project (UNOPS, 2012)
Planning	• Identification of sustainable sources of supply (UNEP, 2011) • Preparing procurement strategy which incorporates sustainable considerations (Local Government NSW, 2017) • Perform value for money analysis (The World Bank, 2019) • Communicating effectively the vision and expectations of stakeholders to project team (UNEP, 2011)
Executing	• Including sustainable targets in the project requirements (Ulaanbaatar, 2019) • Including sustainability in selection criteria for vendors (Dutch Ministry of Infrastructure and the Environment, 2011) • Contract documents for vendors or sub-contractors must reflect sustainable targets (UNOPS, 2012)
Monitoring and Controlling	• Periodic auditing of project outputs to determine if they meet sustainable targets (The World Bank, 2019) • Implementing a measurement system to monitor project outcomes (UNOPS, 2012)
Closing	• Compilation of lessons learnt to be used for future planning (UNOPS, 2012)

2.8 CHALLENGE TO PROJECT MANAGERS PROMOTING SUSTAINABLE PROCUREMENT IN DESIGN-BUILD PROJECTS

Numerous literatures reviewed generally documented barriers to the practice of sustainable procurement. There is limited literature on barriers to the activities of project managers in their promotion of sustainable procurement on design-build. However, parallels can be drawn from the challenges that are faced by practitioners of sustainable procurement on construction projects. Findings of research by Walker and Brammer (2009) identified the following as the main barriers to the promotion of sustainable procurement by practitioners: perceptions of financial viability, lack of awareness, budget restrictions, difficulty in changing from old practices, difficulty in measuring and quantifying the environmental benefits attributed to sustainable procurement, lack of top management support and lack of organization policies mandating the implementation of sustainable considerations..

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the methodology that was employed in carrying out the study. The methodology details out the research design, population of the study, sampling techniques, data collection and analysis methods, sources of data and ethical considerations of the research. To provide authenticity to this research, detailed explanation of all procedures used in data collection and analysis are provided. Additionally, limitations to the methodology adopted is outlined to provide clear understanding of the research parameters.

3.2 RESEARCH DESIGN

Research design is defined as a framework of methods and techniques chosen by a researcher to combine various components of research in a reasonably logical manner so that the research problem is efficiently handled (Question pro, 2019). A quantitative research design was conducted to allow for a statistical analysis. The survey research strategy was adopted to allow us to obtain responses from subjects on their views and opinions on the aims and objectives of the study.

3.3 RESEARCH METHOD

A quantitative research was organized to satisfy the objectives of this research. This method is helpful in gathering data and generalizing it across to explain a particular idea or investigate causal relationships. A combination of literature review and data gathering through questionnaires were adapted. Data was collected through the use of self-administered questionnaires. The questionnaires were structured in organized sequence with closed ended questions which allowed respondents to select from a predetermined list answers based on their

knowledge and experience. The questionnaires were self-administered to allow respondents greater freedom to consult and give honest reliable answers free from interviewer bias.

3.4 POPULATION STUDY

Population is the totality of a well-defined collection of individuals that have a common, binding characteristics or traits. (Doh, 2014). The target population for this study were Project Management Professionals (PMP) of the Project Management Institute (PMI) Ghana Chapter who are familiar with design-build projects. The total number of PMP's in good standing at the time of the study was 274 (PMI Ghana Chapter, 2019). Due to restrictions with data protection policy of the Institute regarding member contact details and time constraints, the researcher was not able to have an interactive communication with all 274 members to determine the exact population size with design-build experience.

3.5 SAMPLE SIZE

The determination of an appropriate sample size is influenced by numerous factors such as: purpose of the study, the target population size, the level of accuracy, level of confidence and the degree of inconsistency in attributes being measured (IFAS extension, University of Florida). It is important that the sample have attributes which are consistent with the target population which will be of a particular interest to the study.

The inability of the researcher to engage all members of the institute with follow up telephone calls to determine the exact number of PMP's who have been involved with design-build projects was a major hinderance both to determining the sample size or using a census, where the whole population would be used as a sample. The target population size was unknown to the researcher. Due to these challenges, the researcher targeted only members whose email addresses were listed in the Local Chapter's membership list which was obtained from the

Institute's website. The membership list was last updated on 13th march, 2017 (www.pmighana.com) and contained details of over 200 members.

3.6 SAMPLE TECHNIQUES

The purposive sampling technique was used to the determine participants that will be targeted for administration of questionnaires. With the assistance of professional networking website LinkedIn, the researcher attempted to identify which members on the list who should be targeted based on their listed professional qualifications on the website. Questionnaires were administered online via electronic messaging (emails) to targeted research participants selected from the membership list that was obtained from the PMI Ghana Chapter website. Additionally, the snowballing sampling technique was employed. Respondents were encouraged to forward the questionnaires to other PMP's. This technique was necessary to reach some hard-to-reach respondents.

Questionnaires were administered to about 145 respondents online. Out of the 145 administered questionnaires 60 respondents responded. 39 were deemed valid out of the retrieved responses. The valid response rate of 26.9% was due to reasons such as: communication challenges with reaching the target population, the homogenous sample of PMP's with design-build experience that was required for the research, time constraints etc. The homogenous sample size of 39 valid respondents was based on the common characteristic of their experience with design-build projects in Ghana. This was helpful, in achieving the purpose of the study where it was necessary to assess how the concept of sustainable procurement was being promoted in design-build projects in Ghana.

The sample size was deemed acceptable as it satisfies the conditions of adapting the Central Limit Theorem. Central Limit Theorem basically states that the mean of a sample of data will be closer to the mean of the overall population in question as the sample size increases, notwithstanding the actual distribution of the data, and whether it is normal or skewed (Ganti,2019). According to Ganti (2019), samples sizes equal to or greater than 30 is considered sufficiently large enough to predict the characteristics of a population.

3.7 DATA COLLECTION

The principal instrument for data collection was the questionnaire. The questionnaires consisted of mostly closed-ended questions which instructed respondents to select their desired response from predetermined list of answers. Additionally, options were provided after the predetermined answers to allow respondents the opportunity to comment on related issues in the questionnaire or provide additional answers which were not listed. The questionnaires were self-administered, eliminating the risk of researcher intervention during the data collection. After a small-scale practice study was conducted to ensure that the questions in the questionnaire were unambiguous, the questionnaires were distributed mainly online to respondents to collect primary data.

3.7.1 Primary Information

Primary data was collected from respondents within the PMI Ghana Charter who share common characteristic of having experience with design-build projects in Ghana. This data provided the information on which the analysis for this study was based.

3.7.2 Secondary Information

The sources of secondary data were mainly published articles, reports, textbooks, journals and relevant online materials covering sustainable procurement and the role of Project Managers on design-build projects.

3.7.3 Questionnaire design

The questionnaire was designed based on information gathered from the literature review. The first section of the questionnaire sought to obtain information about the demographic background of the respondent. Information on their experience both work and educational was collected. The ensuing sections gathered necessary data such as awareness level of the concept of sustainable procurement, factors for its promotion, challenges encountered, project managers

role in its promotion. Response to the questions in these sections were relevant to achieving the aim and objectives of this research. Some questions required respondents to rank the pre-determined categories with a 5-point Likert scale. Language in the questionnaire were simple and explicit.

3.8 DATA ANALYSIS

Data for this study was analysed by employing quantitative analytical methods. Data gathered was processed further to obtain a better understanding through data preparation. The Microsoft excel spreadsheet was used to assist with data analysis. Validation of the data was carried out to confirm the integrity of the data. Descriptive statistics method was used to summarise the data and find patterns. The descriptive statistics that was used included mean, percentage, and frequency. Google Forms, an online survey software was employed. This tool was useful in the collating of data and also for data analysis.

3.9 ETHICAL CONSIDERATIONS

Respondents were made aware of the objectives of this study. They were provided assurance of the confidentiality that will be assigned to their responses and the fact that their responses were for academic purposes and only for the purposes of this study. There was no attempt to physically or psychologically harm or abuse any respondent during the conduct of the study.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

The analysis and discussion of collated survey results and its findings in relation to the promotion of the concept of sustainable procurement on design-build projects by project managers is dealt with in this section. The major areas covered in this report in relation to the objectives set includes:

- Knowledge of the concept of sustainable procurement,
- Strategies for promoting the concept of SP on design-build projects,
- Challenges encountered in the promotion of the concept on design-build projects,
- Underlying the role of the project managers in promoting SP on design-build projects.

Content analysis was used to summarize the data gathered from the Project Managers with design-build experience. This provided a more objective evaluation of the received data from respondents by representing them with numbers and percentages. Data analysis also involved the use of descriptive statistics and mean score ranking.

4.2 SURVEY RESULTS

The research questionnaires were distributed through electronic messaging (email) to members of the PMI Ghana Chapter. A total of 145 questionnaires were forward to respondents through emails. Questionnaires were forwarded to Project management Professionals of the Local Chapter for their responds. Table 4.1 outlines the number and percentage of retrieved responses; valid and invalid responses responds to the total number of administered questions.

Table 0.1: Summary of survey questionnaires

Respondents	Count	Percentage of Questionnaires
Valid responses	39	26.9
Invalid responses	21	14.5
Unretrieved responses	85	58.6
Total administered questionnaires	145	100%

Source: Field Survey, 2019

As detailed above in Table 4.1, a total of 145 questionnaires were administered online to PMP's. Out of the 145 questionnaires, there were 60 respondents representing 41.3% of the administered questionnaires. 21 questionnaires representing 35% of the 60 retrieved responses were rejected since the respondents were outside the focus group; respondents did not have any experience with design-build projects. 39 of the retrieved questionnaires had respondents with experience with design-build projects. This represents 65% of the retrieved responses and 26.9% of the total number of administered questionnaires.

4.3 ANALYSIS OF DEMOGRAPHIC DATA

4.3.1 Professional Background of Respondents

Statistical analysis of the data collected showed that 49% of the project management professionals are solely professionals in project management, 26% are project managers with architecture background, 15% are project management practitioners with professional background in quantity surveying, 8% are project management practitioners with engineering background and least than 3% are project management practitioners with entrepreneurship background. This distribution is shown in Figure 4.1 below.

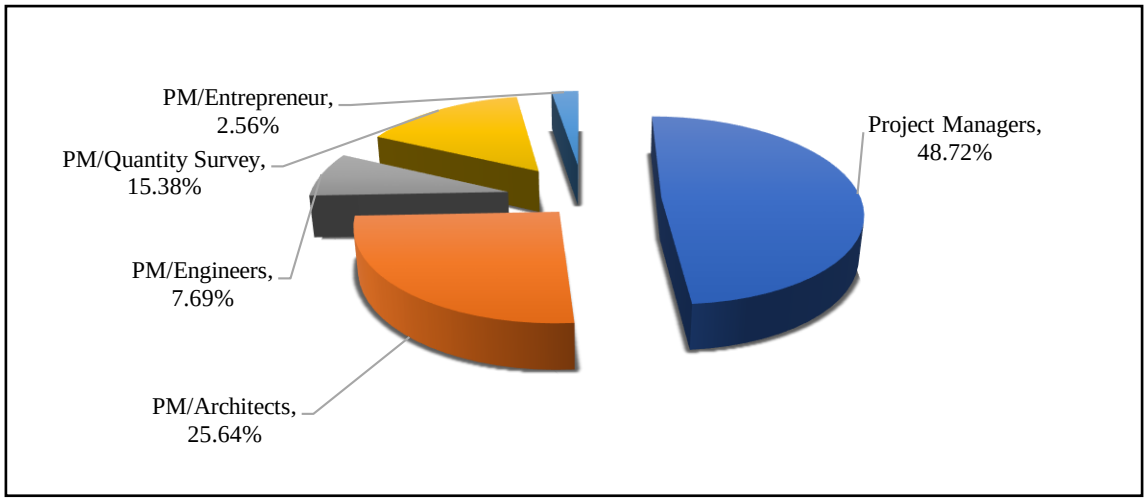

Figure 0.1:Distribution of project managers according to their professional background

Source: Field Survey, 2019

4.3.2 Level of academic qualification

From Figure 4.2, 67% of the project management professionals had postgraduate education in M.Sc./MPhil. /MBA, 18% of the respondents were first degree holders (BSc.), and 5% each of group of professionals with PHD and HND education. In addition, the survey showed that all 39 project management practitioners, representing 100% are certified project managers.

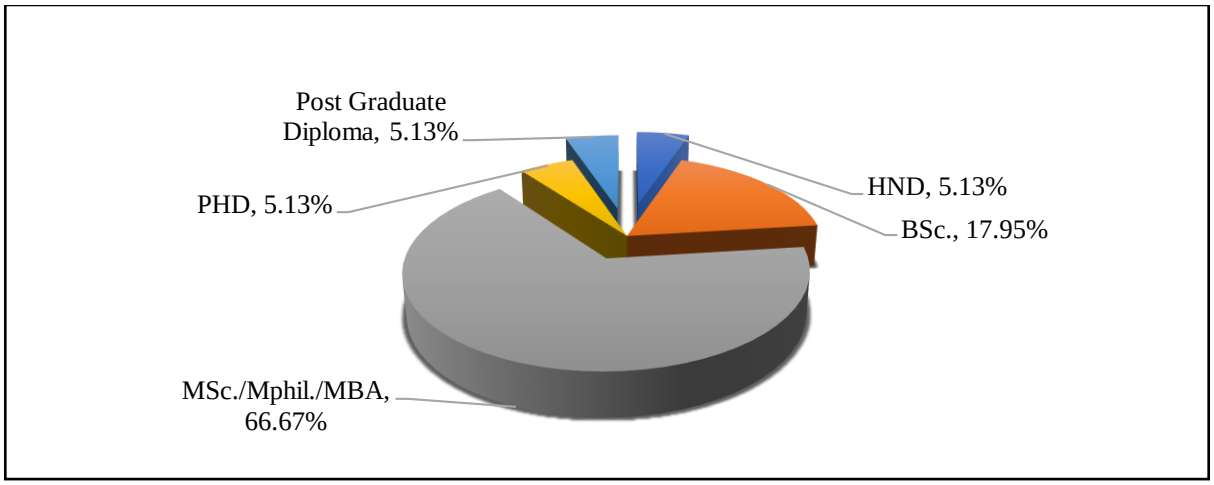

Figure 0.2: Distribution of project managers according to their academic qualification

Source: Field Survey, 2019

4.3.3 Years of work experience in project management

Figure 4.3 below, 51% of the Project Managers had less than 6 years' experience as project management professional. The percentage distribution again indicates that 23% of the project managers had between 6 – 10 years' experience in project management, 18% had between 11 – 15 years project management experience, 5% of the project managers have over 20 years' experience in project management and 3% had between 16-20 years.

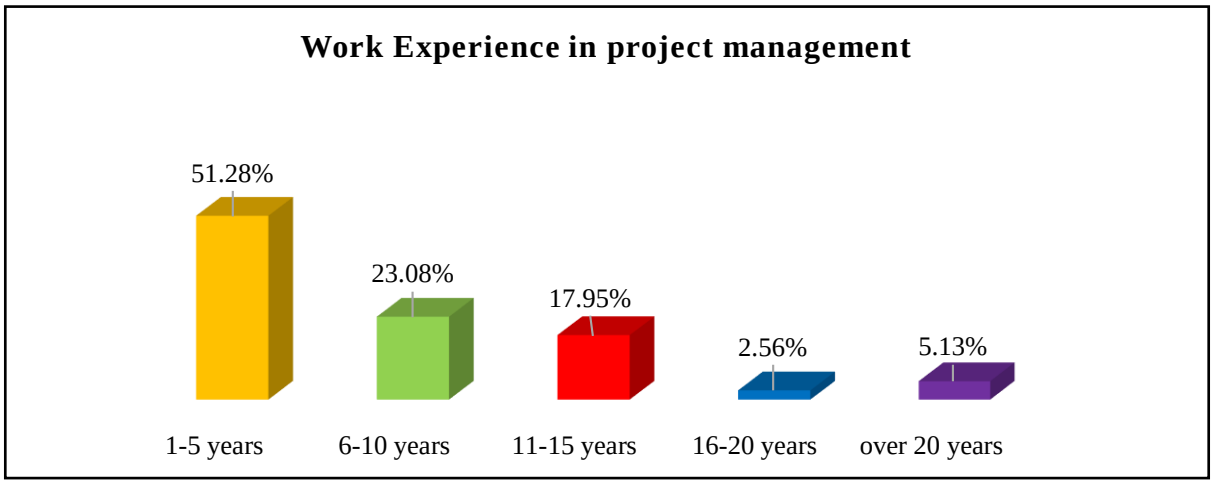

Figure 0.3: Distribution of project managers according to their experience

Source: Field Survey, 2019

4.3.4 Number of Design-Build projects undertaken

Figure 4.4 shows the number of design-build projects the respondents have been involved with during their practice. From the percentage distribution in the chart, more than 50% of the respondents have worked on between 1 – 5 design-build projects, 26% have worked on between 6 – 10 design-build projects, 3% of the respondents have worked on between 11-15 design-build projects and the remaining 15% have worked on over 15 design build projects.

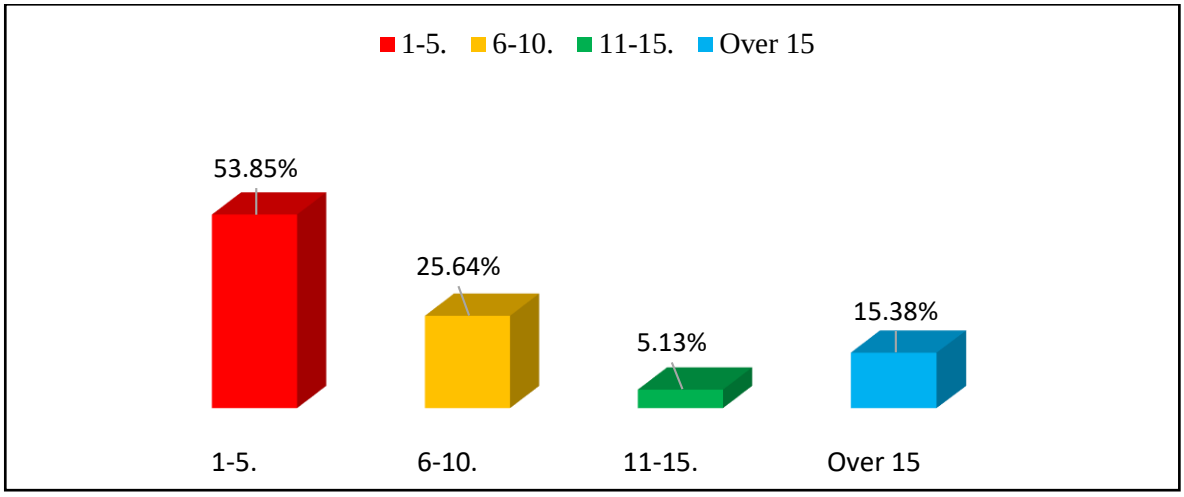

Figure 0.4: Experience with Design-Build projects

Source: Field Survey, 2019

4.3.5 Knowledge of Project Management Processes involved with Design-Build Projects

Looking at the table 4.2 below, more than 95% of the respondents are knowledgeable in the project management processes involved with managing design-build projects. Only 5% do not have any knowledge of the project management processes involved with design-build projects.

Table 0.2: Knowledge of Design-build projects project management processes

Responses	Frequency	Percentage
Yes	37	95**
No	2	5**
Total	39	100%

** *percentages have been rounded up to the nearest whole figure*

Source: Field Survey, 2019

4.3.6 Level of involvement with Design-Build projects

Table 4.3 shows the statistical representation of the thirty-nine respondents on the phases involved in managing Design-build projects. 90% of the respondent were involved in the execution phase of design-build projects, 79% were involved in the monitoring and controlling

phase, 76% were involved in the planning phase, while initiating and closing were represented by 61% and 58% respectively. Most respondents were involved in one or more processes in managing design-build projects.

Table 0.3: Distribution of phases of involvement with managing Design-build projects

Focus group	No. of Respondents	Initiating	Planning	Execution	Monitoring & Controlling	Closing
Project Manager	**39**	**61%**	**76%**	**90%**	**79%**	**58%**

Source: Field Survey, 2019

4.4 RESPONDENTS LEVEL OF AWARENESS OF THE CONCEPT SUSTAINABLE PROCUREMENT

4.4.1 Awareness of the Concept of Sustainable Procurement

Part of the questionnaire sought respondents view on the concept of sustainable procurement. From Table 4.4 below, it can be inferred that respondent's knowledge on the concept of sustainable procurement was high. 79% respondents were knowledgeable about the concept of sustainable procurement whereas the remaining 21% have no knowledge of the concept of sustainable procurement.

Table 0.4:Distribution of the awareness of the concept of sustainable procurement

Responses	Frequency	Percentage
Yes	31	79***
No	8	21***
Total	39	100%

*** *percentages have been rounded up/down to the nearest whole figure*

Source: Field Survey, 2019

The subsequent analysis is based on the responses of the 79% respondents who have knowledge on the concept of sustainable procurement.

4.4.2 Level of familiarity with the concept of sustainable procurement

In addition, respondents were also required to state their level of familiarity with the concept of sustainable procurement. Figure 4.5 below, showed that respondent views were varied. 42% rated their level of familiarity as Average, 29% of the respondents rated their level of familiarity with the concept as Fair and Very well respectively

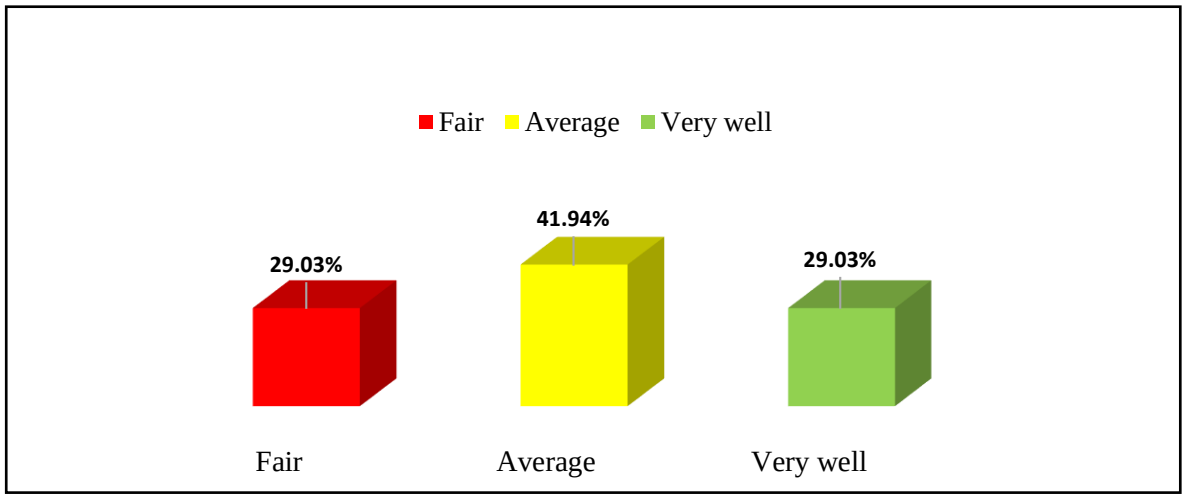

Figure 0.5:Distribution of respondents' level of familiarity with the concept of sustainable procurement

Source: Field Survey, 2019

4.4.3 Respondents experience with design-build projects where sustainable procurement was an expected project outcome.

Table 4.5 represents the distribution on the issue of whether respondents have worked on design-build projects where sustainable procurement was an expected project outcome. 61% of the respondents have worked on design-build projects where sustainable procurement was an expected project outcome and only 39% have not worked on any project where sustainable procurement was a project outcome.

Table 0.5: Percentage of experience with projects with sustainable outcomes

	No. of Respondents	Yes	No	Total
Project Managers	**31**	**61%**	**39%**	**100%**

Source: Field Survey, 2019

4.4.4 Organizational Policy on Sustainable procurement

From the Table (4.6) below, 42% of the respondents indicated that their organizations have policy in place to ensure sustainable procurement practices, whereas the policy did not exist in some of the respondents' organizations as suggested by 58%. However, 50% of the 58% respondents who do not have the policy in their organizations have made the effort in encouraging management to consider having a sustainable procurement policy. The other half (50%) have not made any effort in recommending sustainable procurement policy in their organizations.

Table 0.6: Distribution of sustainable procurement policy in respondents' organization

	No. of Respondents	Yes	No	Total
Project Managers	**31**	**42%**	**58%**	**100%**

Source: Field Survey, 2019

Table 0.7: Distribution of respondent's effort in having sustainable procurement policy in their organization

	No. of Respondents	Yes	No	Total
Project Managers	**18**	**50%**	**50%**	**100%**

Source: Field Survey, 2019

4.5 FACTORS FOR PROMOTING SUSTAINABLE PROCUREMENT ON DESIGN-BUILD PROJECTS

This section analyzed activities deployed to promote sustainable procurement in design-build projects throughout the project management phases. Desktop survey was conducted earlier to identify possible factors that can be adopted by Project managers during the various phases of a design-build project to promote the concept. Respondents were asked to rate the various variables that can be adopted to enhance the promotion of the implementation of SP according to the level of significance. This was done with the help of a Likert scale; ***1-Not Significant; 2-Slightly Significant; 3-Moderately Significant; 4-Very Significant; 5-Extremely Significant.*** The mean score ranking was used to analyse and rank responses. The mean as well as the standard deviation were calculated for all activities and subsequently ranked to determine the main factors.

4.5.1 Initiating Phase

From Table 4.8 below, respondents ranked encouraging the inclusion of sustainable procurement strategies in organizational polices with a mean value of 4.1034 as the main factor to be adopted in promoting the implementation of SP during the initiating phase of a project. This was succeeded by providing education on the potential benefits of SP with a mean of

3.9310 which was ranked second; encouraging senior management support for implementation of sustainable procurement on projects (3.4482) was ranked 3rd; encouraging the promotion of social and environmental impact assessment (2.6551) was ranked 4th; and strict adherence to company policy regarding sustainable procurement which was a variable suggested by respondents (2.1111) was ranked 5th.

Table 0.8: promoting sustainable procurement during the initiating phase

Responses (Initiating Phase)	Mean	Standard Deviation	Ranking
Encouraging the inclusion of sustainable procurement strategies in organizational policies	4.1034	1.0122	1st
Provide education on the potential benefits	3.9310	1.0667	2nd
Encouraging senior management support for implementation of sustainable procurement on projects	3.4482	1.4037	3rd
Encouraging the promotion of social and environmental impact assessment	2.6551	1.5417	4th
Strict adherence to company policy regarding sustainable procurement	2.1111	1.8333	5th
Average mean:	3.2498		

Source: Field Survey, 2019

4.5.2 Planning Phase

Respondents ranked effectively communicating the benefits of sustainable procurement to project team as 1st of the factors for promoting SP during the planning phase with a mean of 4.6551. The following factors were ranked 2nd, 3rd, and 4th respectively: preparation of procurement strategies which incorporates sustainable considerations (4.6206), identification and recommendation of sustainable sources of supply (2.3103), encouraging the performing of value for money analysis (2.0666).

Table 0.9: promotion of sustainable procurement during the planning phase

Responses (Planning Phase)	Mean	Standard Deviation	Ranking
Effectively communicating the benefits of sustainable procurement to project team	4.6551	0.4837	1st
Preparation of procurement strategies which incorporates sustainable considerations	4.6206	0.7752	2nd
Identification and recommendation of sustainable sources of supply	2.3103	1.7949	3rd
Encouraging the performing of value for money analysis	2.0666	1.6676	4th
Average mean:	3.4132		

Source: Field Survey, 2019

4.5.3 Execution Phase

The analysis of respondents' views on the measures taken to promote sustainable procurement in design-build projects during the execution phase is shown in Table 4.10 below. It can be deduced that respondents ranked: contract documents for vendors must reflect sustainable targets (4.6666) as the primary activity for promoting the implementation of SP during the execution phase of managing a design-build project. Both inclusion of sustainable targets in the project requirements (3.8620) and inclusion of sustainability in selection criteria for vendors (3.5862) were ranked 2nd and 3rd respectively.

Table 0.10: promotion sustainable procurement during the execution phase

Responses (Execution Phase)	Mean	Standard Deviation	Ranking
Contract documents for vendors must reflect sustainable targets	4.6666	0.6065	1st
Inclusion of sustainable targets in the project requirements	3.8620	1.2457	2nd
Inclusion of sustainability in selection criteria for vendors	3.5862	1.3763	3rd
Average mean:	4.0383		

Source: Field Survey, 2019

4.5.4 Monitoring and Controlling Phase

Data analysis represented in Table 4.11 below, indicates that periodic auditing of project outputs to determine if they meet sustainable targets (4.9310) was ranked as the 1st factor for promoting SP during the monitoring and controlling phase of a design- build project by project managers. Respondents ranked implementing a measurement system to monitor project outcomes (2.3448) 2nd. Other variable which was proposed by the respondents was comparing project outcomes to social and environmental impact indicators (1.2142); this was ranked as 3rd.

Table 0.11: promotion of sustainable procurement during monitoring and controlling phase

Responses (Monitoring and Controlling Phase)	Mean	Standard Deviation	Ranking
Periodic auditing of project outputs to determine if they meet sustainable targets	4.9310	0.2579	1st
Implementing a measurement system to monitor project outcomes	2.3448	0.6139	2nd
Comparing project outcomes to social and environmental impact indicators	1.2142	0.4179	3rd
Average mean:	2.8300		

Source: Field Survey, 2019

4.5.5 Closing Phase

According to the analysis the most prominent factor for promoting SP during the closing phase of project management of design-build projects is the compilation of lessons learnt to be used for future reference (4.8620) with a standard deviation of 0.3509 which shows great uniformity in respondents rating of this variable. Respondents ranked the other factors which they proposed in addition to the pre-determined responses as follows: Publishing realized social and environmental benefits of the projects in use (2.1666) was ranked 2nd; documenting user feedback on projects procured with sustainable considerations (1.9655) was ranked 3rd; updating enterprise environmental factors (1.1034) was ranked 4th; and updating organizational process assets was ranked 5th.

Table 0.12: promotion of sustainable procurement during closing phase

Responses (Closing Phase)	Mean	Standard Deviation	Ranking
Compilation of lessons learnt to be used for future reference	4.8620	0.3509	1st
Publishing realized social and environmental benefits of the projects in use	2.1666	0.8743	2nd
Documenting user feedback on projects procured with sustainable considerations	1.9655	0.8653	3rd
Updating Enterprise Environmental Factors	1.1034	0.4093	4th
Updating Organizational Process Assets	1.0689	0.2579	5th
Average mean:	2.2333		

Source: Field Survey, 2019

4.6 CHALLENGES ENCOUNTERED BY RESPONDENTS IN PROMOTING SUSTAINABLE PROCUREMENT ON DESIGN-BUILD PROJECTS.

This section analyzed the challenges project managers encounter in the promotion of sustainable procurement on design-build projects. The statistical analysis employed in this situation is the Mean score ranking. In order to determine the degree of challenges of sustainable procurement for the project managers, responses were ranked with the help of a Likert scale; ***1-Very Frequent; 2-Frequent; 3-Moderate; 4-Rare; 5-Very Rare.***

Table 0.13: challenges affecting the promotion of sustainable procurement

Challenges	Mean	Standard Deviation	Ranking
Perception about sustainability being more expensive	3.7241	0.8407	1st
Lack of in-depth knowledge of the concept by Project Stakeholders	3.5517	1.2126	2nd
Perception about the higher initial costs	3.4482	0.9097	3rd
Lack of organizational policies	3.3214	1.3067	4th
Lack of Social drive	3.2142	1.0665	5th
Lack of support from senior management on implementation of sustainable procurement on projects	3.0689	1.1412	6th
Lack of capacity of vendors/sub-contractors to deliver sustainable products	3.0000	1.0690	7th
Low technical capacity	2.8275	1.1360	8th
Low management capacity	2.7586	1.1543	9th
Lack of guideline materials and practical tools	2.6896	1.1052	10th
Average mean:	3.1604		

Source: Field Survey, 2019

From Table 4.13 above, the mean values for most of the challenges was above average with an overall average mean score of about 3.1604. Of the 10 activities stated above, more than half (6) had a standard deviation greater than 1. This is an indication that, more than half of the respondents, had variations in the rating of the challenges encountered during the promotion of sustainable procurement on design-build projects, whereas the remaining 2 had a standard deviation less than 1.0 indicating some level of agreement among the respondent's ratings.

According to the analysis, the most prominent challenges encountered by the project managers in promoting sustainable procurement are perception about sustainability being more expensive with a mean score of 3.7241, lack of in-depth knowledge of the concept by project stakeholders had a mean score of 3.5517 and perception about the higher initial costs with a mean value of 3.4482.

The trend further shows that, challenges such as lack of organizational policies (3.3214) and lack of social drive, (3.2142) had a mean value above the average mean value of 3.1604. The other challenges identified by the project managers in promoting sustainable procurement on design-build projects are lack of support from senior management on implementation of sustainable procurement on projects (3.0689), lack of capacity of vendors/sub-contractors to deliver sustainable products (3.0000). Low technical capacity (2.8275), low management capacity (2.7586) and lack of guideline materials and practical tools (2.6896) were the least rated.

Based on the results presented above, it is rational to conclude that, the promotion of sustainable procurement on design-build project is mostly impeded by negative perceptions.

4.7 THE UNDERLYING ROLE OF PROJECT MANAGERS IN PROMOTING SUSTAINABLE PROCUREMENT

This part of the analysis was to allow respondents to answer questions on the role of Project managers in promoting Sustainable Procurement.

4.7.1 The role of Project managers in promoting sustainable procurement

The study further revealed that only 3 respondents representing 10% of the project managers felt they were not empowered to make significant contribution to promoting SP on design-build projects, whilst 90% representing 28 of project managers acknowledge to have the power to contribute to promoting sustainable procurement on design-build projects. This is shown in the table below:

Table 0.14: Percentage of PM's empowered to promote sustainable procurement

	No. of Respondents	Yes	No	Total
Project Managers	**31**	**90%**	**10%**	**100%**

Source: Field Survey, 2019

Additionally, 90% of project managers agreed to the fact that PM processes makes room for the implementation of sustainable procurement in design-build projects, only 10% of the project managers objected to this assertion.

4.7.2 Project managers encouraging other project participants to adopt SP

71% of the project managers revealed that they have actively encouraged other project participants to adapt the concept of sustainable procurement.

Table 0.15: Distribution of other project practitioners adapting the concept of SP

	No. of Respondents	Yes	No	Total
Project Managers	**31**	**71%**	**29%**	**100%**

Source: Field Survey, 2019

Further analysis to determine the dominant factors for promoting SP to other project participants was carried out. Respondents were asked to rate on a Likert Scale of 1 to 5, the level of significance of pre-determined factors which enhances the promotion of SP to other project participants. From Table 4.16 below, it can be deduced that the main factors for promoting SP to other project participants with mean scores of 4.7586 and 3.8275 were education for project participants about potential economic, social and environmental benefits and encouraging the implementation of organizational policies enforcing the implementation of SP respectively. These were followed by inclusion of sustainable requirements to project needs assessment with a mean score of 2.3793 at 3rd and ranking of education on life cycle costing of projects with a mean score of 1.9310 at 4th.

Table 0.16: Promoting the concept of SP to other Project Participants

Responses	Mean	Standard Deviation	Ranking
Education for project participants about potential economic, social and environmental benefits	4.7586	0.6356	1st
Encourage the implementation of organizational policies enforcing the implementation of SP	3.8275	1.0025	2nd
Inclusion of sustainable requirements to project needs assessment	2.3793	0.9416	3rd
Education on life cycle costing of projects	1.9310	0.7527	4th
Average mean:	3.2241		

Source: Field Survey, 2019

4.7.3 The barriers Project managers faced in promoting SP to other project participants

In the process of promoting the concept of SP to other project participants, project managers encountered some challenges as shown in Table 4.17 below. Based on responses of project managers who responded positively to actively promoting the concept of SP to other project practitioners, lack of understanding of the concept of SP; with a mean score of 4.3793 and a standard deviation of 0.9029; was ranked as the most prominent barrier to their efforts. Other major barriers

included: negative perception about the financial viability of sustainable procurement (3.9655) which was ranked 2nd; difficulty in quantifying the potential social and environmental benefits (3.9310) which was ranked 3rd; reluctance of project participants to adopt new practices (3.8275) which was ranked 4th and lack of management support (1.4827) which was ranked 5th. Additionally, respondents proposed budget constraints (1.4482) which was ranked 6th as another identified barrier to their efforts at promoting SP to other project participants.

Table 0.17: Barriers to promoting the concept of SP to other project participants

Responses	Mean	Standard Deviation	Ranking
Lack of understanding of the concept	4.3793	0.9029	1st
Negative perception about its financial viability	3.9655	0.9443	2nd
Difficulty in quantifying the potential social and environmental benefits	3.9310	0.9611	3rd
Reluctance to adopt to new practices	3.8275	1.0025	4th
Lack of Management Support	1.4827	0.8710	5th
Budget Constraints	1.4482	0.7831	6th
Average mean:	3.1724		

Source: Field Survey, 2019

4.7.4 Outcome of efforts at promoting SP to other project practitioners

The analysis revealed an unimpressive success rate among respondents who actively attempted to promote sustainable procurement. As shown in Figure 4.6 below, only 14% of respondents who tried to promote the concept of SP indicated that the outcome was successful, 4% of the respondents rated the outcome as failed. 82% of the respondents representing the majority rated the overall outcome as challenging.

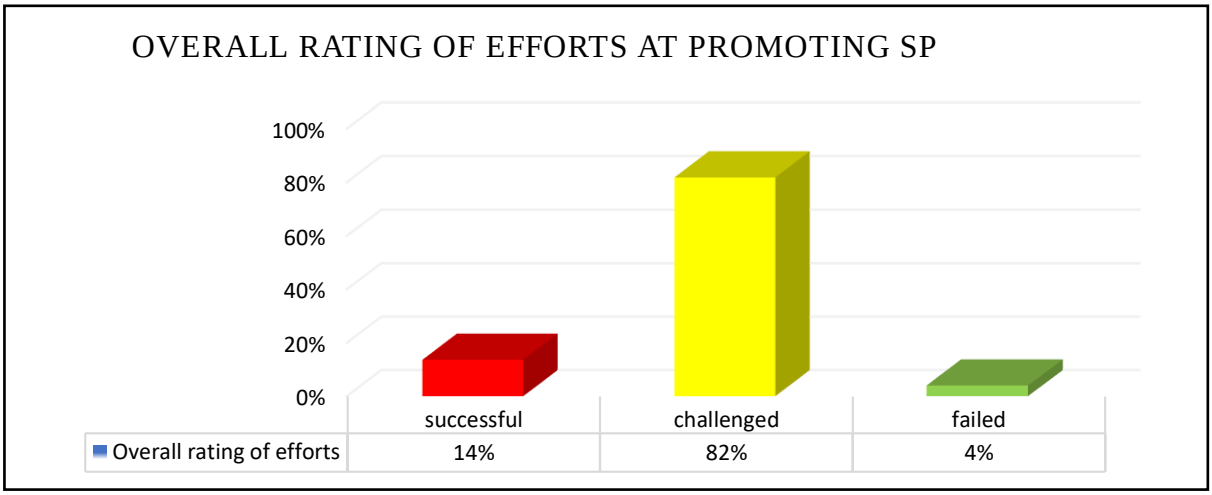

Figure 0.6: Outcome of efforts at promoting SP

Source: Field Survey, 2019

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The growing necessity to balance the economic, environmental and social needs of a society to allow for its growth and preservation necessitates measures such as practicing the concept of sustainable procurement (SP). It's against this backdrop that this research has provided the findings concerning the achievement of the research aim and objectives. It provides information on the extent to which Project managers promote the concept of sustainable procurement on design-build projects. The research further outlines the factors which promotes or inhibits the role Project Managers play in promoting this concept. Recommendations are later made based on the findings of the study on how Project Managers involved with design -build projects, can play a vital role on promoting the concept.

5.2 SUMMARY OF RESEARCH FINDINGS

This research set out to find what role Project Managers played in the promotion of sustainable procurement on design-build projects in Ghana. In order to achieve this aim, the following objectives were established:

i. To assess the level of knowledge of Project Managers on the concept of SP;
ii. To identify factors that Project Managers use in promoting the concept of SP on design-build projects;
iii. To identify the challenges encountered by Project Managers in attempt at promoting SP on design-build projects; and
iv. To identify the underlying role of Project Managers in promoting SP in design-build projects.

Data which was collected through administered questionnaires to Project Management Professionals were analysed to obtain findings in line with the aim of the research. The fulfillment of these four (4) objectives has been explained in the ensuing subsections.

5.2.1 Review of Objective One (1)

The first objective focused on assessing the level of knowledge and awareness of Project Managers of the concept sustainable procurement. Primary data collected showed that considerable number of Project Management Professionals were aware of the concept of sustainable procurement. Approximately 79.5% of the valid respondents were aware of the concept representing thirty-one (31 respondents).

The research now proceeded to solely analyse the responses of the thirty-one (31) respondents.

Subsequently, when respondents were further asked to identify variables which best defines sustainable procurement, the research found that some Project Managers (approximately 19.3%) considered the traditional components of procurement in addition to only environmental benefits whilst neglecting social and economic benefits. Project Managers' level of knowledge and familiarity with the concept was evaluated as mainly average. Evidently, 61.3% of the project managers have been involved with a substantial number of design-build projects where sustainable procurement was an expected project outcome regardless of the fact that only 41.9% of them had an organizational policy that promotes sustainable procurement.

5.2.2 Review of Objective Two (2)

Objective two focused on identifying the measures that Project Managers use in promoting the concept of sustainable procurement on design-build projects. To accomplish this objective, existing literature was reviewed to determine the project managers input throughout the project life cycle of design-build projects. The Respondents with knowledge of the concept of SP, rated the pre-determined activities which can be employed in promoting the concept during the

various phases of a design-build project from initiating to closing. Data gathered from respondents buttressed information obtained from the reviewed literature. The major measures employed by Project Managers to promote the concept, included: encouraging the implementation of organization polices on sustainable procurement, providing education on the potential benefits to both project stakeholders, encouraging senior management support and encouraging more social and environmental impact assessment of projects at the initiating stage; communicating the potential benefits of sustainable procurement to the project team, incorporating sustainable considerations into the procurement strategy and identifying sustainable sources of supply during the planning phase; inclusion of sustainability targets in contract documentation for execution of projects, inclusion of sustainable targets in the project requirements and the inclusion of sustainability in the selection criteria for contractors/suppliers/vendors during the execution phase; periodic auditing of on-going projects against set sustainable targets and documenting lessons learnt during project implementation to be used for future reference among others during the project closing phase.

5.2.3 Review of Objective Three (3)

The third objective bothered on identifying the challenges encountered by Project Managers in their attempt to promote sustainable procurement on design-build projects in Ghana. To identify the factors that inhibits the promotion of sustainable procurement on design-build projects, a desk top analysis of published literature was conducted to outline the most prominent inhibitors. Respondents were requested to rate each barrier on a Likert scale to determine how frequent they encountered that barrier and its prominence to inhibiting their promotion of the concept. A total of ten (10) variables was listed. Received responses were analysed and ranked. Findings after the analysis ranked the barriers affecting project Managers in their promotion of sustainable procurement in the following order: perception about sustainability being more expensive, lack of in-depth knowledge of the concept by project stakeholders, perception about

higher initial costs, lack of organizational policies on sustainable procurement, lack of social drive, lack of support from senior management, lack of capacity of sub-contractors/vendors to deliver sustainable products, low technical capacity, low management capacity, lack of guideline materials and practical tools. Additional barrier which was identified from responses was budget constraints.

5.2.4 Review of Objective Four (4)

Objective four (4) bothered on identifying the underlying role of the project manager in promoting sustainable procurement on design-build projects.

In order to determine what role project managers can play in the promotion of the concept, respondents were asked if they were positioned to promote the concept and if the project management processes made room for the promoting of the concept on design-build projects. 90.3% of the 31 respondents believed as Project Managers of design-build projects, they had the authority to make significant contributions towards the advancement of the concept of sustainable procurement and the project management process allowed for the integration and promotion of SP in design-build projects. When determining if they promote the concept to other project participants, approximately 71% of those respondents admitted to having actively encouraged other project participants to adapt the concept of SP by mostly educating them about the potential economic, social and environmental benefits and encouraging the implementation of organizational policies that enforces them to implement SP among others. They however did acknowledge some barriers that hampers their efforts to encourage other project participants. Largely, among them were: lack of understanding of the concept by other project participants, negative perception about the financial viability of implementing SP on projects, difficulty in quantifying the potential social and environmental benefits, reluctance of participants to adopt new practices, lack of management support and budget constraints; in the descending order of relevance. Overwhelmingly, 81.9% of the respondents who actively promoted the concept to

other project participants, considered the outcome of their efforts as challenged with only 13.6% being successful with a failure rate of 4.5%.

5.3 CONCLUSION

This research was conducted to evaluate the role of project managers in promoting the concept of sustainable procurement on design-build projects in Ghana. The following conclusions were drawn from the research findings:

- Majority of Project Managers who have been involved with design-build projects in Ghana are aware of and have a fair knowledge of the concept of SP. Whilst more than half of the project managers are members of organizations which does not have a sustainable procurement policy, a considerable number of them have had the opportunity to work on design-build projects where sustainable procurement was an expected project outcome.
- The study concludes that the main factors to promoting SP throughout the phases (from initiating to closing) of project management on design- build projects involves mainly: inclusion of sustainable procurement strategies in organizational policies, and providing education on potential benefits during project initiating; effective communication of potential benefits to project team and incorporating sustainable considerations into the project procurement strategy during the planning phase; inclusion of sustainable targets in the contract documents of contractors, sub-contractors or suppliers and subsequently into the project requirements during the execution phase of the project management; periodically auditing project outputs to determine if they are meet the set sustainable targets during the monitoring and controlling phase; and finally compiling a lessons learnt register to serve us future reference for upcoming projects during project closing.
- The study further established that the main challenges encountered by Project Managers in their promotion of SP on design-build projects was mainly negative perception about

cost; either SP being expensive or requiring high initial cost to implement. Additionally, the lack of education among project stakeholders and the absence of organizational policies that enforces project participants to enforce SP are principal inhibitors to the promotion of the concept in agreement with the findings of Chari and Chiriseri (2012).

- The study further established that the authority of Project managers aided by the project management processes involved with undertaking design-build projects empowered Project Managers to make significant contributions towards the promotion of SP.
- Furthermore, the study concluded that the efforts to promote the concept of SP to other project participants by providing them with education on the potential benefits whilst encouraging the implementation of organizational policies that mandates the implementation of SP was rife among Project Managers regardless of the major barriers such as lack of knowledge among participants and the ensuing negative perception which is ascribed to its financial viability. The study is conclusive on the fact that the crusade by Project Managers to promote the concept is fraught with many challenges with an unimpressive success rate.

5.4 CONTRIBUTION TO KNOWLEDGE AND INDUSTRY

Outlined below are the ways in which academia and practice has benefitted from this research:

- The universal benefits to be derived from the implementation of the concept of sustainable procurement necessary for achieving continued survival of the human race and our environment have been brought to the fore,
- The research has provided insight to the level of awareness of the concept of sustainable procurement of Project Managers who have been involved with design-build projects,
- Knowledge has been provided to serve as guideline on how sustainable procurement can be implemented by Project Managers throughout the project life cycle of a design-build

project and how the project management processes can be used in this advocacy for a sustainable development.

- Challenges faced by Project Managers in their advocacy for the adoption and promotion of the concept of SP have been documented to which proposed recommendations have been outlined for implementation.

5.5 RECOMMENDATIONS FOR INDUSTRY AND FUTURE RESEARCH

The following recommendations have been made by the researcher based on the research findings for the benefit of both the industry and academia. Summarized below are suggestions which will assist project managers with the advocacy and the implementation of sustainable procurement on projects.

5.5.1 Recommendation for Industry

Based on research findings, the study recommends the following:

- Project Management Professionals must be encouraged to improve their level of knowledge of the concept to a more advance level. Additionally, this education will must result in 100% awareness among professionals.
- Institutions, industries, companies and corporate entities must endeavor to have a sustainable procurement policy which will form part of its greater agenda of promoting sustainable development.
- Project Managers must increase their advocacy level to change the negative perception attached to sustainability specifically the perception about sustainability being more expensive this could encourage project sponsors to consider sustainable outcomes.
- Project Managers in performing their duties must educate project stakeholders on the potential benefits to be derived from the implementation of SP because when there is

stakeholder buy-in from project initiating stage it empowers the Project Manager to enforce the achievement of sustainable targets during the planning and execution stage.

- Educational outreach programmes should be conducted by bodies such as the Ghana Task Force on Sustainable Public Procurement to provide general awareness of the concept, its potential benefits and the necessity of sustainable development. Once the awareness is created it becomes an easier task to seek stakeholder and/or sponsor endorsement.

5.5.2 Recommendation for Future Research

This research focused on how Project managers involved with design-build projects can promote the concept of SP on those projects. For future research the following recommendations have been proposed:

- The study should focus on projects procured through other delivery method such as the traditional or design-bid-build method.
- Study should include other members of the project team such as Consultants e.g Architects, Engineers, Surveyors etc.
- Future research can also focus on sustainability in all the knowledge areas of project management.

5.6 RESEARCH LIMITATIONS

There were some challenges encountered in the course of conducting this research. Key among them has been listed below:

- The researcher had enormous challenge with accessing the potential respondents (PMP's of the PMI Ghana Chapter) due to the data protection guidelines regarding membership information. The researcher believes this affected the questionnaire response rate.

- Time constraints also limited the period which the researcher could retrieve responses for the questionnaire with the method of communication making it difficult to do effective follow-ups for responses on time.
- The possibility of some minimal sampling and measurement errors and the effects of these errors on the data collected cannot be ignored.

REFERENCES

Adamu, I., Sidik, M. A., and Ernest, O. (2017). Adopting Design and Build (D & B) as an Alternative Construction Procurement System to the Traditional Method in Ghana. *International Journal of Construction Engineering and Management, 6*(4), pp. 148–159.

Adjei, A. B. (2010). Sustainable public procurement: A new approach to good governance. Seul: IPPC4. Available at: http://www.ippa.org/IPPC4/ (visited 28.6.19)

Adjei-Bamfo, P. (2017). Mainstreaming Sustainable Public Procurement in Ghana's Public Sector: The Role of E-Government*; MPhil. Thesis, University of Ghana, Legon.* Available online at: www.ugspace.ug.edu.gh

Adjei-Bamfo P. and Maloreh-Nyamekye T. (2019). The "baby steps" in mainstreaming sustainable public procurement in Ghana: A "double-agency" perspective. *Journal of Public Affairs,* 19(1), pp. 1-6

Ahadzie, D. K., Kissi, E., and Adjei-kumi, T. (2012). The Status of Project Management Practices in the Ghanaian Construction. International Journal of project Planning and Finance Vol. 3, No. 1 2012, pp. 123-135. Available at https://www.researchgate.net/

Alvani, E., Bemanian, M., and Hoseinalipour, M. (2014). Analysis of Critical Success Factors in Design-Build Projects; a Case study of Karaj Urban Projects. *International Journal of Innovative Science, Engineering & Technology, 1*(6), pp. 519–523.

Ametepey, S. O., Aigbavboa C. and Ansah, K. (2015) Barriers to successful implementation of sustainable construction in the Ghanaian construction industry Procedia Manufacturing, 3 (2015), pp. 1682-1689

Ametepey, S.O., and Ansah, S.K. (2015) Impacts of Construction Activities on the Environment: The Case of Ghana. *Journal of Environment and Earth Science, 5*(3), pp. 23–32.

Ameyaw, C. (2009). Comparative Performance Evaluation of The Traditional Design-Bid-Build (DBB) and Design-Build (DB) Procurement Methods in Ghana. *Energy*, pp. 1–116.

Appiagyei, A. A., Ayarkwa, J., and Agyekum, K. (2016). Environmental Considerations in Procurement Decisions: A Literature Review. *Sustainability in Environment*, *1*(1), pp.40.

Appiah, S. C. Y., Mohammed, A., and Emmanuel, O. (2014). Integrating Environmental and Social Considerations into Public Procurement Practice in Ghana. *SSRN Electronic Journal*, *2*(6), pp. 276–280

Appiah, R.E (2014) A case for sustainable public procurement. Available online at: www.graphiconline.com (visited 24.04.2019)

Asman, G. E. (2016). Guidelines for Environmentally Sustainable Building Practices at the Design Stage for Office Buildings. *Msc. Thesis, KNUST* Available at: www.ir.knust.edu.gh

Barnhart, B., Zahn, J., and Gaines, M. (2017). Design-Build Best Practices Guidelines. pp. 1–45.

Belfitt, R. J., Sexton, M., Schweber, L., and Handcock, B. (2011). Sustainable Procurement – Challenges for Construction Practice. *TSBE EngD Conference*, (July).

Berry, C. and McCarthy, S. (2011). Guide to sustainable procurement in construction. CIRIA, London. pp. 174–180

Boampong-Ohemeng, P., Kusi-Sarpong, S., Saani, A. S., and Agyemang, M. (2015). Evaluating Green Public Procurement Practices: The Case of Polytechnics in Ghana. *International Journal of Sustainable and Green Energy*, *4*(2), pp. 54–65.

Boudjabeur, S. (1997) Design and Build Defined. In: Stephenson, P (Ed.), 13th Annual ARCOM Conference, 15-17 September 1997, King's College, Cambridge. *Association of Researchers in Construction Management, Vol. 1*, 72-82.

Breckland Council (2009). Sustainable Procurement Guide. Available online at: https://www.breckland.gov.uk/sites/default/files/Uploads/sustainable%7B_%7Dprocurement%7B_%7Dguide.pdf.

Brundtland Commission, (1987). Report of the World Commission on Environment and Development: Our Common Future: Oxford University Press.

Buertey, J.I.T. & Dadadzogbor, E. (2015). Design and Build Procurement System: An Elixir to Project Failure?. LAP Lambert Academic Publishing.

Buertey, J.I.T., Dadadzogbor, E. & Atsrim, F. (2016). Procurement of Developmental Projects in Ghana: A Literature Review of the Designer-Led System Verses the Producer-Led Systems. *American Journal of Civil Engineering*. Vol. 4, No. 4, 2016, pp. 127-142.

Chandrasekhar, C. (2002). How to Write a Thesis: A Working Guide. *English*, *31*(2), pp. 144–148.

Chari, F., & Chiriseri, L. (2014). Barriers to Sustainable Procurement in Zimbabwe. *Greener Journal of Business and Management Studies*, *4*(1), pp. 014–018.

CIPS: The Chartered Institute of Purchasing and Supply. (2009). Sustainable Procurement. *CIPS Knowledge Works Document: Knowledge Summary*. *44*(0). Available at: www.cips.org

Clement, S., Watt, J. and Semple, A. (2016). The Procura+ Manual: A Guide to Implementing Sustainable Procurement. pp. 106. Available at: www.procuraplus.org (Accessed 28.05.2019)

Connaughton, J., and Hughes, W. (2017). Sustainable Procurement. Sustainable Futures in the Built Environment: A Foresight Approach to Construction and Development, pp. 194–222.

Cousins, R., MacKay, C.J, Clarke, S.D., Kelly, C., Kelly, P.J., & McCaig, R.H. (2004). Management Standards' work-related stress in the UK: practical development, Work & Stress, 18:2, pp. 113-136

De Souza Dutra, C. T., Rohan, U., Branco, R. R., Chinelli, C. K., de Araujo, A. J. V. B., & Soares, C. A. P. (2017). Barriers and Challenges to the Sustainability Requirements Implementation in Public Procurement of Engineering Works and Services. *Open Journal of Civil Engineering*, *07*(01), pp. 1–13.

Doh, Z.K. (2014). Sustainable Procurement Practice in Ghana Health Service, *MSc. Thesis, Department of Building Technology, KNUST.* available online at: www.ir.knust.edu.gh

Egan, J. (2002). Accelerating change: Hospitals and Health Networks, AHA, 84(10), p. 76. Available at: http://www.pubmedcentral.nih.gov/articlerender

ESUB (2017). The Environmental Impacts of Construction Projects and the next steps forward for the Industry. Available at: https://esub.com/environmental-impacts-of-construction-projects/ (Accessed: 27.04.2019)

Ganti, A. (2019). Central Limit Theorem (CLT), *Investopedia.* Available online at: https://www.investopedia.com/terms/c/central_limit_theorem.asp(Accessed: 28.08.2019)

Gudiene, N., Banaitis, A. and Banaitienne, N., (2013). Evaluation of critical success factors for construction projects - an empirical study in Lithuania. International journal of strategic property management, pp.21-31.

Harold Adjarko. (2014). Challenges to the Incorporation of Environmental Sustainability Issues into Construction Procurement at the Local Government Level of Ghana. *International Refereed Journal of Engineering and Science (IRJES)*, *3*(11), 42–52.

Heyde, C. C. (2014). Central Limit Theorem. *Wiley Stats Ref: Statistics Reference Online*.

Ilori, B. O., and Talukhaba, A. A. (2017). Evaluating the practice of the design-build procurement method in South Africa. *International Journal of Construction Supply Chain Management*, *7*(3), 110–123.

InnProBio- Forum for Bio-Based innovation in Public Procurement (2017). Handbook on the Public Procurement of Bio-Based Products and Services. Available at: https://www.biobasedconsultancy.com/uploads/files/

Interagency Procurement Working Group (2006). UN Procurement Practitioner's Handbook. Available at: https://www.ungm.org/Areas/Public/pph/ (Accessed: 24.04.2019)

Israel, G. D. (2018). Sampling the Evidence of Extension Program Impact 1 The Evaluation Purpose Defining the Population. 1–9. Retrieved from http://edis.ifas.ufl.edu/pd006

Jung, Y. M. (2019). Data Analysis in Quantitative Research. *Handbook of Research Methods in Health Social Sciences*, (November 2007), 955–969. doi: 10.1007/978-981-10-5251-4_109.

Kalubanga, M. (2012). Sustainable Procurement: What it is and practical implications in managing Procurement and Supply Chain Processes. *International Journal of Economics and Management Sciences, 1*(7), pp. 1–7.

Kissi, E. (2013). Empirical Understanding of the Status of Professional Project Management Practices in the Ghanaian Building Industry, *MPhil. Thesis, Department of Building Technology, KNUST.* available online at: www.ir.knust.edu.gh

Koh, T.Y., Rowlinson, S., Tuuli, M.M. and Liu, A.M.M. (2011). Sustainable procurement through a construction project: a vignette. *IN: Proceedings of the RICS Hong Kong Annual Conference 2011: Why, what and how - the truth behind sustainability: building towards a vision, Hong Kong,* 14 May 2011, 10 pp.

Kwakye, A.A. (1997). Construction Project Administration in Practice, *CIOB textbook Series, Chartered Institute of Building*, Longman.

KPMG. (2015). Climbing the curve. *2015 Global Construction Project Survey*, pp. 1–36. Retrieved from http://www.kpmg.com/building

Langkos, S. (2014). Athens as an international tourism destination: An empirical investigation to the city's imagery and the role of local DMO's. *Athens As an International Tourism Destination*, *2018*(September 2014), p. 5.

Liebert, T. (2012). Swiss–Ghana Project on Sustainable Public Procurement. (November). Available at: https://www.iisd.org/pdf/2012/spp_swiss_ghana.pdf.

Ling, F. (2012). Design-Build: How to Increase Its Usage and Its Impact on Architects and Contractors in Singapore. *Construction Economics and Building*, *6*(1), pp.12–24.

Local Government NSW (2017). The Sustainable Procurement Guide for Local Government in NSW, *NSW Environmental Trust, ESSTAM Project,* Available at: https://www.lgnsw.org.au/files/imce-uploads/127/esstam-sustainable-procurement-guide- (Accessed: 24.07.2019).

Meehan, J. and Bryde, D. (2014). Sustainable Procurement Practice Guidelines. *Business Strategy and the Environment*, *106*(July), pp.94–106.

Mensah, S., and Ameyaw, C. (2012). Sustainable procurement: the challenges of practice in the Ghanaian construction industry. *4th West Africa Built Environment Research (WABER) Conference, 24-26 July 2012*, (July), pp. 871–880.

Milligan, D. (2016). Design-Build Project Management. *Short course material, Texas Department of Transportation*. Available at: www.sttatic.tti.tamu.edu/conferences

Mohammed, A. (2012). Procurement Practices in Ghana: The Challenges faced by Takoradi Polytechnic; *Msc. Thesis, Ghana Telecom University College*. Available online at: www.academia.edu

Morton. (2014). The Construction Industry in Ghana, West Africa "How can the construction industry in Ghana The Construction Industry in Ghana, West Africa.

Mulcahy, R. (2014). PMP Exams Prep; RMC Publications Inc.

Naoum, S. G. and Mustapha, F. H. (1994). Influences of the client, designer and procurement methods on project performance. *CIB Report*, 221–221. Available at: https://www.irbnet.de/daten/iconda/CIB12593.pdf

National Audit Office. (2013). Sustainable procurement in government. (February), pp. 1–42. Available at: http://www.nao.org.uk/wp-content/uploads/2012/11/sustainable

Nikumbh, A.R. and Pimplikar, S.S. (2014). Role, Services of Project Management Consultancy in Construction Projects & the Audit Process. *IOSR Journal of Mechanical and Civil Engineering*. 10(6). pp. 14-19.

OECD (2015) Going Green: Best Practices for Sustainable Procurement. Available at: https://www.oecd.org/gov/ethics/Going_Green_Best_Practices_for_Sustainable_Procurement.pdf.

Owoo, N., and Lambon-Quayefio, M. (2018). The Role of the Construction Sector in Ghana. WIDER Working Paper 2018, forthcoming. Helsinki: UNU-WIDER.

Owusu-Manu, D., Addy, M. N., Agyekum, K., and Aidoo, C. (2017). Exploring the Critical Success Factors of Ghanaian Built Environment Consulting Firms. *International Journal of Construction Project Management*, *9*(2), pp.137–152.

Paintsil, D. (2015). Achieving Sustainable Construction through Procurement in the Ghanaian Construction Industry. *Msc. Thesis, Department of Building Technology, KNUST.* Available online at: www.ir.knust.edu.gh

Peprah, J. A., Brako, S., and Akosah, N. B. (2018). The Awareness Level of Green Procurement at the District Assemblies in Western Region in Ghana. *Journal of Management and Sustainability*, *8*(1), pp.46.

PMI. (2017). A Guide to the Project Management Body of Knowledge (PMBOK GUIDE); PMI Inc.

PMI Ghana Chapter (2019). Chapter Membership. Available online at: https://pmi-ghana.org/(visited 27.08.2019)

PPA-Public procurement Authority (2003). *ACT663_RePrinted.pdf* (pp. 1–93). pp. 1–93.

QuestionPro (2019). Research Design: Definitions, Characteristics and Types, Available at: https://www.questionpro.com/blog/research-design/ (Accessed: 28.08.2019)

Renukappa, S., Akintoye, A., Egbu, C. and Suresh, S. (2016). Sustainable procurement strategies for competitive advantage: An empirical study. *Proceedings of Institution of Civil Engineers: Management, Procurement and Law*, *169*(1), pp.17–25.

Roos, R. (2012). Sustainable Public Procurement: Mainstreaming sustainability criteria in public procurement in developing countries. *Centre for Sustainable Management (CSM) Journal*. Available at: http://www.leuphana.de/csm

Royal Institute of Chartered Surveyors (RICS), (2016). Sustainable Procurement: benefits, *RICS Building Surveying Journal*, Available at: https://www.rics.org/uk/about-rics/responsible-business/un-sustainable-development/ (Accessed: 26.07.2019)

SAFE-ICE (2015). Sustainable Procurement Toolkit: a step-by-step approach to best practice in 'green' purchasing. Available online at: http://www.safe-ice.eu/wp-content

Sarda, A., & Dewalkar, S. (2016). Role of Project Management. *International Journal of Technical Research and Applications, 4*(2), pp.317–320. Available at www.ijtra.com

Sarfo, M. (2007). The Effect of Project Management Practices on Building Project Performance: The Case of Three Organizations. *MSc. Thesis, Department of Building Technology, KNUST.* Available at www.ir.knust.edu.gh

Siddiqi, Z. A., Chaudhry, M. A., & Ashraf, M. (2002). Effects of Construction Activities on Environment. *Challenges of Concrete Construction: Volume 5, Sustainable Concrete Construction*, *5*(3), pp. 23–32.

Smith, J, Georgiou, J, O'Keeffe, N and Love, P (2003) Design management in a design-construct organization. In: Greenwood, D J (Ed.), 19th Annual ARCOM Conference, 3-5 September 2003, University of Brighton. *Association of Researchers in Construction Management, Vol. 1*, pp. 131-40. Available at: www.arcom.ac.uk/-docs/

Shibani, A. and Sukumar, D. (2015). The Role of the Project Manager in Construction Projects in India. *Chinese Business Review*, *14*(6).

Sustainable Procurement Limited (2010). Guide 1 to Sustainable Procurement Identifying Sustainable Procurement Priorities. (June), pp.1–15.

Takim, R., Esa, M. R., & Hamid, S. H. A. (2013). Delivering Best Value for Design and Build (D&B) Projects through Integrated Process Improvements Solution. *Procedia - Social and Behavioral Sciences*, *101*(2006), pp. 62–70.

The World Bank. (2019). Sustainable Procurement: An introduction for practitioners to sustainable procurement in World Bank IPF projects procurement guidance. (April), pp.1–60.

The Swiss-Ghana Sustainable Public Procurement Project (SPP) Available online at: www.spp.ppaghana.org (visited 27.04.2019)

Thom, W. (2009). The ABC's of Project Management for Project Managers, *Projectsmart*. Available at: http://www.projectsmart.com/articles/the-abcs-of-project-management-for-project-managers.php (Accessed: 18.06.2019)

Ujene, A. O., & Oladokun, M. G. (2017). Sustainability Assessment in Construction Organisations' Project Delivery Practice in Nigeria. *Journal of Building Performance*, *8*(1), pp. 12–24. Retrieved from http://spaj.ukm.my/jsb/index.php/jbp/index

Ulaanbaatar. (2017). Sustainable Public Procurement Action Plan. Available at: www.un-page.org/files/2 _national_action_plan_on_spp.pdf

UNEP (2011). Sustainable Procurement: Buying for a Better World: A Guide on Sustainable Procurement for The UN System. (May), pp.1–35.

UNEP. (2012). The Impacts of Sustainable Public Procurement: Eight Illustrative Case Studies. *Online Publication, United Nations Environmental Programme*. Available at www.unep.fr/scp/procurement/docsres/projectinfo/studyonimpactsofspp.pdf

UNGM (2016). Sustainable Procurement Tools, *United Nations Global Marketplace*, Available at: https://www.ungm.org/Shared/KnowledgeCenter/Pages/PT_SUST (Accessed: 10.07.2019)

UNOPS. (2011). Delivering sustainable results. *Online Publication*. Available at: www.content.unops.org/annual-brochure/

Venter, F. (2005). Project management in Ghana: expectations, realities and barriers to use. *The Journal for Transdisciplinary Research in Southern Africa*, *1*(1), pp. 20.

Walker, H., & Brammer, S. (2009). Sustainable procurement in the United Kingdom public sector. *Supply Chain Management*, *14*(2), pp. 128–137.

Walker, H. & Phillips, W. (2009). Sustainable procurement: Emerging issues. *International Journal of Procurement Management*. 2. 10.1504/IJPM.2009.021729.

World Population Review (2019). Ghana Population 2019. Available at: www.worldpopulationreview.com/countries/ghana (Accessed: 27.04.2019)

Yadollahi, M., Mirghasemi, M., Zin, R. M., & Singh, B. (2014). Architect critical challenges as a project manager in construction projects: A case study. *Advances in Civil Engineering*, *2014*.

Zaidi, S. A. H., Mirza, F. M., Hou, F., & Ashraf, R. U. (2018). Addressing the sustainable development through sustainable procurement: What factors resist the implementation of sustainable procurement in Pakistan? *Socio-Economic Planning Sciences*, Elsevier (December), pp. 0–1.

APPENDIX

SURVEY QUESTIONNAIRE

To whom it may concern

Dear Sir/Madam,

Invitation to participate in a research into assessing the role of Project Managers in the promotion of sustainable procurement in design-build projects in Ghana

I write to request your assistance as an experienced practitioner with substantial knowledge in Project management processes to complete the attached questionnaire. Currently, I am undertaking a Master of Science (MSc.) degree in the Department of Building Technology of the Kwame Nkrumah University of Science and Technology under the supervision of Mr. Peter Amoah. This research is entitled **"Assessing the role of Project Managers in the promotion of sustainable procurement in design-build projects in Ghana"**.

This research aims to assess the role Project Managers play in the promotion of sustainable procurement in design-build projects in Ghana. Hence, your expert knowledge and experience will be extremely useful for this research in determining how sustainable procurement can be promoted through the project management processes. ***The definition of the various terminology associated with sustainable procurement can be found in page six (7).***

The questionnaire will take 10 to 15 minutes. All your responses will be treated with strict confidentiality and used only for academic purpose. Your views are valuable for the success of this research. After the research, we are willing to share a summary of the outcomes with practitioners in Ghana and anyone who shows interest. For any enquiries, please contact Odjidja, Tetteh (Tel.: **0242516306**; & email: odjidja.tetteh@gmail.com}.

Sincerely,

Odjidja, Tetteh, MSc. Student
Mr. **Peter Amoah**, Supervisor
Department of Building Technology
Kwame Nkrumah University of Science and Technology, Ghana

Assessing the role of Project Managers in the promotion of sustainable procurement in design-build projects in Ghana

Questionnaire Survey

Important Instructions:

1. Please duly fill this questionnaire with reference to your latest experience about design-build projects and the procurement management process.
2. Please answer the questions by ticking {such as "✓"} or checking {such as "☒"}.
3. Section D of the questionnaire involves writing of appropriate rate (Details in section D)
4. If you wish to have a copy of the report on research findings, please provide your email address: Click or tap here to enter text.

Section A: Background of respondent

Q1. Please indicate your professional background.

Architect ☐; Engineer ☐; Quantity Surveyor ☐; Project Manager ☐ Other ☐

Q2. Please indicate your academic qualifications.

HND ☐; BSc ☐; MSc/Mphil ☐; PhD ☐; Others ☐

Q3. Are you a certified Project Manager?

Yes ☐; No ☐

Q4. Please indicate your years of work experience in project management.

1-5yrs☐; 6-10yrs☐; 11-15yrs☐; 16-20yrs☐; Over 20yrs☐

Q5. How many Design-Build projects have you been involved with?

1-5☐; 6-10☐; 11-15☐; Over 15☐

Q6. Do you have any knowledge of the project management processes involved with managing Design-Build projects?

Yes ☐; No ☐

Q7. Which phases of project management have you been involved with on design-build projects? (*tick all relevant options*)

Initiating☐; Planning ☐; Execution ☐; Monitoring and Controlling ☐; Closing ☐

Section B: Sustainable Procurement

Q8. Are you aware of the concept of sustainable procurement?

Yes☐; No ☐

Q9. If Yes, which of the following best describes sustainable procurement?

☐ It is process through which organisations meet their needs for goods services and works;

☐ Achieving value for money, obtaining economic and social benefits, reducing environmental damage;

☐ Type of procurement that integrates requirements, specifications and criteria that are geared towards sustaining and protecting the environment;

☐ Procurement which maintains maximum transparency, fairness, quality and participation

Q10. How would you rate your level of familiarity with the concept of sustainable procurement?

Poor☐; Fair ☐ Average☐; Very well☐; Extremely well☐

Q11. Have you worked on design-build projects where sustainable procurement was an expected project outcome?

Yes☐; No ☐

Q12. Does your organization have a sustainable procurement policy?

Yes☐; No ☐

Q13. If No to Q13, have you made any effort to encourage Management to consider having one?

Yes☐; No ☐

Section C: Factors for promoting Sustainable Procurement

Q14. Indicate how you **promote** sustainable procurement on your design-build projects at the following stages:

Please rate the significance of each factor on the scale of 1 to 5 where 5 is the highest. **1 = not significant; 2 = Slightly Significant; 3 = Moderately Significant; 4 = Very Significant; 5 = Exceedingly Significant.**

No.	Activities to promote sustainable procurement	Level of Significance
		Low <<<--------- >>>Extreme
A	**Initiating Phase**	
1	Encouraging the inclusion of sustainable procurement strategies in organizational policies	☐1; ☐2; ☐3; ☐4; ☐5
2	Encouraging Senior management support for implementation of sustainable procurement on projects	☐1; ☐2; ☐3; ☐4; ☐5
3	Provide education on the potential benefits	☐1; ☐2; ☐3; ☐4; ☐5
4	Encouraging the promotion of social and environment impact assessment	☐1; ☐2; ☐3; ☐4; ☐5
5	Others:	☐1; ☐2; ☐3; ☐4; ☐5
B	**Planning Phase**	
1	Preparation of procurement strategy which incorporates sustainable considerations	☐1; ☐2; ☐3; ☐4; ☐5
2	Effectively communicating the benefits of sustainable procurement to project team	☐1; ☐2; ☐3; ☐4; ☐5
3	Identification and recommendation of sustainable sources of supply	☐1; ☐2; ☐3; ☐4; ☐5
4	Encouraging the performing of value for money analysis	☐1; ☐2; ☐3; ☐4; ☐5
5	Preparation of procurement strategy which incorporates sustainable considerations	☐1; ☐2; ☐3; ☐4; ☐5
	Others:	☐1; ☐2; ☐3; ☐4; ☐5
C	**Execution Phase**	
1	Inclusion of sustainability in selection criteria for vendors	☐1; ☐2; ☐3; ☐4; ☐5
2	Inclusion of sustainable targets in the project requirements	☐1; ☐2; ☐3; ☐4; ☐5
3	Contract documents for vendors must reflect sustainable targets	☐1; ☐2; ☐3; ☐4; ☐5
4	Others:	☐1; ☐2; ☐3; ☐4; ☐5
D	**Monitoring and Controlling Phase**	

1	Periodic auditing of project outputs to determine if they meet sustainable targets	☐1; ☐2; ☐3; ☐4; ☐5
2	Implementing a measurement system to monitor project outcomes	☐1; ☐2; ☐3; ☐4; ☐5
3	Others:	☐1; ☐2; ☐3; ☐4; ☐5
E	**Closing**	
1	Compilation of lessons learnt to be used for future reference	☐1; ☐2; ☐3; ☐4; ☐5
2	Others	☐1; ☐2; ☐3; ☐4; ☐5

Section D: Challenges to promoting Sustainable Procurement

Q15. Please indicate the **challenges** you face when you try to promote sustainable procurement on design-build projects:

Please rate the frequency of each factor on the scale of 1 to 5 where 5 is the highest. **1 = Very rare; 2 = Rare; 3 = Moderate; 4 = Frequent; 5 = Very frequent.**

No.	Challenges affecting sustainable procurement	Level of Frequency
		Low <<<--------- >>>Extreme
1	Lack of organizational policies on sustainable procurement	☐1; ☐2; ☐3; ☐4; ☐5
2	Lack of support from Senior management on the implementation of sustainable procurement on projects	☐1; ☐2; ☐3; ☐4; ☐5
3	Perception about the higher initial costs	☐1; ☐2; ☐3; ☐4; ☐5
4	Perception about sustainability being more expensive	☐1; ☐2; ☐3; ☐4; ☐5
5	Low technical capacity	☐1; ☐2; ☐3; ☐4; ☐5
6	Low management capacity	☐1; ☐2; ☐3; ☐4; ☐5
7	Lack of guideline materials and practical tools	☐1; ☐2; ☐3; ☐4; ☐5
8	Lack of in-depth knowledge of the concept by project stakeholders	☐1; ☐2; ☐3; ☐4; ☐5
9	Lack of capacity of vendors/sub-contracts to deliver sustainable products	☐1; ☐2; ☐3; ☐4; ☐5
10	Lack of social drive	☐1; ☐2; ☐3; ☐4; ☐5
11	Others:	

Section E: Role of Project manager in promoting Sustainable Procurement (SP)

Q16. Do you think in your capacity as a Project Manager, you are empowered to make significant contributions to promoting SP on the design-build projects?

Yes☐; No ☐

Q17. Do the project management processes make room for the promotion of sustainable procurement when undertaking design-build projects?

Yes☐; No ☐

Q18. Have you ever actively encouraged other project participants to adapt the concept of sustainable procurement?

Yes☐; No ☐

Q19. If Yes, indicate how you actively **promote** sustainable procurement to other project participants:

Please rate the significance of each factor on the scale of 1 to 5 where 5 is the highest. **1 = not significant; 2 = Slightly Significant; 3 = Moderately Significant; 4 = Very Significant; 5 = Exceedingly Significant.**

No.	Factors for promoting sustainable procurement to other project participants	Level of Significance
		Low <<<--------- >>>Extreme
1	Education for Project participants about potential economic, social and environmental benefits	☐1; ☐2; ☐3; ☐4; ☐5
2	Education on life cycle costing of projects	☐1; ☐2; ☐3; ☐4; ☐5
3	Inclusion of sustainable requirements to project's needs assessment	☐1; ☐2; ☐3; ☐4; ☐5
4	Encourage the implementation of organizational policies enforcing the implementation of SP	☐1; ☐2; ☐3; ☐4; ☐5
5	Others:	☐1; ☐2; ☐3; ☐4; ☐5

Q20. If Yes to 7, please rate the **barriers** to you promoting SP to project participants:

Please rate the frequency of each factor on the scale of 1 to 5 where 5 is the highest. **1 = Very rare; 2 = Rare; 3 = Moderate; 4 = Frequent; 5 = Very frequent.**

No.	Barriers to promoting sustainable procurement to other project participants	Level of Frequency Low <<<--------- >>>Extreme
1	Difficulty in quantifying the potential social and environmental benefits	☐1; ☐2; ☐3; ☐4; ☐5
2	Negative perception about its financial viability	☐1; ☐2; ☐3; ☐4; ☐5
3	Lack of understanding of the concept	☐1; ☐2; ☐3; ☐4; ☐5
4	Reluctance to adopt new practices	☐1; ☐2; ☐3; ☐4; ☐5
5	Others:	☐1; ☐2; ☐3; ☐4; ☐5

Q21. How would you rate the outcome of your efforts at promoting sustainable procurement?

Successful☐; Challenged☐; Failed ☐

This is the end of the survey

Thank you for your time

Definitions of Sustainable procurement:

- 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, whilst minimising damage to the environment (CIPS Knowledge Summary December 2008).
- Sustainable procurement is the pursuit of sustainable development objectives through the purchasing and supply process, and involves balancing environmental, social and economic objectives (Walker and Wendy, 2006).
- Procurement is termed sustainable when it integrates necessities, specifications and standards that are well-matched and in favour of the safety of the environment, social improvement and in provision of fiscal growth, specifically through search of

resource effectiveness, enhancing the excellence of goods and services and eventually improving costs (UNGM, 2016).