

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF ART AND BUILT ENVIRONMENT

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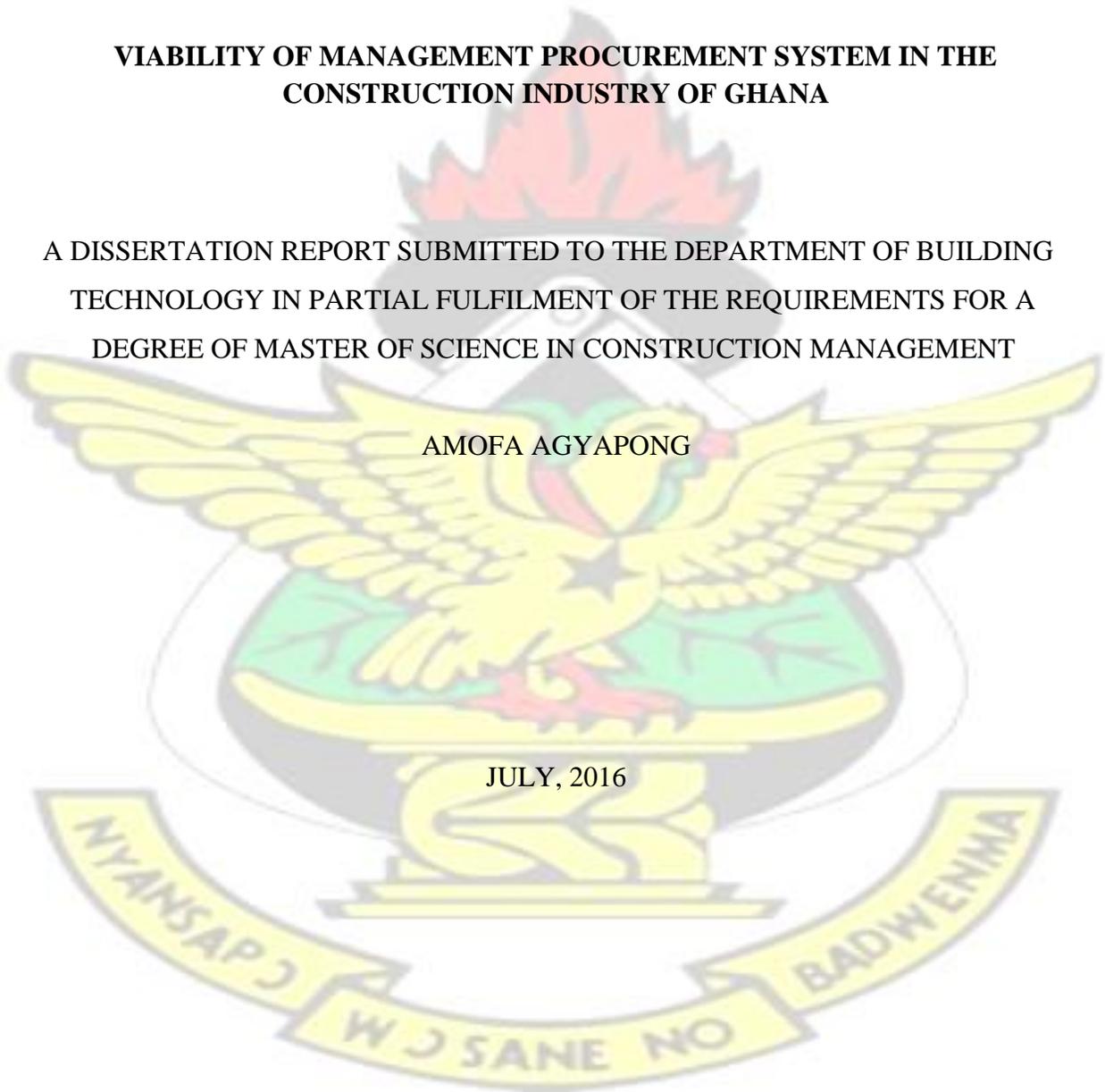
DEPARTMENT OF BUILDING TECHNOLOGY

**VIABILITY OF MANAGEMENT PROCUREMENT SYSTEM IN THE  
CONSTRUCTION INDUSTRY OF GHANA**

A DISSERTATION REPORT SUBMITTED TO THE DEPARTMENT OF BUILDING  
TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR A  
DEGREE OF MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT

AMOFA AGYAPONG

JULY, 2016



## DECLARATION

I hereby declare that this work is the result of my own original research and this thesis has neither in whole nor part been presented for another degree elsewhere. References to other people's work have been duly cited.

**Amofa Agyapong (STUDENT)**

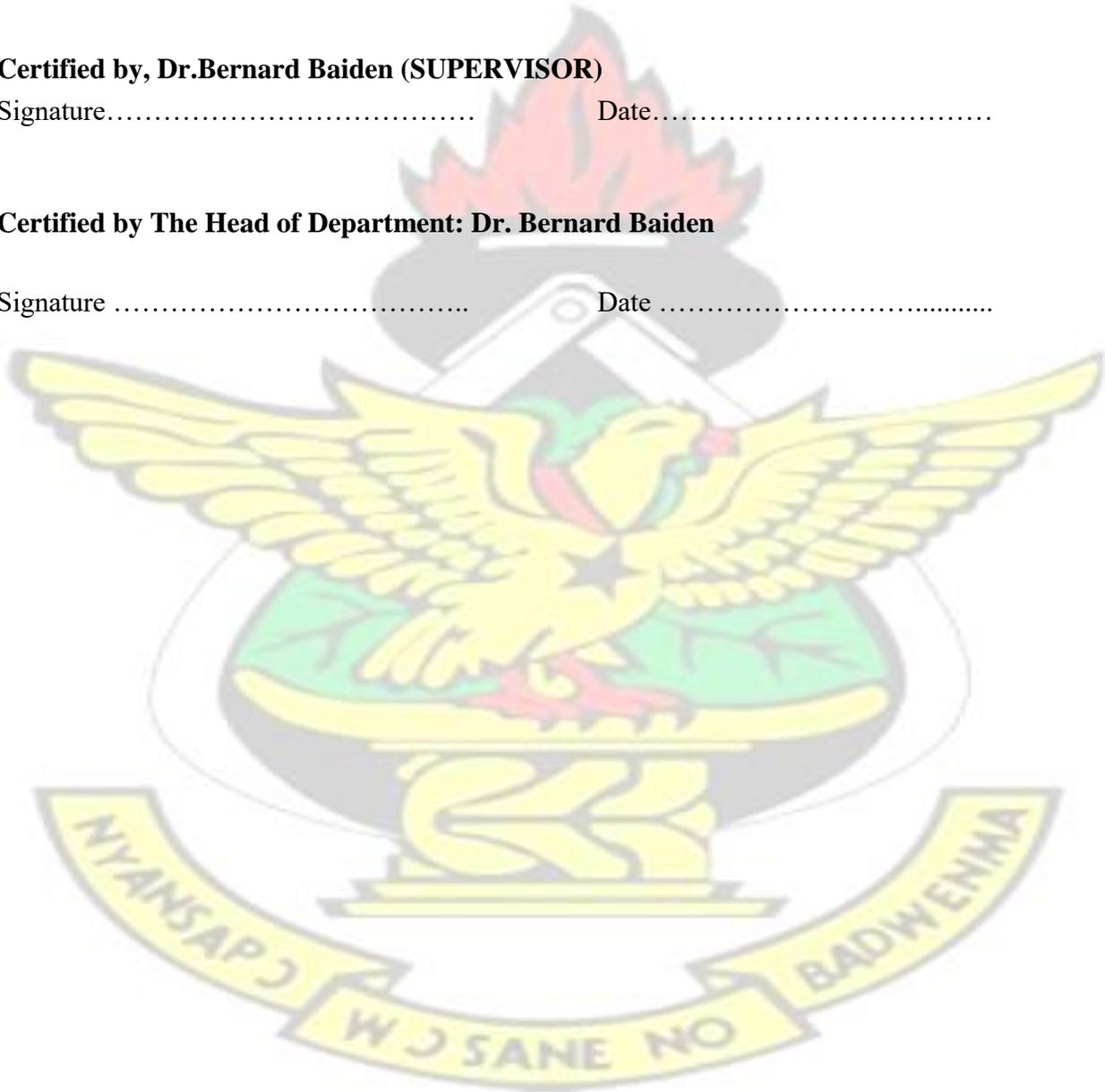
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**Certified by, Dr. Bernard Baiden (SUPERVISOR)**

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**Certified by The Head of Department: Dr. Bernard Baiden**

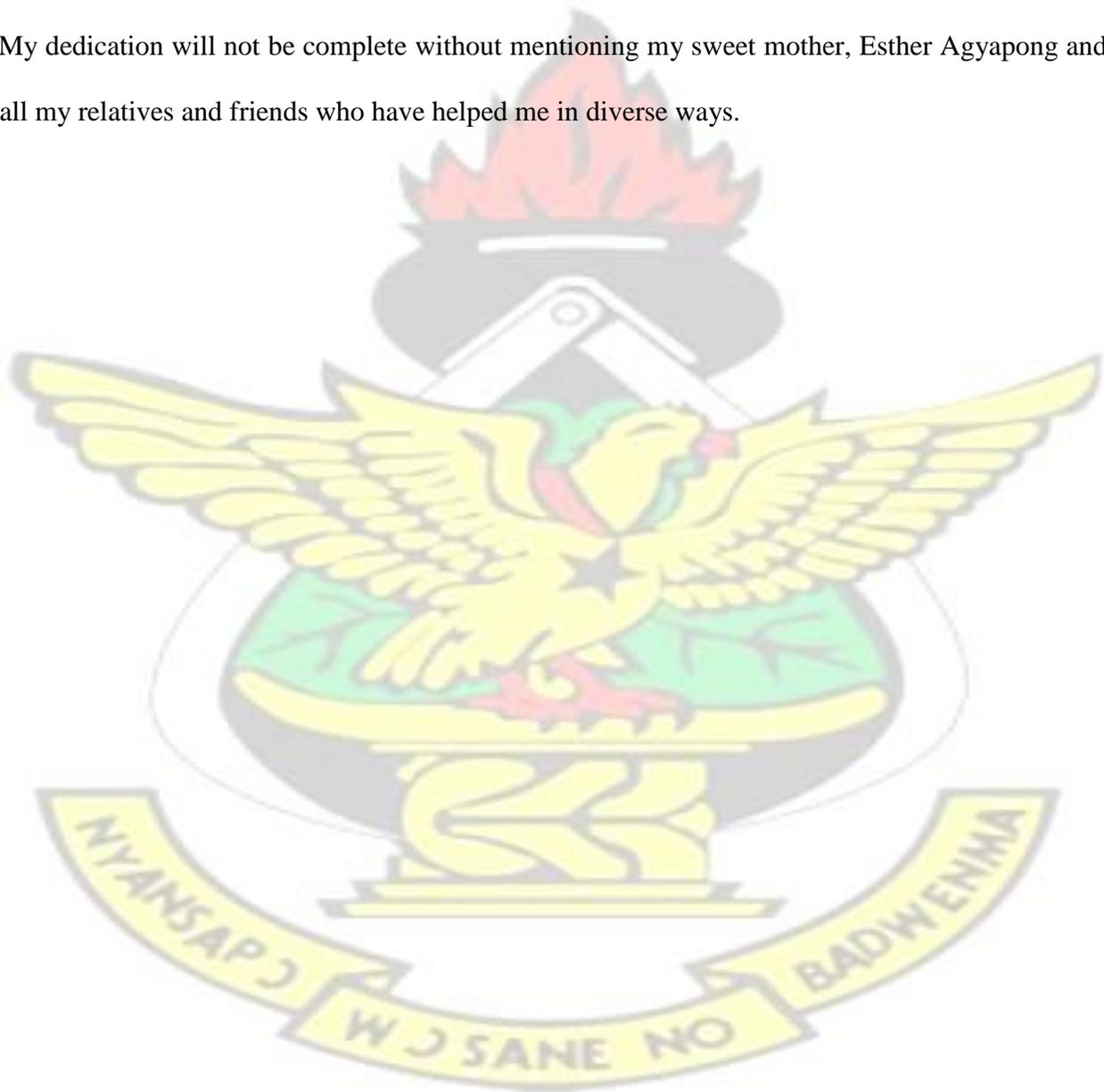
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## DEDICATION

This project is dedicated to my beloved uncle Lawyer Kwaku Kyeremanteng, the CEO of Comet Properties Limited who by the Grace of God has made my First Degree and Post Graduate Diploma in architecture education not only possible, but convenient. It is also dedicated to my wife Mrs. Jennifer Agyapong.

My dedication will not be complete without mentioning my sweet mother, Esther Agyapong and all my relatives and friends who have helped me in diverse ways.



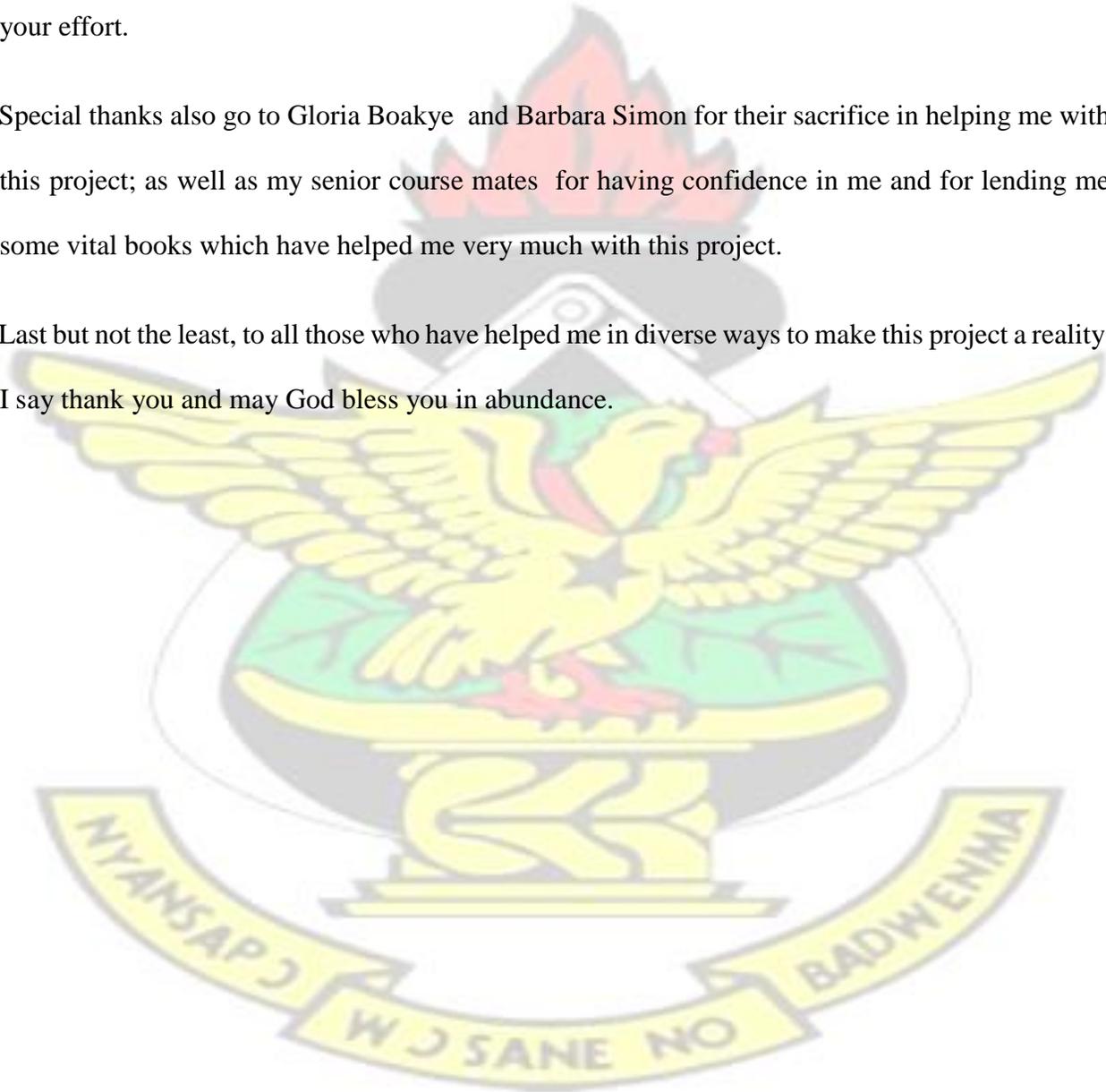
## ACKNOWLEDGEMENTS

Thanks and glory to God Almighty who by His grace has brought me this far; for even in times of faithlessness He remained faithful.

I am very much grateful to my supervisor, Prof. Bernard Baiden who through his patience and compassion has helped me come this far with my project. I say that may God richly bless you for your effort.

Special thanks also go to Gloria Boakye and Barbara Simon for their sacrifice in helping me with this project; as well as my senior course mates for having confidence in me and for lending me some vital books which have helped me very much with this project.

Last but not the least, to all those who have helped me in diverse ways to make this project a reality, I say thank you and may God bless you in abundance.



## ABSTRACT

Management procurement system designed to solve construction procurement of complex and time bound project is virtually unknown in Ghanaian construction industry. The purpose of this research is to educate and bring into the attention of consultants and clients the need to employ management procurement method. The mixed methodology design employs non-probability sampling technique to survey 103 construction professionals in the Greater Accra Region in an attempt to investigate the viability of management procurement system in the construction industry. The study revealed that the construction firms in the region predominantly depend on the traditional procurement system. The major factors influencing the construction firms dependency on this system of procurement were found to include minimization of construction time, project completion at estimated cost, quality assurance minimization of design time, consultancy service offered, availability of information at project inception, and technical complexity of construction in that order of their rank. The study also revealed several effects of management procurement system on the success of building project including reduction in project cost, reduction in conflict of interest, risk reduction, design flexibility, quicker delivery, and the achievement of full control of the construction process. However, the study revealed several challenges to the practice of the management procurement system including increased level of risk for the client, lack of a firm price when construction commences, more administration for client, need for meticulous and comprehensive administration, construction project manager must be an expert and control process well and others. Based on these findings, the study recommended the need for appropriate procurement management system adoption, advice clients on available procurement systems; need to employ a qualified and experienced in procurement manager, and training of project team on procurement management systems.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Ghana as a developing nation and one of the fastest developing nations in the world, (World Bank, 2012) has been witnessing a boom in the construction industry over the last 15 years. If one walks through every corner of Accra, the capital city especially, one sees quite a number of high-rise office complexes, shopping malls condominiums and many other complex buildings being constructed by corporate clients, public and private clients.

Every construction project is unique and for each, there is an optimum project delivery method. The effectiveness and the efficiency of the systems have considerable impact on the project success or failure. The variants of procurement methods available today metamorphosed from the need to improved construction project delivery that is project completion within budget and time.

According to Frank (1984) as cited by Holtzhausen (1998), there is no single procurement system that can be applied universally on all construction projects. In view of that several alternative delivery methods have been developed to address the potential weakness of the traditional designbid-build scenario which has been practiced over a century and a half ago Joint Contract Tribunal (JCT) .This has been supported by Skitmore and Marsden, (1988), and love et al (1997) who say that not all forms of procurement method however, are appropriate for a particular project type, as client objectives and priorities invariably differ.

The amazing phenomena in Ghana is that, most of these upcoming construction processes undergo the traditional system of procurement whether the project is time bound, high risk, complex ,cost

bound or quality bound project etc. In some few instances design and build system is employed but its contribution to the construction procurement system in Ghana is very minimal and insignificant. Latham (1994) states that after the client is satisfied with the brief and feasibility of the project, a typical client instinctive is to get into the 'ring' up of an architect or engineer syndrome'. He continues to argue that the immediate call of architect or engineer closes up other procurement systems to the client. The traditional system of procurement which has been in existence over the last 150 years (JCT) and continues to be the leading and preferred procurement system worldwide (Emap Glenigan 1984) which Ghana is not an exception is not being condemned by this research as some other researchers sought to do (Rowlinson 1987) but to bring into the attention and educate both clients and consultants on the importance of other forms of procurement which management procurement system is not an exception.

Anvuur and Kumaraswamy (2007) stated that increased complexity, uncertainty, and time pressure in construction projects have increased the need for cooperation among different project actors. These have resulted into the development of alternative procurement systems such management procurement to increase collaboration in achieving project success.

Even though management procurement has been designed to deal with complex and technologically advanced and time bound construction building projects (JCT), construction industry in Ghana have not been utilizing it but continue to stick to the traditional system and in few occasions design and build system. Management procurement (JCT) is a method where construction work is completed using a series of separate works or trade contracts which the main contractor is responsible for managing. The contractor does not actually do the physical work, but is paid a sum for managing the project through the various works packages. Management

procurement is divided into management contract and construction management. With management contracts, the employer appoints a professional team and a management contractor who is responsible for managing the works. With construction management contracts, the employer will appoint a professional team with either an in-house manager, or enters an agreement with a construction manager to oversee the work. In the contractual arrangement, the management contractor has contract with both the client and the trade contractors but the construction manager has contract with only the client.

Several different classifications of procurement routes or delivery methods have been proposed by different researchers and authors from several different perspectives. Categorizations have been created by considering the process through which the work is carried out, the contracting party that carries out the project, the bearer of risks and responsibilities, the form of relationships between the parties, the compensation method employed and the management process adopted.

In order not to be confused about the different categorization of the procurement routes by various researchers and authors which some are mere proliferation and synonymous to each other, JCT (2005) categorization of procurement systems has been adopted as working categorization.

According to Joint Contract Tribunal (JCT), construction procurement has been categorized into Traditional/Conventional and Non-Traditional - Design and Build, Integrated and Management

## **1.2 Problem Statement**

Strategies for the procurement of building projects have not changed significantly in the last 25 years, though time and cost overrun and poor quality of work are still prevalent throughout the industry (Smith and love, 2001) which Ghana cannot be exempted. This can be attributed to little

knowledge about appropriate construction procurement systems for specific projects. High-rise buildings of multi-storey office complexes and shopping malls and many other complex and technologically advanced building structures were not known some few years ago back in Ghana but as one walks through the streets of Accra today, the national capital, one witnesses some of these complex edifices changing the skylines of the city.

The management procurement system which has been designed to solve construction procurement of complex and time bound project is virtually unknown in the Ghanaian construction industry. The purpose of this research is to educate and bring into the attention of consultants and clients the need to employ management procurement method for complex, specialized and time bound project to achieve project success in Ghana and

### **1.3 Aim of the study**

The aim of this research is to investigate the viability of management procurement system in the construction industry in Ghana.

### **1.4 Objectives of the study**

The objective of the research is

1. To identify the extent to which management procurement is practised in Ghana.
2. To identify the effects of management procurement system on building project success.
3. To examine the factors that influences the choice of management procurement system for building construction.

### **1.5 Research Questions**

- 1) What is the extent to which management procurement is practiced in Ghana?
- 2) What is the effect of management procurement system on building project success?
- 3) What factors influence the choice of management procurement system for building construction?

### **1.6 Significance of the Study**

The complexity of demands, civil and individual engineering projects resulting from technological advancement have over the years, resulted in specialization within the construction industry. This has made it imperative for client with the assistance of their consultants to select appropriate procurement strategy to meet the objectives of the client. The significant of this study is to improve upon the quality of construction in Ghana as well as reducing cost and time overruns through management procurement system of construction

### **1.7 Scope of the study**

This research will focus in Accra, the capital city of Ghana which has become the hub of construction for last 15years. Due to time and financial constraints a nationwide survey would not be conducted. The scope of the project is limited to public, corporate and private clients, consultants and contractors in Ghana. They have been selected because they are the major stakeholders in the construction industry. Clients have been selected because they bear the consequences of the procurement strategy they choose. Consultants provide professional advice to client on appropriate procurement route to meet their objectives. Constructors were chosen because they implement what has been design and specified by the Architect.

### **1.8 Research Methodology**

This concerns data collection procedures and the source of data for this research. Achieving the objective of this research requires conforming to logical and scientific processes and empirical investigations from the viewpoint of clients, consultants and contractors. Mixed methodology involving qualitative and quantitative approach was adopted to elicit the relevant information from stakeholders. To achieve high reliability of data the interview was mostly conducted in the focused group where subjective was minimized. The research style was survey and the approach was based on collection and analysis of publish and unpublished literature, field visit and interviews. The literature sources was gathered from primary sources like reports, minutes and thesis, secondary sources like books, journals internet and newspapers and tertiary sources like abstracts and dictionaries. An extensive literature review was conducted to provide thorough understanding of management procurement for building construction.

### **1.9 Organization of the Study**

The thesis is divided into five (5) independent but interrelated chapters. Chapter one deals with the general introduction to the research. It also presents the problem statement, the aim and the objectives, the significant of the study, research methodology, the scope, research limitations research questions and hypothesis. . The research aim, objectives, and scope are presented, the research questions are formulated. Chapter Two broadly contains the literature review. The review was given an extended coverage of earlier works. The challenge of the review was the establishment of the conceptual underpinnings regarding project management competencies. Chapter Three is dedicated to provide in-depth discussions on the methodology adopted for the study.

Chapter Four presents the empirical analysis of data from the field survey that answered all the research objectives and questions. Chapter Five wraps up the research by reviewing the main contributions of the research to knowledge. A provision is made for summary of the research results. Avenues for further research are identified. Policy recommendations and limitations of the study are also outlined. Finally, a personal reflection on the entire dissertation project concludes the report.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter first discusses the concept of procurement and public procurement systems in Ghana, and procurement management. The chapter further reviews the procurement system employed in different parts of the world; discussing in detail the traditional procurement systems, and

nontraditional procurement management systems. Literatures on building procurement systems, the process of the various procurement systems, and the consequence of the varying procurement systems on project performance, and the requirement for operative procurement management system.

## **2.2 Procurement Concept**

The process of purchasing goods, services and goods, casing couple of purchases from stakeholders is referred to as procurement. It includes choices appraisal and the vigorous “make or buy” choice that could end up in the delivery of services and goods in suitable conditions (PPB, 2007). In another instance, procurement in the public sector is described as the purchase of services, goods and works through the most minimal cost of proprietorship, in the appropriate quality and quantity, at the appropriate defined time, in the appropriate place for the uninterrupted value or use of government institutions, companies, or individuals persons, commonly through a contract (Ghana Integrity Initiative, 2009). It is also referred as the acquisition of public properties, and public works by governmental and public organizations. It has couple of important influences on the economy and an uninterrupted effect on the day-to-day activities of people as it is a mode via which public principles are introduced (GII, 2009). This description of procurement is in the scope of that given by Lyson (1996). Lyson (1996) asserts that procurement is described as that purpose accountable for acquiring through purchases, lease or other legal modes, materials, items, services and other supplies required by an undertaking for use in satisfying companies or individual s wants. The description of the general acquisition role is “to acquire goods, services and materials at the preferred or maximum value, in the appropriate or required quantity from the appropriate producer and distributed to the appropriate destination at a well-defined time at the appropriate value, toward the realization of corporate objectives.

Furthermore, the Public Procurement Act, 2003 (Act 663), describes public purchases as ‘the purchase of services and good at the appropriate total cost of proprietorship, in the appropriate defined value and volume, at a given spell frame, at appropriate place for the uninterrupted value or use of government institutions, companies, or else individual persons, normally through signed agreements (PPA Module, 2007). From differing angle, Public Procurement is defined as the procedures through which a company buys properties, works and service area by communal funds. This involves thorough procedures that start via appropriate procurement arrangement, budget apportionment, tenders request, tenders appraisal, offering of contract, management of contract, performance assessment, intensive care, examining and reportage. The process of acquiring the appropriate volume of material at the appropriate spell, in the right amount, from the appropriate place, at the value deemed appropriate culminates in Public Procurement. The key objectives of public procurement comprise: supplying the company with a steady stream of goods, services and resources to suffice its needs, to purchase competently and astutely, gaining by ethical methods the best profit per money spent, to effectively manage inventory in order render the utmost potential services to operators at the minimal cost and salvage the public institutions cost structure (Baily et al., 1994).

Public procurement is further defined as principally negotiated lawful procedure that are coxswained via political pronouncements and virtually used by numerous home buyers. It essential to emphasize that public procurement encompasses both social and economic advantages; however the social advantages of public purchases remain virtually considered as secondary progressive effect from pecuniary savings and ecological enhancements (Björn Wickenberg, 2004). Public

purchases are potential avenues for adapting informally and parsimoniously sustainable advantage to ignite work engagement policies.

Waara (2007) assert that governmental purchases encompass purchases done thru some public institutions inside the traditional segment, otherwise inside the services segment. The government purchases rubrics valid toward buying properties also relies on as to the summed worth of purchase is lower or higher than the defined so-defined “threshold worth”, that vary with respect to service, good and company work. Public institutions that purchase higher than defined ‘threshold worth’ use the procurement guidelines and should be publicized in the Official Journal for public bidders. Available currently are numerous differing public procurement processes out of which selection is made, on condition that it is an acquisition higher or lower than the defined ‘threshold worth’. Numerous trivial acquisitions are constraint to the so-defined “undeviating purchases”, that requires no public announcement. Nonetheless, considering the ideologies of competition in the market, undeviating purchases is required to assume position recurrently, and procurement must not be separated in lesser parts so as to circumvent surpassing the threshold worth.

### **2.2.1 Nature of Public Procurement Systems in Ghana**

The Ghana National Procurement Agency (GNPA) and Ghana supply Company Limited (GSCL) remained the key mediators that conducted government purchases because of the absence of complete procurement schedule, preceding the passing of the Public Procurement Act, 2003 (Act 663) (Anvuur & Kumaraswamy, 2006). The numerous agencies rarely adjust purchases however buy properties for of government institutions.

The Public Procurement System in Ghana according to PUFMARP (1996) has: (1) absence of complete public purchases principles; (2) absence of pivotal entity with technical knowledge to manage effective procurement exercises; (3) absence of complete lawful frame to protect public purchases; (4) no visibly described functions, tasks and ability for procurement institutions; (5) absence of procedures and guidelines to direct, train and carefully watch public purchases; (6) National Procurement Agency (NPA) and Supply Company Ltd acquire goods in the place of government for PEs; (7) absence of sovereign pleas procedure to manage grievances from distressed bidders; (8) absence of expert to position public properties; and (9) absence of selfgoverning purchases reviewing and checking function.

Considering the absence of inclusive lawful authority and a vital agency, there is the need to define the role to complement procurement procedures in the nation, the greater the segment ministries such as the Ministry of Health (MOH) agreed to put in place their own sectorial procurement method. The World Bank Procurement Directive is also employed for World Bank schemes (World Bank, 1997). For public works, the traditional procurement methods were employed with necessities for obligatory cataloguing and sorting of sellers and consultants managed by the Ministry of Water Resources, Works and Housing. Suppliers classified by the Ministry of Water Resources, Works and Housing are said to be too broad and outmoded and their registering standard - contractors catalogs and monetary allowed value - are not frequently streamlined as showed by the World Bank (1996) and Eyiah and Cook, (2003). Meanwhile 1999, the Ministry of Finance is progressively managing the growth of the national Procurement Code employing accomplishments in purchases at the Ministry of Health as an illustration to highly control purchases via the provision of circulars. These accompaniments define processes which progresses from agreements which are associated with purchases control by the Ministry.

Foremost or multifaceted contracts which are funded via the government via architectural consultancy services and project supervision were allotted to the Architectural and Engineering Services Limited (AESL) on single grounds deprived of recourse to reasonable rivalry (World Bank 1996). The numerous clumsy and unfettered methods of purchases constitute the significances of deprived procurement condition resulting to the much-admired restructuring of public purchasing practices to impart faith and sureness in the government and the benefactor society.

### **2.3 Procurement Management Overview**

Business plan structured to achieve higher sales, from the appropriate suppliers, to ensure suitable quality of the premise, at the appropriate time, appropriate price, purchase the appropriate volume of goods taken by management activities is often referred as Procurement management (Chitkara, 2005). Procurement management system needs the appropriate vendors, the appropriate quality, the appropriate defined time, and a well-defined price, and the appropriate volume of goods (Lam, et al., 2003).

Procurement management requires the study of the procedures involved acquiring goods, complete pre-planning, application and post things in control, to attain the upkeep of normal activities of business, with the sole aim of minimizing marketing and production costs (Lam, et al., 2003). In procurement management, procurement planning requires defining corporate goals, designing appropriate plans, putting in place appropriate systems and organization, establishing department of responsibilities and authority, appropriate employee selection, designing appropriate procedures and forms, and given the required supervision and evaluation function. Classified according to

different methods, procurement management can be alienated into the several categories including:

- (1) Harmony with the procurement of the key different classifications: government procurement, public procurement, corporate procurement units, military purchases, and the purchases of other meaningful social groups;
- (2) purchasing by Scientific level: traditional procurement, scientific procurement (supply chain, IIT purchasing, point of purchase orders, MRP procurement, procurement, bidding and purchasing, e-procurement);
- (3) Divided is in regard to the defined scope of procurement: whether local procurement and foreign procurement;
- (4) categorization of Procurement by authority: decentralized purchasing, and centralized purchasing;
- (5) classification by Morphology which regards procurement of materials including buying goods that are tangible (raw materials, auxiliary materials, energy, components semi-finished products and finished products), goods that are intangible procurements such as technology, services and engineering procurement.

## **2.4 Procurement Systems**

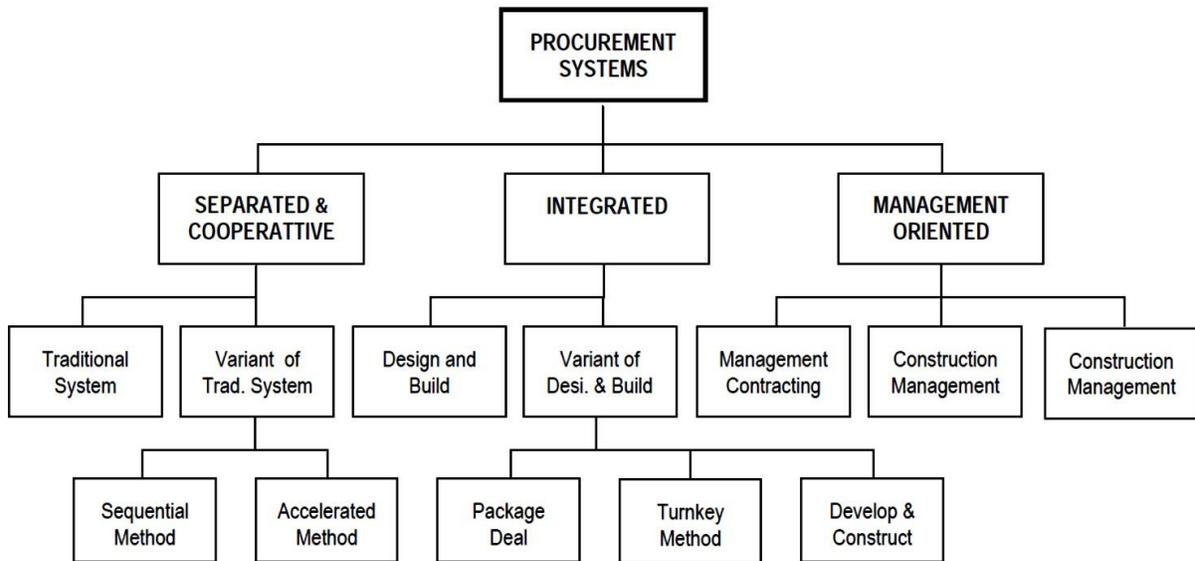
Procurement system is a modern term, known to volumes of researchers and practitioners of the construction industry through different terms including; procurement methods, project approach, project delivery systems or procurement delivery methods and numerous other (Rameezdeen and Ratnasabapathy, 2002, 2006). Procurement system or procurement methods have been described from differing angles and aspects. To begin with, it is a form of structure of organizational system employed thru the customer for the application and in certain period ultimate process of a construction work (Masterman, 2002). This is also referred as primary mode that clients put in place to ensure appropriate prior-climate for the successful attainment of precise purposes of defined projects (Rameezdeen and Ratnasabapathy, 2002, 2006). Procurement method “is an

institutional method that defines appropriate tasks and authorities to individuals and corporation, and plans numerous rudiments in the completion of a venture” (Love et al. 1998:p.222).

Ogunsanmi and Bamisile (1997); and Ashwort and Hogg (2007) referred to procurement systems as the administration of the aggregated procedures channeled via the project construction carriage system. Ashwort and Hogg (2007) further assert that different alternatives of procurement are accessible for sufficing the needs of different clients’ and details of projects. However, researchers, predominantly vary in these groups of purchasing systems. Birchall and Ramus (1996) showed that categorization normally used, in organisational practice, often involves combining the features of two or more methods or systems. Nevertheless, several studies (Seeley, 1997; Turner, 1997; Ashwort and Hogg, 2007) among others that predominantly categorized construction procuring system in dual key comprehensive dimensions: conventional procurement system, and nontraditional procurement systems. The conventional procurement systems by term requires, involves three successive stages of design, tender and build are identified as distinct roles. The traditional method is so named because it predominantly involves competitive bidding contract process. The traditional procurement system permits number of contractors who feel competent to present tenders for construction ventures in a permitted environment comparable to the normal environment of the rivalry market.

Masterman (1992) referred to past research works by describing ‘the fusion of activities taken on by a client to acquire a building’ as a ‘building procurement method. Masterman (1992) indorses that the construction industry should employ the term procurement system to define: ‘The structure of the organization employed by the customer for the administration of the construction project’.

The building procurement methods in the categories of the definition of Masterman (1992) are: (1) Separated and co-operative method (traditional system and variants); (2) Integrated method (Design and Build and variants system); and (3) Management orientated method. The different category and sub-classification of construction project procurement methods can be illustrated in Figure 2.1.



**Figure 2.1: Building Procurement methods category**

**Source: Mastermann (1996)**

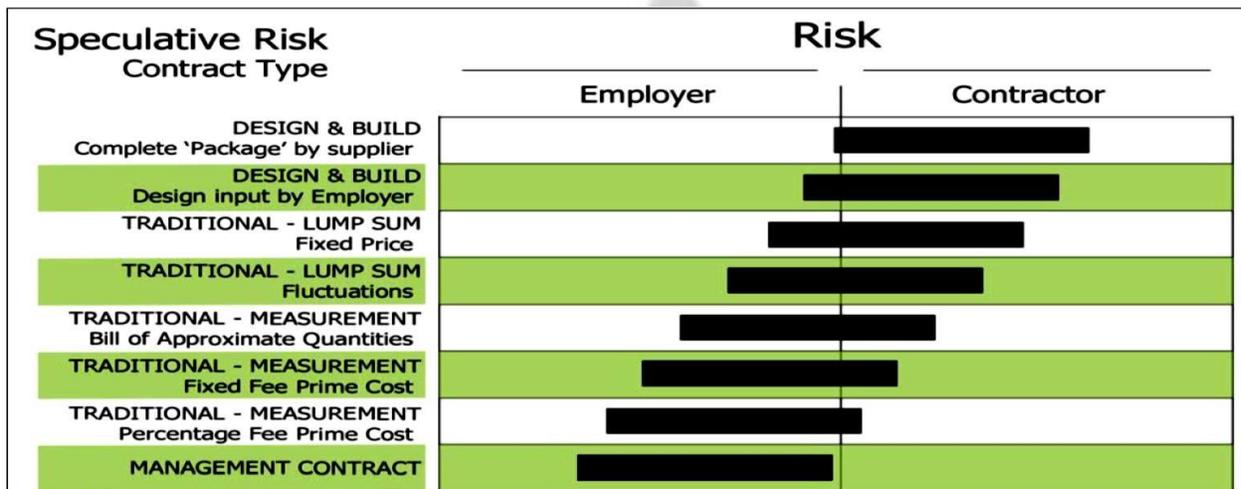
Under the separated and co-operative, the role of construction and designing of projects are detached and are established by diverse sovereign organizations specifically the contractors and designers. This method is in some occasion referred to as linear or sequential contracting methods

or manifold responsibilities approach of contracting. With this method, the project development events begin from viability assessment, initial design, certification, and so are carried out uninterruptedly. Conventionally, the comprehensive building construction working drawings needs to be readied by the designers before tender and building construction events can initiate. The separated and co-operative procurement system is categorized into two divisions including the conventional method and alternatives of the conventional Methods. The Variant or alternative methods is additionally categorized into (i) Accelerated Method, and (ii) Sequential Method.

With the sequential system, also defined as a single phase bidding method, the building construction owners often assign team of advisers to perform on their account to produce building sketches, requirement and bidder certificate and to govern the offering procedures to sample a contractor. After the sampled contractor is awarded the contract, the contractor initiates work on the basis of the sketches and requirement readied via customer's consultants. The accelerated technique involves a groundbreaking approach to expedite the sampling of contractors and the initiation of the building construction. The technique can be sub-categorized into two sub-divisions including two-stage and the negotiated tendering techniques. The two systems primarily comprise initial dialogue with sampled contractors, tendering of fixed tender and/or cost negotiation.

Sub-categorization of these techniques has tended to flourish in a reaction to the demands of the market. Holt et al. (2000) showed that there are multiples of variables to each of the normally employed procurement techniques, nonetheless the normally employed nomenclature; there is large variance of procurement techniques accessible. For instance, procurement rules identify more than eight alternatives of the design and constructs techniques (NSW Government, 2005). Nevertheless, there are variances of normally employed procurement techniques and contract

systems. The choice as to the kind of procurement technique to employ would be rendered likely and reinforced thru the customers' enterprise situation for building initiatives. The dangers related to every purchasing method and the possible means of influencing the customer must be given due consideration. Considering this, Figure One gives a summary of 'speculative risk' to a customer and contractor for detailed purchasing techniques.



**Figure 2.2: Risk Distribution between Client and Contractor**

**Source: CRC for Construction Innovation (2004)**

From Figure 2.2, design and construct types of procurement reveals that the contractor overwhelmingly shoulders the dangers of construction and design of the building project (CRC, 2004). Building design and construct disparities occur in situations where the defined stage of the danger associated with the construction design can be distributed equally, for instance, novation. The traditional lump sum contracts are often intended to preface impartial and balance of risk between parties involved in the contract. The balance and fairness in the distribution of risk can be attuned as demanded, but the higher the danger shouldered by the contractor, the greater the tendering value. Considering the administration procedures of public purchases, the steadiness and fairness of the distribution of dangers associated with procurement is most burdensome for the

customer since contractor is rendering solely ‘administration services’ to the construction building initiative (CRC, 2004). Nonetheless, considering the design and manage techniques a high level of risk is often put on the contractor for design amalgamation.

#### **2.4.1 Traditional Procurement**

The traditional procurement system or technique is so referred since it has been in life for a long time and has often been the viable or feasible choice accessible to most clients of the construction industry for many years (Al-Bahar and Crandall, 1990), especially the construction industries in the developing world. By this technique, the customers go into a settlement with the design consultant to certainly diffuse the sketch document and make the agreement papers.

In the traditional procurement technique, the company admits that design work commonly detach from the building construction, and consultants are selected for building sketch work and cost minimization, and the contractor is accountable to performing the works (Chitkara, 2005). This requirement encompasses every employee and other resources, and constitutes every construction work thru sub-contractors and providers of materials. The contractor is normally chosen via competitive tendering on comprehensive data, nevertheless may if obligated be sampled previously by negotiation on the basis of fractional or theoretical data (Kwakyee, 1997). The conventional procurement system, adopting two-phase bidding, is in some circumstance defined as the ‘Accelerated Traditional Approach’. The definition of the conventional approach as accelerated conventional approach is based on the techniques ability of to run both design and construction in analogous to a limited degree. At the same time as this permits timely beginning of project, it also encompasses limited conviction on incurred cost. CRC (2004) suggest that there are 3 modes of

contract, considering the conventional purchasing system. The 3 modes of the conventional purchasing systems include the lump sum contract, measurement contracts and cost reimbursement.

#### **2.4.2 Non-Conventional Procurement Methods**

Non-conventional is a broad word employed to discuss every evolving purchasing techniques of the building industry apart from the conventional purchasing technique. For the past considerable periods, the building business has suffered alterations in a way not ever witnessed. The amplified scope and intricacy of the building schemes, economic encounters, social and political thoughtfulness, and the level of information technique are fairly a number of the alterations which are occurring. These consistent alterations have resulted in emergence of different forms of purchasing techniques apart from the predominantly adopted conventional system. Even though the emergence of the non-conventional procurement technique appeared relatively better method, greater number of clients of the building business relies on the traditional methods, though there are no specific appropriate procurement systems for defining the quality of procurement systems. Masterman (2002) describes the non-conventional purchasing technique by way of differentiated modern-day purchasing technique(s) that reflect not solely design and construction, nonetheless also deliberates on the economic, working as well as the of the competence management. Therefore, the 3 differing forms of non-conventional purchases techniques employed in the building construction industry are integrated purchasing method, administration-directed purchasing method, and cooperative purchasing method.

##### **2.4.2.1 Separated and Co-Operative Procurement Systems**

Masterman (1992) refers to the struggle in acquiring precise reasonable historical information on the volume of use of variance of procurement techniques. This form of data is currently extensively accessible from market research firms such as Glenigan and Market and Business Development although at a sizeable cost. The challenges that emerged during the construction phase and that are accredited to the traditional technique of procurement are scrutinized by numerous authors. Sharif and Morledge (1997) in their examination of the procurement process in congruence to small and occasional customers identified the concept of 'procurement catch'. The concept of procurement catch theory asserts that the architect accessed by the customer should influence them to employ this technique since the higher volume of design work result in greater payment for the architect's consultancy. Conlin et al. (1996) examines the relationship between construction procurement strategies and construction contract disputes. In examining twenty one completed projects, covering five common procurement options they found that conflicts relating to payment and budgets, delay and time, negligence and performance are more prevalent on traditional projects.

Nahapiet and Nahapiet (1985) discussed building contracts from a cooperative viewpoint in consideration with 10 construction schemes in the United States and United Kingdom. Nahapiet and Nahapiet (1985) further stressed the relationship amid the agreement - (Lump sum and Negotiated) conventional method (construction administration, management contract, Design and Build) and the combined-cooperative associations that occur. Nahapiet and Nahapiet (1985) also revealed: 'Though frequently viewed by way of being mainly about describing the role of the construction contractor, in the field formal agreement have a undeviating and important inference for all the stakeholders that are part of the construction scheme completion. Furthermore, formal agreements are considered as representing varying cooperative arrangements for describing and coordinating the influence of the numerous agents that are part of the building project scheme.

#### **2.4.2.2 Integrated Procurement Systems**

The integrated procurement technique, as the name infers, merges the tasks of design and construction of the scheme (Ashworth, 2001). The design and construction tasks are deployed to only one Construction Company. In other instances, it is referred as single task procurement method since it requires the client to work with only one company for designing and constructing the projected construction scheme. With regard to this, the contractor needs to involve and be accountable to construction vis-à-vis designing group. The design and build methods are categorized into this purchasing technique. Considering this procurement method, the customer in conjunction with his/her employed consultants make bidding document that encompasses the brief of the construction project and customers' demands, and call on numerous contractors to tender. Considering the submission of bidding documents, the called-on contractors make their own design, building and cost schemes. In most frequency than not, contractors are contracted via lump sum price and a fixed duration (Ashworth, 2001; Edmond, 2003).

The modernism of this method of construction scheme technique encompasses: (1) Package deal; (2) Turnkey; and (3) Develop and construct. These techniques require the contractor to be accountable for the construction project and the design, permits beginning of construction via the decreasing of the pre-bidding activities and so decrease the development period. The Package deal is a form of purchasing technique that requires that a contractor is afforded the task for all that is essential and essential for the design, construction and carriage of the construction project. Considering package deal, the works of the contractor comprise the groundwork of project brief, sketching and finalizing working drawings, receiving every endorsement thru the appropriate

powers, project bankrolling, construction, furnishing and authorizing of every equipment and materials and delivering the construction work to the customer.

On the other hand, the American word, Turnkey contract that also means package deal requires commissioned contractor to take the task for all essential and requirements for the development of the project, finishing, authorizing and hand over the project. The term “turnkey” implies that, after conclusion, the customer is rendered the main and so can go into the construction scheme by “turning the key”. The contractor is required to perform all including getting ready the project brief, receiving endorsement, scheming, bankrolling, construction, furnishing and beautifying to authorizing and handing over finished, gutted and set for use construction work (Allen, 2001).

Another form of integrated procurement technique, develop and construct is comparable to design and build (Rowlinson, 1987). With regards to this, the contractor further is tasked to design and construct the construction scheme. The variance is that, considering this technique the customer’s design consultants contracted prepares the drawings of the concept and send them to the contractor to improve them and create thorough sketches. The contractor onward constructs and finishes the construction scheme grounded on what it has established and created. A report published by the CSSC (1996) focuses its attention on the Design and Build (D&B) procurement route. The report suggested that D&B presently surpasses the success of traditional procurement methods considering the rate of the project construction (by 12%), project performance quickness (by 30%) and cost (by 13%). Furthermore construction works procured using [D&B] is 50% highly sure to be finished on the defined period and more likely to be finished on budget of 5%. Best performance, where client’s quality expectations were met on 72% of all projects, was found where

contractor's in-house designers are employed to undertake design from the earlier stage. Clear benefits to the client arise from close communication between designers and construction personnel, where practical knowledge about construction issues can have the greatest influence. Performance dropped when the contractor employed external consultants to finalize design. The extent to which D&B procurement methods allow for increased management synergy of a construction project compared with traditional procurement has been examined by Dulaimi and Dalziel (1994). Their study revealed that D&B is seen to be providing the missing integration of the design and execution of the construction project. The results also suggested that there was an increased level of synergy in the D&B environment for procurement. Communication was seen to be more informal and greater satisfaction was reported.

#### **2.4.2.3 Management Oriented Procurement Systems**

The management oriented procurement technique provides greater weight on the administration and combination of design and building of construction schemes. Considering this technique, the administration of the drawings and the construction the project is formally given to a contractor who plays the role of administrative consultant on the account of the customer. The construction is granted to numerous "experts" who come into agreement with the administrative contractor or the customer. This purchasing technique was promulgated on grounds that a builder has enormous experience and knowledge to administer the design and construction of a building scheme. Being an administrative consultant, the chosen builder does not perform the design of the construction scheme. The key role of the builder is to administer the design and construction via the design consultants and the numerous expert contractors.

The key merits of employing an administrative mode to purchasing as given by Turner (1990) include: (1) the customer contracts solely a single company, that ensures enhanced harmonization and teamwork among designers and builders; (2) possible for lesser time period for the entire construction scheme as design and construction events are overlaid; (3) considering a design and administrative form, the builder shoulders risk and roles for the combination of the design with construction; (4) construction activities are given away competitively at cost that are up-to-date; (5) enhanced building via builders effort into the design; (5) responsibilities, dangers and roles for every stakeholder are well-defined; and (6) suppleness for alterations in design.

The main demerits of employing an administrative method to purchasing given by Turner (1990) included (1) cost certainness is not arrived till the last services set is given away; (2) up-to-date and pre-emptive customer is needed; (3) deprived cost certainness; (3) close time and data regulations is needed; (4) customer is required offer an enhanced valuable brief to the design group as the design could lag behind finishing till the needed funds are dedicated to the construction scheme; and (5) customers mislays undeviating regulation of design value that is affected thru the builders.

## **2.5 Building Procurement Systems**

A building procurement system creates the roles and associations that constitute the project organisation (Ahmad and Sem, 1997). Likewise, the building procurement system makes the complete management structure and system of the building construction project (Bennet and Brice, 1992). This technique additional support to manufacture the general values and style of the project, and consider the volume of risk the customer is prepared to take (Anumba and Evbuomwan, 1997).

For instance, a customer that accepts infinitesimal or no risk is better off avoiding a procurement system favoured by customers that partake in detail and wants hands-on control.

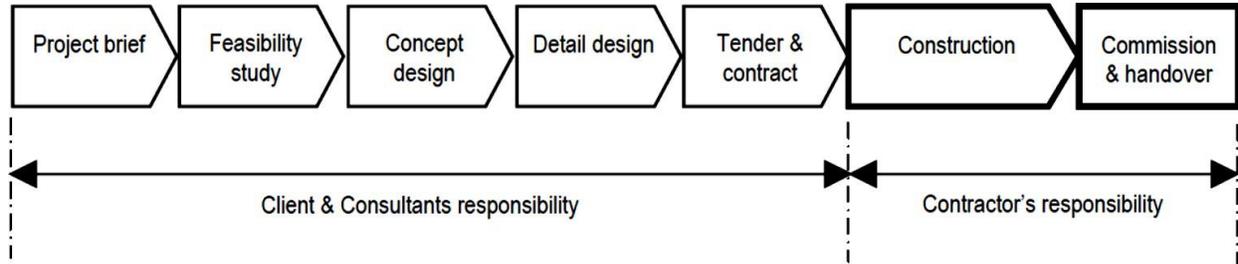
Specific major elements, prevailing in the United Kingdom building sector, that influence the selection of building procurement method are fragmentation of the building industry, specialist selection, changing roles of specialist, the possibility of specialists knowledge limitations, management, experts and experienced clients (Bennet and Brice, 1992). The construction sector is perceived disjointed. There are numerous of contractors and designers in contribution, and every service for varying companies. Nonetheless, the contractors and designers are provisionally bonded together to build an interim organisation with the aim of finishing a detailed product (building, bridge, road and many others). Furthermore, Franks (1990) assert that the design and production procedures are also incoherent. In the construction industry, the assortment of specialists is accomplished on economic grounds and the contracts incline to be quarrelsome somewhat compare to coordination among the customer and the experts. This “them” and “us” behaviour diminishes team attitude and odds of achieving project success decline. Furthermore, the function of specialists is altering. Better role for thorough design and field monitoring is handed to experts in building; consequently, more purchasing methods currently encompass selected modes of contractual relationship among clients and at least, principal specialists. Architects, usually, carry contractual obligation to be part of every section of complete design, nonetheless this could be problematic once majority of the expert’s in-depth skills on some design areas exists external to architects’ companies. Administration has also arisen together with design and construction as a rudimentary and vital role in construction schemes. Specialists and knowledgeable customers currently perform a greater vigorous function in construction projects

compare to previous periods. Customers currently contest every section of the construction industry's success in quest for greater worth, speedy building of projects and greater incomes.

The points discussed make building procurement system selection both challenging and very essential. This tough but vital decision requires to be made subsequent to considering the various types of building procurement techniques that are in practice currently. Existing literature indicates that there are volumes of ways of not only classifying these, but also of referring to each of them. Bennett and Grice (1992) found four essential building procurement technique sub-divisions or groups including the traditional method, design and build method, management and design and manage. In another instance, Rawlinson (1987) found only three groups of building procurement systems including the traditional method, design and build method, and management method. It is fascinating to recognise that a number of researchers define project management as a separate or detached building procurement system. This classification, however, is incorrect as project management can be applied to any building procurement system.

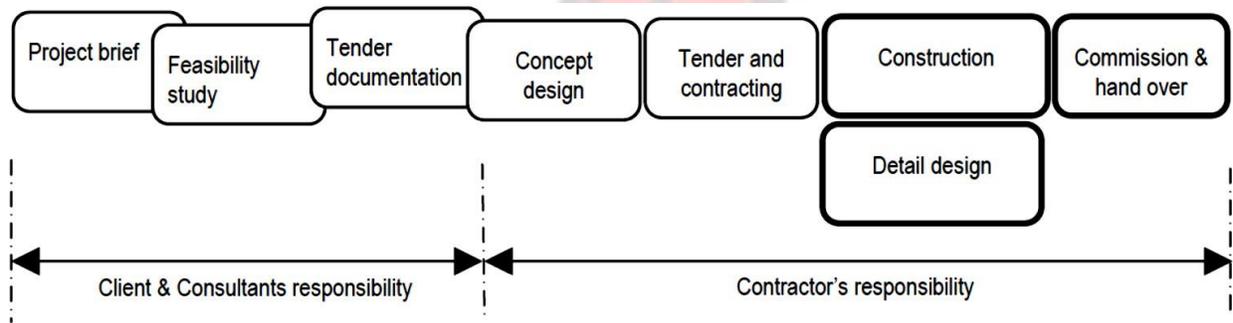
## **2.6 The Procedures of Numerous Procurement Methods**

It is suitable at this stage to envisage the procedures of events of the differing purchasing methods or approaches. They are required, to some degree, suggested the influence of the varying procurement methods or approaches on the performance of the construction scheme, precisely on the period of the project growth and the stage of starting the building project. They also demonstrate the distribution of roles and responsibilities amongst the customer, design and construction consultants and contractors. The procedures of all the deliberated methods of procurement are evidently displayed in Figure 2.4, 2.5, and 2.6.



**Figure 2.4: The Linear or Sequential Process of the Traditional Procurement System**

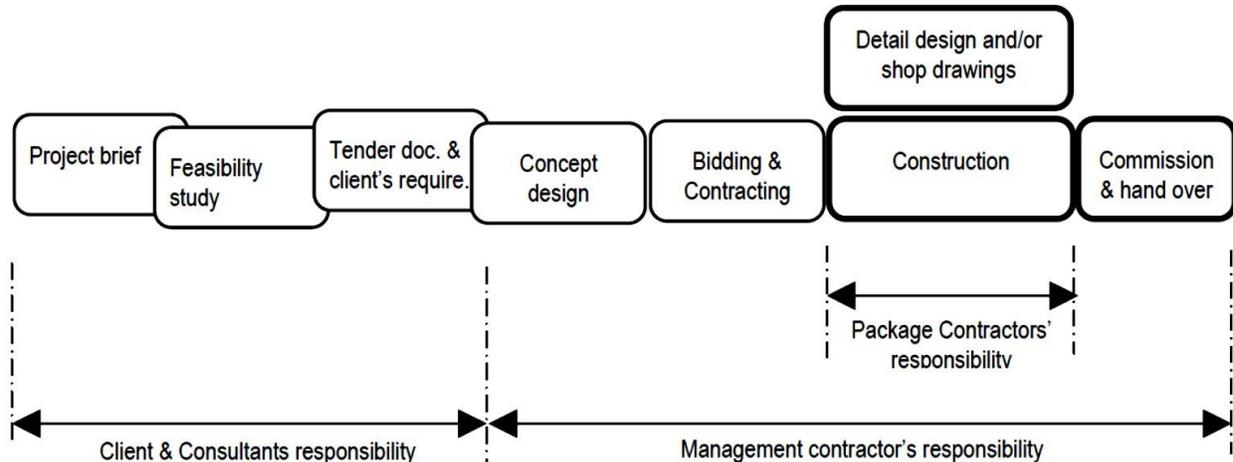
Source: Masterman (1996)



**Figure 2.5: The Integrated Process of Project Designing and Construction in the Design and Build Procurement System**

Source: Masterman (1996)





**Figure 2.6: The Process of Project Designing and Construction in the Management Contracting & Professional Construction Management Procurement System**

Source: Masterman (1996)

## **2.7 Influence of the Varying Procurement Methods on Construction Performance**

Subsequent to regarding the idea and the working procedures of the dissimilar the building scheme procurement methods, there is the need to research into the overall influence of the different methods of procurement on construction project performance. As tinted previously, the scope of this study is limited to 3 purchasing techniques including: (1) conventional methods; (2) Design and Build /Turnkey Procurement methods (3) Management contracting and Professional Construction Management methods. The deliberations are therefore confined to the key construction success factors including time, cost and quality.

### **2.7.1 Conventional Procurement Methods**

Considering time, owing to its chronological method, the conventional purchasing method is recognized as the sluggish construction completion method. Nonetheless, this method is relatively desirable since it delivers precise culpability and healthier design and construction regulation by the customer. Considering that the pre-contract phase of this technique is lengthier, extra period is

offered for the customer and the construction team to examine and appraise the design prior to building the project. Considering cost, the traditional procurement technique delivers greater cost precision to the customer at the precise initial phase of the construction scheme (Masterman, 1992). It also delivers to the customer steadier and more economical price since the design in addition to the comprehensive working drawings have been copiously structured and comprehensive presented preceding bidding. This therefore reduces various form of design or construction uncertainty that could cause the contractors to gratuitously bloat the price. Under condition where bill of quantities is employed, the tendering inclines to be fairer and so the cost of the project is also slightly lesser. The technique also ensures improved cost regulation and so cost upsurge owing to the minimized differing, nonetheless construction services are frequently interrupted under condition of the presence of multiples of disparities (owing to unanticipated challenges) and it is incline to result to bloated cost (Masterman, 1996).

Considering the volume of a project, the conventional purchasing method similarly delivers a greater grade of superior precision and useful values (Masterman, 1996). This method further provides a chance for the client to synchronize the expertise of the best design, administrative, consultants and contractors. The system provides extra period for customers and consultants to evaluate and wholly improve the design and requirement thus permitting healthier paper groundwork. Nonetheless, this technique does not necessarily deliver chances for contractor to add his construction expertise and administrative experience since they are only required in the act subsequent to the period the design is wholly completed and accepted. Rowlinson (1987) asserts that the chronological mode of the construction work and the frequency of the period and price ravages ascribed, in addition, to the inadequacy of effort from the principal builder thru the design stage of the building project.

### **2.7.2 Design and Build and Turnkey Procurement Systems**

Design and build and turnkey project purchasing method are referred as “fast-tracking” project performance method wherever the design and construction are united (Masterman, 1996). The design free pre-bidder procedures permit for previous building period. The method also permits the procedures of complete design and construction to manage nearly in similar and concomitantly to one another, hence plummeting the general construction growth time noticeably. By way of only one firm accountable for the design and construction, the builder is capable to regulate not merely the building period nonetheless likewise the period earmarked for the design of the construction work, consequently plummeting the general agreement period (Akintoye and Fitzgerald, 1995). With reference to this purchasing method, the builder has continually remained chosen on the ground of its huge expertise, skills and capability in building, and so giving it the design role, the builder most frequently is capable to decrease the building speculated period (Lam,etal, 2003). To achieve this, excusing the design and the building procedure and field events are performed.

Though the price is constant at the bidding phase and is conditional to design alterations, it is frequently greater than the conventional agreement method. Excluding the reality that restricted number of builders is requested to present bids, the inadequacy of design and requirement specifying throughout bid, has requested the builder to lift the value to permit for numerous hesitations. On the basis that after given the go ahead, the bidder price would be the ultimate contract entirety. It is not limited to alterations, except there are disparities obligatory or inculcated by the customer. Such extra price cannot be evaded since underneath this procurement method the builder would require greater economic dangers. Though, as numerous researchers have ascribed, the important cost minimizing in this kind of purchasing methods is promulgated thru the decrease

of the general growth time frame. The cost of builder's uncertainty may be set through the discount in loan interest and timely economic yield. Cost reduction could be achieved once the builder smears their building expertise and acumen to abridge design and services (Lam et al., 2003). At similar additional cost reduction may be rendered once the customer gives the builder certain mode of enticement considering their ability minimize cost.

The incorporation of design and construction permits the builders to use their expertise and knowledge to cultivate greater compressed and intelligible work and to enhance efficiency in design and project regulation (Masterman, 1996). It simultaneously permits the builder to be inventive to additionally enhance the building procedures and methods consequently permitting for healthier work and procedural eminence. Nevertheless, it is frequently observed that the worth of project in this contracting methods incline to be uncertain. The transmission of the designing and construction to a builder has coerced the customer to mislay control of the design and management of the project. This is particularly so once the customers form their group of consultants. Considering the contractor, they are inclined to put in place measure so as to increase profit, particularly once they think prices have been under quoted throughout bidding of the project.

Variants of this system include the Build Operate and Transfer (BOT) contracts. BOT and other similar arrangements such as Build Operate Own (BOO), Build Operate Own and Transfer (BOOT) and Design Build Finance and Own (DBFO) are increasingly being used on large infrastructure projects (traditional only financed by government) in south Africa. Instances of projects that have been executed in this manner include Empageni Maximum Security Prison and the Department of Trade and Industry Campus in Pretoria.

### **2.7.3 Management Contracting and Professional Construction Management Methods**

The two methods run nearly on similar idea, apart from that in the administration contracting, the package contractors are contracted together with the management contractor (Murdoch & Hughes, 2000). In Construction Management methods, the Package Contractors go into agreement with the customer. The crux of both techniques of construction procurement is that a contractor has the knowledge, understanding and proficiency to better accomplish the design and construction of a project. It is a major element that permits for relatively extra efficiency and effectiveness in the coordination of works, materials, manpower and plants thus that ensures that construction period is shorter relative to some purchasing techniques. This is particularly so, considering the reality that similar administrative contractor is capable of managing and contributing to the progress of the project. This permits the administrative contractor to improve the buildability or constructability.

In the same vein, the technique permits for timely beginning of construction relative to the conventional technique in procurement (Chitkara, 2005). The groundwork of unassuming bidding paper and the change of the procedures of diagrammatic and detail design to the construction stage, permits for a timely initiation of the building work (Lam,et al., 2003). As indicated before, both methods, the detail design is performed during the construction phase of the project. These factors often result in a substantial dwindling of the general project time relative to the conventional purchasing technique or even the design and the build contracting technique.

The cost of the construction project acquired by employing this technique is inclined to be relatively lesser than those employing other procurement techniques (Lam et al., 2003). This advantage can primarily be attributed to the fact that the cost of the project is actually the sum of

prices cited by the package contractors. With the management contractor being the consultant, no additional cost is being added up for key contractor's profit margin. The consultant fee is therefore regarded as the only additional cost the client is required to pay to the construction management consultant.

As manager accountable for the construction project, the professional construction manager is inclined to be relatively more severe with the required value and quality of the construction work done by the package contractors (Bennet and Grice, 1987). Their experience as contractor or construction manager could make them more proficient and more effective in safeguarding heightened quality works. The knowledge and experience of contractors or construction manager also make them more adept in selecting materials and components of the appropriate type and quality (Bennet and Grice, 1987). These factors immensely contribute to a relatively better standards and quality of the completed construction project.

Where construction management is utilised, a professional firm (construction manager) is paid a fee to provide a management service throughout the project (design and construction phase). Work is then broken down into various specialist and trade contracts and is carried out by trade contractors. These trade contractors enter into direct contracts with the client, who retains the time and price risks (Bennet and Grice, 1987). Bovis has utilised this system in Britain for over forty year (Franks, 1990).

Under a collaborative system the client puts in place a framework for the general administration of the project within which the managers have the pleasure to practice the most suitable of all the procurement techniques contained within the other three divisions of procurement systems. In a

collaborative procurement technique quantity surveyors perform a vital role by making available a wide variety of services that comprise contractual matters; it also provides quantity surveyors an appropriate chance to perform as sovereign advice-givers within the employed techniques (Cartlidge, 2002).

## **2.8 Effective Procurement Management System**

Procurement management techniques embrace the procedures to purchase products, services, or results required from outside the company to undertake the construction work. Procurement management also comprises administering any contract delivered through an outside organization that is obtaining the company from the performing organization, and administering contractual agreements put on the organization by the contract (Belev et al., 2004). The effective procurement management technique requires acknowledge intricacy, find the appropriate competencies and organize the construction work, develop a sound construction strategy, manage timetable successfully, follow effective tender reviewing techniques and develop a smart and a reasonable agreement. Effective procurement methods require prearranged collaboration: authorities, tasks, agenda, and assets (Talero, 2004).

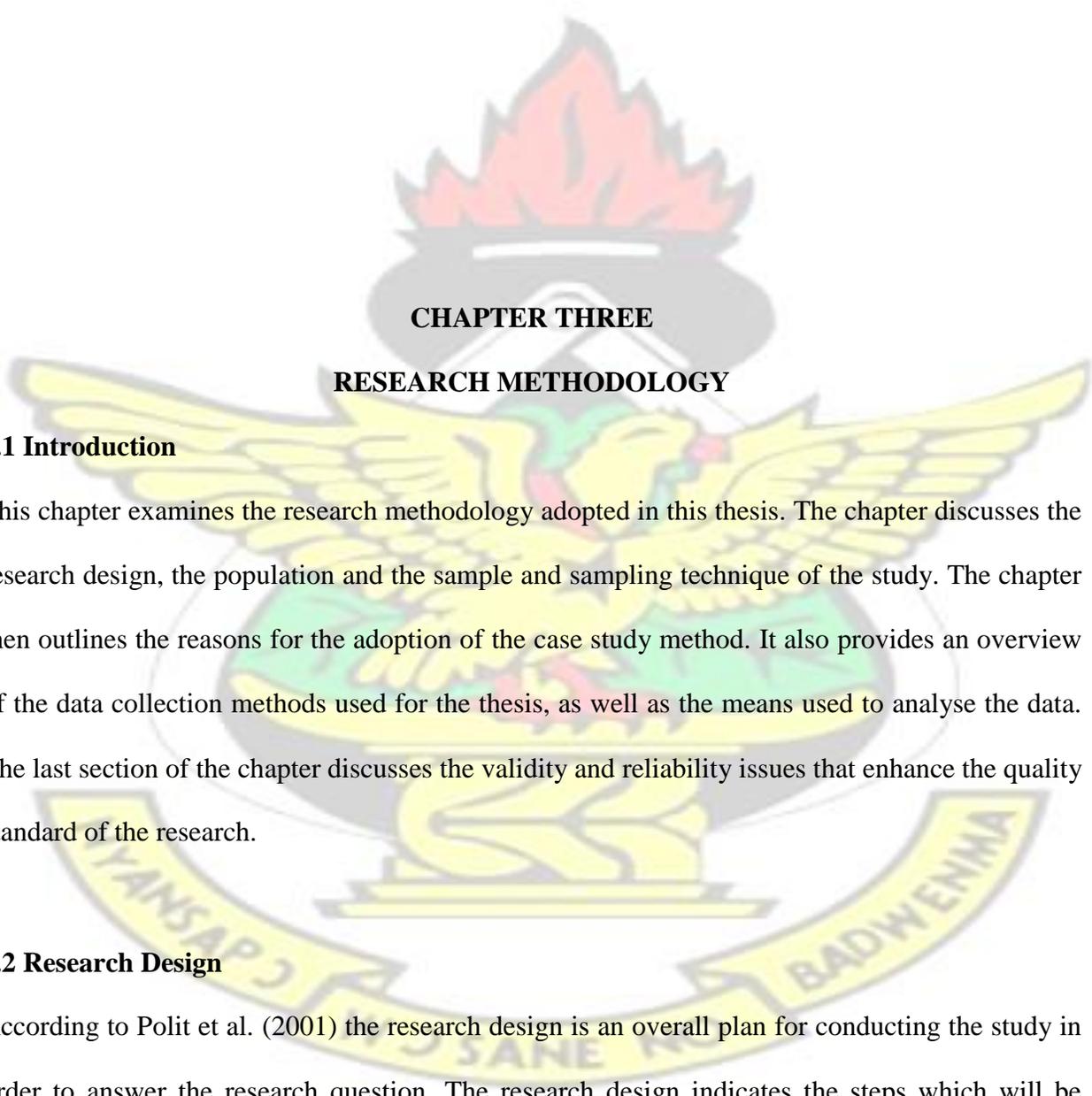
In numerous circumstances, improved costs and interruptions in the construction project implementation can be accredited to inadequacy of expertise with the procurement procedures of the funding organizations combined with insufficient command of the indispensable day-by-day “business expertise” required to administer international procurement operations. Failure can virtually be built in if there is deficient consideration given to the procedures at each of the processes of procurement. It aids to deliberate each phase of the procedures and to scrutinize the potential grounds of failure as an initial step to taking pre-emptive feat (Cannon, 2006).

The performance of construction project has customarily been measured in consideration to cost and time, and the broadly embraced tools such as C/SCSC, have been premeditated to determine or measure a project's progress and performance in these two circumstances. The success of government funded construction projects cannot, nevertheless, be estimated by these two principles alone (Eng et al., 1997). When the bidding authority decide to award a tender or a contract, the factors such as inaccessibility of contractors, insufficient qualification of tender such as funding capacity, unobtainability of equipment, unobtainability of technical personnel and the bills of quantity volumes not corresponding to the tender's rate etc. influences the pronouncement. The blockages in the procurement management techniques including the key elements of construction and the socio-cultural environment element include incompetency of the Management of procurement, time length, suppliers, inadequacy of funds and technologies are the primary tailbacks that reduces the effectiveness of procurement (Talero, 2004).

## **2.9 Summary of Chapter Two**

The chapter basically elaborates on the procurement concepts in terms of the process of purchasing goods and services. It further defines and reviews the public procurement Act 663 in terms of its usage in the country. The chapter also assesses the nature of the public procurement system and its management practices in an attempt to reducing the level of risk involved in procurement contract. The chapter further reviews the various building procurement systems in Ghana and the methods available to the construction industry. The final section of the chapter discusses the influence of the varying procurement methods on the performance of the construction firms in Ghana.

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## CHAPTER THREE RESEARCH METHODOLOGY

### 3.1 Introduction

This chapter examines the research methodology adopted in this thesis. The chapter discusses the research design, the population and the sample and sampling technique of the study. The chapter then outlines the reasons for the adoption of the case study method. It also provides an overview of the data collection methods used for the thesis, as well as the means used to analyse the data. The last section of the chapter discusses the validity and reliability issues that enhance the quality standard of the research.

### 3.2 Research Design

According to Polit et al. (2001) the research design is an overall plan for conducting the study in order to answer the research question. The research design indicates the steps which will be followed in conducting the research. Burns and Grove (2001) describe the research design as a

guideline for the research process in order to achieve the intended results that will be a reflection of reality. Polit and Hungler (1999) indicate that the research design includes some of the most important decisions in research methodology that the researcher makes in conducting the study. The current study adopts an exploratory qualitative design. To find out what is happening in a given situation, an exploratory study is most appropriate and especially where the nature of the problem is unclear, exploration helps gain an understanding of issues (Saunders et al., 2009). The main advantage of conducting an exploratory study is that it is flexible and adaptable to change. It allows for the researcher to change the direction of the study when new insights or information is discovered in the course of study. The study employed a descriptive method of analyses and a case study approach to study.

### **3.3 Population of the Study**

A population is a group of individuals, persons, objects, or items from which samples are taken for measurement (Saunders et al., 2009). Target population is the entire group of individuals about whom you want to gather information. To design a useful research project, there is the need to be specific about the size and location of your target population. The current study was limited to some professionals in the construction industry in the Greater Accra region. The selection of professionals (respondents) was limited to Consulting Firms, Contracting Firms and or Agencies as well as D1K1 Contractors representing Building Contractors. Construction professionals comprised of Construction project manager, Construction manager, Quantity surveyor, Architect, Civil and/or structural engineer, Electrical and/or mechanical engineer. The choice of this class of building contractors was made on the basis that they were well established firms which engage the services of these professionals. Consultancy Firms included public institutions like the Ministries,

Departments and Agencies responsible for infrastructural project. The decision to focus on Greater Accra region was based on the list obtained from the Associations of both building and road contractors which showed that more than 65% of D1KI and A1B1 contractors have their presence in Accra. In addition, the limited time available for the study and financial constraints did not allow the researcher to travel to the other regions.

### **3.4 Sample and Sample Size of the Study**

It has been argued that a sample is a sub-group of the population which is an ideal representative of the entire population (Kumar, 2008). Researchers usually cannot make direct observations of every individual in the population they are studying. Instead, they collect data from a subset of individuals (a sample) and use those observations to make inferences about the entire population (Zickmund, 2003). Therefore, there is the need for determination of appropriate number of respondents to be sampled from the entire target population of the study.

Several approaches are available for determining the sample size of a study population (Israel, 1992). Among these are using a census for small populations, imitating a sample size of similar studies, using published tables, and lastly applying formulas to calculate a sample size. For this study the first and the latter were applied. The total number of contractors with A1B1 and D1K1 status working in Accra area is 65 and according to their associations (Building and Road Contractors); each employs a minimum of three project professionals. Therefore, the population of the professionals working with these construction companies in Accra is one hundred and ninety-five (195). The sample size was determined using the formula (Kish, 1965).

$$n_1 = \frac{n_1 n}{1 - N}$$

Where n = sample size

$$s_2$$

$$n^1 = \frac{s^2}{v^2} \left( \frac{1}{p} - 1 \right)$$

N = Total population = 195, s = Maximum standard deviation in the population elements, p = proportion of the population elements that belong to the defined category i.e. p = 0.5 (95% confidence level), v = standard error of the sampling distribution i.e. v = 0.05, Hence solving for n<sup>1</sup>

$$s^2 = p(1-p) = 0.5(0.5) = 0.25 \quad v^2 =$$

$$0.05^2 = 0.0025$$

$$n^1 = \frac{s^2}{v^2} \left( \frac{1}{p} - 1 \right) = \frac{0.25}{0.0025} \left( \frac{1}{0.5} - 1 \right) = 100$$

$$n =$$

$$n = 100 / \left( 1 - \frac{100}{195} \right) =$$

$$n = 66$$

The sample size formula employed for the calculation of the sample size of the construction professionals provides the minimum number of responses to be obtained. From the available literature in this area, researchers such as Cochran (1963) and Israel (1992) commonly add 10% to the sample size to accommodate for persons the researcher is unable to survey. Therefore, approximately, 7 which represent 10% of 66 would be added to the sample size. Thus a total of

seventy-three (73) questionnaires were personally sent to professionals who work at the contractors offices in Accra. However, because the population of construction professionals working in the consultancy firms as well as government agencies were difficult to come by, a sample sizes (n) for the professionals working with clients and consultancy firms in Accra targeted for this study was 30 each. This was purely considered in the remits of convenient sampling method. Convenience sampling differs from purposive sampling in that expert judgment is not used to select a representative sample of elements (Battaglia, 2011). Rather, the primary selection criterion relates to the ease of obtaining a sample. The total sample size used for this research was therefore one hundred and three (103).

### **3.5 Sampling Techniques**

The non-probability sampling technique was used in this study. In probability sampling, the decision as to whether a particular element is included in the sample or not, is governed by chance alone. However, nonprobability sampling does not attempt to select a random sample from the population of interest. Rather, subjective methods are used to decide which elements are included in the sample (Battaglia, 2011).

Purposive sampling which is an example of the non-probability sampling technique was used in identifying the key respondents who were professionals in these project organisations; Contractors, Agencies and Consultants. This was because the researcher required certain categories of respondents who had been involved in a lot of construction projects and therefore had experience with the practices of management procurement systems in Ghana to answer the questionnaires. Purposive sampling also referred to as judgmental sampling or expert sampling often helps produce a sample that can be considered “representative” of the population (Battaglia, 2011).

Snowball sampling technique, which is an example of a non - probability technique was also used to get the number of clients for the study due to the different types of professionals who are working with project clients such as the Ministries, Departments, Agencies, Municipal, District Assemblies and Financial institutions. This sample technique was initially used to contact few potential respondents who are then asked to give names of persons or organisations with the characteristics sought for so that the sample size will be reduced with less costs. As a result of this, the professionals working with the D1 contractors and the consultants gave the names of clients they deal with. The list obtained from them was sorted out and the names of thirty (30) professionals working with project clients were obtained and targeted for the research.

### **3.6 Source and Type of Data**

The data used for the study were mainly primary data. Cross-sectional data were collected through a field survey of Construction professionals comprising of Quantity Surveyors, Civil Engineers, Structural Engineers, Project Managers and Architects. Information was collected on the practice of procurement management system in the construction industry, and the effect of management procurement system on the success of building project. The data was principally obtained from 103 professionals in the construction industry and agencies in government responsible for project construction in the Greater Accra region with the aid of a structured questionnaire.

### **3.7 Data Collection Instruments**

The research principally depended on structured questionnaire for collecting data. There are various methods used for collecting empirical data for case study such as interviews, archives, questionnaires, and observations (Eisenhardt, 1989; Yin, 1994). However, for this research,

structured questionnaire was employed as the main data collection tools, as it is claimed to be the most effective technique that helps gather valid and relevant data (Easterby-Smith et al., 2002). Thus, this section describes the structure of the structured questionnaire and the administration of the questionnaire to 103 professionals in the construction industry and agencies in government responsible for project construction in the Greater Accra region.

### **3.7.1 Structured Questionnaire**

A structured questionnaire was chosen as the primary method of collecting information. The questionnaire was developed and built on closed questions. This form of questionnaire was particularly employed in the sense of capturing all the objectives of the study. The questionnaire was self-administered to the professionals and consultants in the construction industry and government agencies in the Greater Accra region.

The questionnaire was divided into four parts: (1) the first section had to do with the respondent's demographic characteristics such as the professional background of respondent, respondent's academic qualification, nature of projects undertaking by respondents, and the respondent's years of experience in the construction industry, (2) the practices of management procurement systems in the construction industry, (3) the third section of the questionnaire provides items to determine the various factors influencing construction firm's choice of procurement management systems, and the (4) the fourth section identifies the effects of management procurement systems on the success of building project in the construction industry. All items or statements were measured through a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

### **3.8 Pre-test**

To maximize the reliability and validity of the questionnaire, questions generated from the interview was pretested on a sample of 30 professionals in the construction industry in the Kumasi metropolis. This sample is consistent with a study by Patton (2002) that suggests that the sample size for a pilot study should be at least 20 respondents. The participants were asked to fill out the initial surveys based on the procurement management practices and the factors influencing building contractor's choice of procurement management methods or systems. The initial survey took about five to ten minutes to complete. By administering the pre-test, the researcher ensured that the items measured in the study reflected actual interactions and expectations from the construction professionals interviewed. Results from the pre-test analysis showed that professionals in the construction industry viewed some of the items as measuring the same constructs, which resulted in some minor changes in both the questions and the (wording of) items. It was decided to keep all items in the research so as to have contributions on a wider scale to see if these items indeed measured the same constructs from the construction professional's point-ofview.

### **3.9 Ethical Consideration**

De Vos et al. (1998) defines ethics as ' a set of moral principles which is suggested by an individual or group, is subsequently widely accepted and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents, employers, sponsors, other researchers, assistants and students.' Ethical issues considered in this study include the rights of the institution and scientific honesty on the part of the researcher. The goal of conducting the research is to generate knowledge through honest conduct, reporting and publication of a research report. The researcher is aware that data should not be falsified nor

manipulated in order to maintain the quality of the research and of the report (Burns & Grove, 2003). To accomplish this, a written consent was obtained from the manager of the construction firms and government agencies in the Greater Accra region sampled informing managers about the purpose and design of the study.

### **3.10 Method of Data Analysis**

As Miles and Huberman (1994) state, differentiating and combining data, and then reflecting on that data, is “the stuff of analysis” (Miles & Huberman, 1994: 56). This step in the qualitative research process typically involves assigning descriptive and inferential tags or codes to data (Bryman & Bell, 2007; Flick, 2002). After Miles and Huberman (1994) the data analysis for this research study commenced with a preliminary set of codes based on the perceptual framework, the research aim and research questions, and the key factors apparent from the literature review. As Robson and Hedges (1993) advice, a process of revisiting the data was adopted, whereby the data were continually re-examined and re-evaluated. The researcher was then able to refine and revise the codes as the analysis progressed. Some codes ‘decayed’ and were dropped, while others ultimately proved important enough to be included in the study. Coded data on responses were fed into the computer based programme, Statistical Package for Social Sciences (SPSS), version 17 for display and analysis. The programme generated figures, frequencies, percentages and tables to show results of the data analysis. Descriptive analysis conducted involved the use of tabular analysis (percentages and frequencies), mean and graphs for discussing the key variables involved in the study. However, the inferential analysis employed was a binary logistic analytical tool to assess the factors influencing construction firm’s adoption of of procurement management systems in the construction industry. The effects of management procurement system on the success of building project and the factors influencing contractor’s choice of management procurement systems were ranked with the aid of the Relative Importance Index (RII) formula. Relative

Importance Index (RII) method was used to determine the relative importance of each of the factors and impacts identified. The five-point scale ranged from 1 (strongly disagree) to 5 (strongly agree) was adopted and transformed to relative importance indices (RII). Relative Importance Index, RII was calculated from the formula given below:

$$RII = \frac{\sum W}{A * N}$$

Where

RII = Relative Importance Index

W = is the weighting given to each factor by respondents ranging from (1 to 5)

A = highest weight (i.e. 5 in this case)

N = Total no. of respondents

### **3.11 Quality of the Research Design**

The quality of the research design that can be checked by considering the validity of the study, reliability of the data and instruments of data collection as well as the generalization ability of the study are described below.

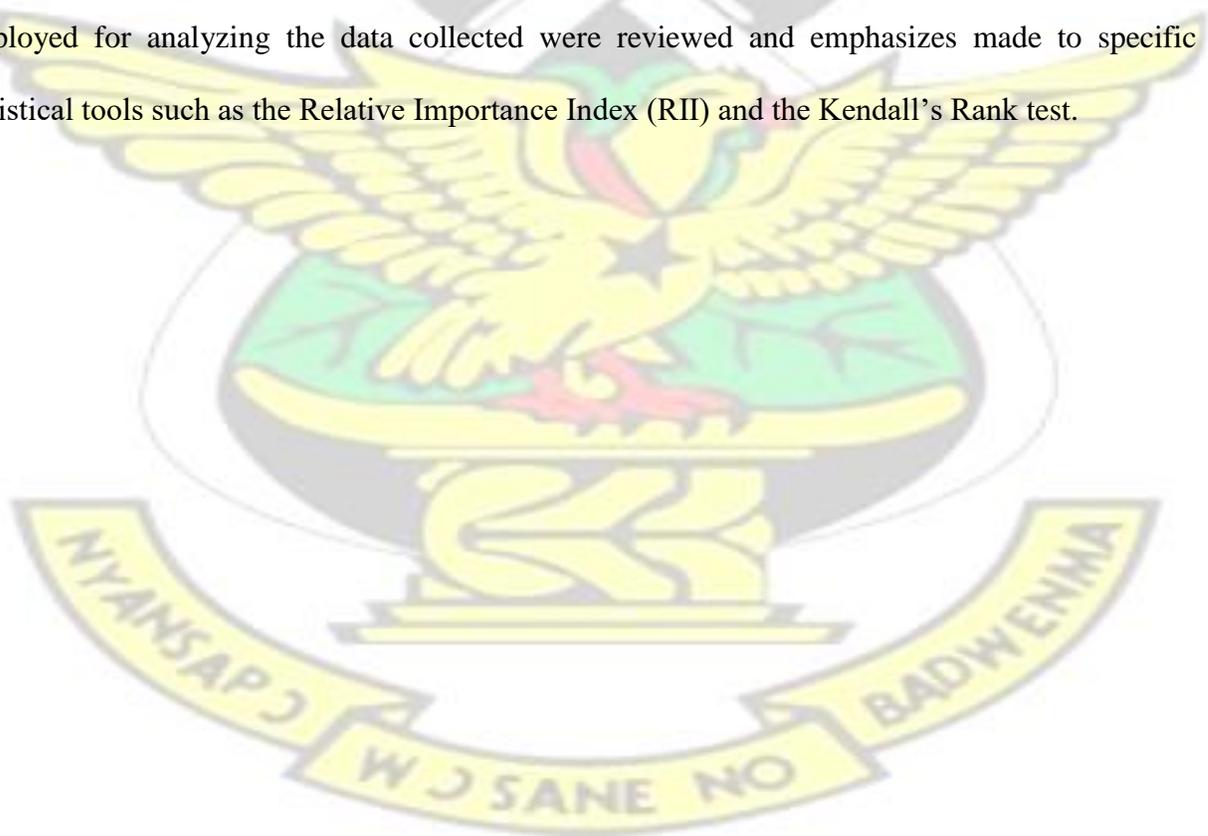
#### **3.11.1 Validity and Reliability**

Validity has three distinct aspects, such as content validity, criterion validity and constructs validity. Content validity refers to whether or not the content of the manifest variable is right to measure the latent concept that the study are trying to measure. An extensive search of the literature on the concept that will be measured is one way to achieve content validity. Criterion validity are also related to the theory and expected to be able to predict certain outcomes. There are two ways to establish criterion validity; first, the good knowledge of theory relating to the concept, and

Second, conducting statistical analysis measure of correlation between dependent variable and Independent variables. Construct validity is a slightly more complex issue relating to the internal structure of an instrument and the concept it is measuring.

### **3.12 Summary of Chapter Three**

The chapter expatiates on the exploratory design employed for the study in that the study. The target population which constituted the some selected professionals in the construction industry in the Greater Accra region was defined. The chapter further justifies the 73 construction professionals selected for the study employing the Cochran sample size calculation formula. To survey these samples, a non-probabilistic procedure was employed. The semi-structured was divided into four parts in an attempt to capture the objectives of the study. The descriptive methods employed for analyzing the data collected were reviewed and emphasizes made to specific statistical tools such as the Relative Importance Index (RII) and the Kendall's Rank test.



## **CHAPTER FOUR**

### **ANALYSES AND DISCUSSION**

#### **4.1 Introduction**

This chapter is made up of two main sections. In section one, descriptive analyses based on the survey data are undertaken. The descriptive analyses cover the socio-demographic characteristics of the construction professionals interviewed, construction firms practice of procurement management systems, ranks of the factors influencing construction firms choice of procurement systems, the effects of management procurement systems on the success of building projects and the challenges of construction firms in the practice of procurement management systems. Section two, discusses the empirical results (binary logit result) of the factors affecting the construction firms practice of procurement management system.

#### **4.1 Socio Demographic Characteristics of Respondents**

The socio demographic information of the participating construction professionals surveyed in the study are discussed in this section of the study. The major socio demographic characteristics discussed included the organisation of the respondents, the professional background of the respondents, the academic qualification of the respondents, the nature of the projects undertaken by the respondents and the years of working experience of the respondents in the construction industry. The result of the demographic data of the participating construction professionals in the study is presented in Table (4.1).

**Table 4.1: Socio Demographic Information**

| <b>Socio Demographic Data</b>                           | <b>Frequency</b> | <b>Percent</b> |
|---|------------------|----------------|
| <b>Type of organisation of respondents</b>              |                  |                |
| Public institution                                      | 12               | 11.7           |
| Consulting firm   | 24               | 23.3           |
| Contracting firm  | 67               | 65.0           |
| <b>Professional background of respondent</b>            |                  |                |
| Construction project manager                            | 6                | 5.8            |
| Construction manager                                    | 8                | 7.8            |
| Quantity surveyor                                       | 60               | 58.3           |
| Architect   | 10               | 9.7            |
| Civil and/or structural engineer                        | 13               | 12.6           |
| Electrical and/or mechanical engineer                   | 4                | 3.9            |
| Others  | 2                | 1.9            |
| <b>Academic qualification</b>                           |                  |                |
| HND   | 7                | 6.8            |
| PDG   | 6                | 5.8            |
| BSc/B-Tech  | 84               | 81.6           |
| MSc/Mphil   | 5                | 4.9            |
| Others  | 1                | 1.0            |
| <b>Nature of projects undertaking by respondent</b>     |                  |                |
| Office building   | 6                | 5.8            |
| Residential buildings                                   | 5                | 4.9            |
| Industrial buildings                                    | 8                | 7.8            |
| Civil engineering projects                              | 12               | 11.7           |
| Combination of above                                    | 72               | 69.9           |
| <b>Years of experience in the construction industry</b> |                  |                |
| 0-5 years   | 6                | 5.8            |

|               |    |      |
|---------------|----|------|
| 6-10 years    | 68 | 66.0 |
| 11-15 years   | 24 | 23.3 |
| 16-20 years   | 3  | 2.9  |
| Over 20 years | 2  | 1.9  |

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Source: Field Survey, 2014

From Table (4.1), out of the total surveyed respondents of 103 construction professionals, the majority (65.0%) were from contracting firms, 11.7% were from public institutions and 23.3% were also from consulting firms. Thus, there is adequate representation of every stakeholder of the construction industry in the study area. The professional background of the majority (58.3%) of the participants of the study was quantity surveying. Also, 5.8% of the participants of the study were construction project managers, 7.8% were construction managers, 9.7% were architects, 12.6% were civil and/or structural engineers, 3.9% were electrical and/or mechanical engineers and other construction professionals constituted 1.9%. The result expressed the generation of adequate opinion of the construction industry in the study area as the entire construction professionals are represented.

The academic qualification of the majority (81.6%) of the participating construction professionals in the study was Bachelor of Science or a Bachelor of Technology (BSc or B-Tech), whereas 4.9% of the participants also have MSc or MPhil. However, 6.8% and 5.8% of the participating respondents have Higher National Diploma (HND) and Post Graduate Diploma (PDG) academic qualifications respectively. The result shows that all the respondents possess the minimum registration requirement of their various professional bodies in Ghana and adequate academic training to supply reliable data for the study. The majority (69.9%) of the participants of the study

were predominantly engaged in combination of office, residential, industrial and civil engineering projects. Thus, the majority of the construction firms of the surveyed respondents are engaged in multiphaceted building projects. The results further indicate that the respondents have accumulated experience on all classes of construction projects where the different variants of the procurement methods would have being employed. This would guarantee the supply of adequate data on the frequencies of use of each of the variants of the procurement methods on different categories of projects which this study intends to investigate. The years of experience of the majority of the participating construction professionals in the construction industry was between 6-10 years. Also, 23.3% and 2.9% of the participants of the study have 11-15 and 16-20 years of working experience in the construction industry. This therefore implies that the participants of the study have in depth knowledge and experience in the construction industry to provide adequate data for the current study.

#### 4.2 Practices of Management Procurement Systems

This section of the study examines the practice of management procurement system by construction firms in the Accra metropolis. It further examines the various management procurement systems practiced by the construction firms. The result of the section is presented in Table (4.2).

**Table 4.2: Type of Procurement Method or Systems Is Practiced**

| <b>Procurement Systems</b>  | <b>Frequency</b> | <b>Percent</b> |
|---|------------------|----------------|
| <b>Consider all possible building procurement systems at start of new construction projects</b> Yes |                  |                |
| Yes   | 65               | 63.1           |
| No  | 38               | 36.9           |
| <b>Rate of building procurement management practice</b> Very  |                  |                |
| often   | 5                | 4.9            |
| Often   | 76               | 73.8           |
| Rarely  | 19               | 18.4           |
| Not at all  | 3                | 2.9            |

|  |            |              |
|--|------------|--------------|
| Total                                      |            |              |
| <b>Type of procurement method used</b>     |            |              |
| Traditional method                         | 60         | 58.3         |
| Non-traditional procurement system         | 43         | 41.7         |
| <b>Total</b>                               | <b>103</b> | <b>100.0</b> |
| <b>Non-traditional procurement system</b>  |            |              |
| Design and construct                       | 10         | 43.5         |
| Package deal                               | 8          | 34.8         |
| Management contracting                     | 2          | 8.7          |
| Construction management                    | 3          | 13.0         |
| <b>Public Private Partnership variants</b> |            |              |
| DBFT                                       | 2          | 10.0         |
| BOT  | 10         | 50.0         |
| BOO  | 2          | 10.0         |
| DBFO                                       | 0          | 0            |
| BOOT                                       | 3          | 15.0         |
| ROT  | 2          | 10.0         |
| BLT  | 1          | 5.0          |
| <b>Total</b>                               | <b>103</b> | <b>100.0</b> |

Source: Field Survey, 2014

From Table 4.2, out of the total participants of the study, the majority indicated that their respective construction firms consider all possible building procurement systems at the start of new construction projects. The majority (73.8%) of the construction professionals surveyed indicated that their respective construction firms are often engaged in the practice of building procurement management. However, 18.4% indicated that their construction firms are rarely engaged in the practice of building procurement management systems. The majority (58.3%) of the participating construction professionals of the study indicated that their construction firms are still predominantly employing the traditional methods of construction management, whereas 41.7% also showed that their firms are using various forms of non-traditional methods of procurement systems. The major non-traditional method of procurement management system practiced by the construction firms as indicated by the majority (43.5%) of the participating construction professionals was design and construct, whereas 34.8% also indicated that their construction firms

currently are practicing the package deal non-traditional procurement management system. Design and construct is another of the integrated procurement approach under which the contractor is given the responsibility for both the design and construction of the project (Rowlinson, 1987).

Under this method the client's design consultants prepare the concept sketches or designs and passed them to the contractor who will develop them and produced the detailed working drawings (Rowlinson, 1987). Furthermore, a report published by the Centre for Strategic Studies in Construction (1996) suggested that build currently exceeds the performance of traditional procurement approaches in terms of construction speed (by 12%) project delivery speed (by 30%) and cost (by 13%). Moreover projects procured using [D&B] are 50% more certain to be completed on time and more likely to be completed on budget or within 5% of budget. However, 8.7% and 13.0% of the participating construction professionals indicated that their construction firms are practicing management contracting and construction management respectively.

The majority (50.0%) of the participating constructing professionals indicated that their respective construction firms are engaged in the practice of build-operate and transfer option (BOT) of public private partnership variants. Also, 10.0% indicated that their construction firms are engaged in design- build- finance and transfer option (DBFT) of public private partnership variant, 10.0% practiced BOO, 15.0% practiced BOOT, 10.0% practiced ROT and 5.0% also practiced BLT. The results therefore give a general indication that the variants of both the traditional and nonconventional procurement methods are embraced in the study area. The results, however, show that the variants of procurement methods in use are still much of traditional method. This may be presumably due to long age existence of the traditional procurement systems. It could be noted that despite the fact that almost all variants of the non-conventional methods have been applied to construction contracts (except DBFO), the percentages of the use of design and build are still

significantly low, indicating that stakeholders are still not well familiar with the method or are yet to appreciate their advantages. This therefore consistent with the study of Ashwort and Hogg (2007), that indicated that different variants of procurement are available for meeting different clients' needs and projects specifics.

#### 4.3 Factors Influencing Procurement Management System Adoption

The result from the logit model has been presented in Table 4.3. The Pseudo R<sup>2</sup> of the estimated model was 26.0%, which means that 26% of the variation in the dependent variable (practice of procurement management system) is explained by the model or the explanatory variables. To further study the explanatory power of the model, a statistic based on likelihood ratio (LR) is appropriate. The significance of the likelihood ratio statistic indicates that the model follows a chisquare distribution ( $\chi^2$ ) with 24 degrees of freedom. The Hosmer-Lemeshow statistics (df = 8, p = 0.2656) for the Logit model is insignificant. This is because, the observed probability did not reach significance at  $\alpha = 0.05$  on  $\chi^2$  distribution with 8 degrees of freedom. Hosmer and Lemeshow (2000: 145-147) suggests that insignificant statistics indicates a goodness of fit of a model. Thus, it can be concluded that the Logit model sufficiently explains the data. That is, there is enough evidence to suggest that the goodness of fit of the overall model is very good.

**Table 4.3: Binary Logit Estimates of the Adoption of Procurement Management Systems**

| <b>PMS Practice</b>                  | <b>Odds Ratio</b> | <b>Std. Err.</b> | <b>Z</b> | <b>P&gt; Z </b> |
|--------------------------------------|-------------------|------------------|----------|-----------------|
| Project completion at estimated cost | 0.9372            | 0.0238           | 2.55     | 0.011           |
| Quality assurance                    | 9.8176            | 12.8252          | 1.75     | 0.080           |
| Minimization of construction time    | 0.5039            | 0.1997           | 1.73     | 0.084           |

|   |         |        |       |          |
|---|---------|--------|-------|----------|
| Minimization of design time                             | 6.1657  | 3.9699 | 2.83  | 0.005    |
| High degree of control                                  | 14.7910 | 1.1013 | 2.45  | 0.014    |
| Flexibility to entertain change for clients requirement | 2.8789  | 1.2919 | 2.36  | 0.018    |
| Consultancy service offered                             | 0.9995  | 0.0003 | 1.55  | 0.121    |
| Technical complexity of construction                    | 3.7254  | 4.5712 | 3.31  | 0.001    |
| Availability of information at project inception        | 6.1218  | 6.1102 | 1.82  | 0.069    |
| Risk avoidance  | 1.7110  | 5.1443 | 2.79  | 0.005    |
| Nature of the project                                   | 1.0922  | 0.4126 | 0.23  | 0.815    |
| Nature of the client                                    | 3.6690  | 1.2865 | 1.01  | 0.312    |
| Insufficient knowledge of the system                    | 1.435   | 0.1220 | -2.96 | 0.003    |
| Inadequacy of capital                                   | 2.3602  | 1.1148 | -1.82 | 0.069    |
| Inadequacy of human resources                           | 0.1426  | 0.0912 | -3.05 | 0.002    |
| Dispute resolution, etc.                                | 0.0673  | 0.0684 | 2.65  | 0.008    |
| <b>Goodness Of Fit Of The Model</b>                     |         |        |       |          |
| Number of Observations                                  |         |        |       | 103      |
| LR Chi <sup>2</sup> (24)                                |         |        |       | 75.77    |
| Prob > Chi <sup>2</sup>                                 |         |        |       | 0.000    |
| Pseudo R <sup>2</sup>                                   |         |        |       | 0.2608   |
| Log likelihood  |         |        |       | -107.396 |
| Number Of Groups  |         |        |       | 10       |
| Hosmer-Lemeshow chi <sup>2</sup> (8)                    |         |        |       | 9.99     |
| Prob > chi <sup>2</sup>                                 |         |        |       | 0.2656   |

Source: Output from STATA 11

From the logistic regression model, the desire to complete projects at the estimated cost positively influences construction firm's practice of procurement management systems. The study revealed that the need for construction firms to complete projects at their estimated cost was statistically significant at 5%. Considering cost, the traditional procurement system provides more price certainty to the client at the very early stage of the project (Masterman, 1992). However, Lam et al. (2003) also indicated that the cost of the project procured using management contracting and professional construction management system tends to be lower than those using other procurement approach (Lam et al., 2003). The table (4.3) also shows positive influence of the need

to produce quality products or project by construction firms on the practice of procurement management systems at a statistical significance level of 10%. This therefore implies that construction firms that have the desire to produce quality projects have higher probability or odds (9.8176) of employing procurement management systems. Considering quality of a project, the traditional procurement system provides a high degree of quality certainty and functional standards (Masterman, 1996).

Minimization of construction time also positively affects construction firm's use or practice of procurement management systems at a statistical significance level of 10%. This implies that construction firms with the desire to minimize construction time have greater probability or odds (0.5039) of adopting procurement management system in the construction industry. High degree of control of construction projects positively influences procurement management practices at a statistical significance level of 5%. Construction firms that desire to have a high degree of control of the construction projects therefore have greater probability or odds of practicing or using procurement management system.

To further elaborate on the factors affecting the practice or adoption of procurement management methods or systems, the result from table (4.3) showed that construction firms that desire flexibility to entertain change for client's requirements, availability of information at project inception, desire to avoid risk and resolve disputes have greater odds or probability of practicing or adopting procurement management systems. Also, the more complex the technical nature of the construction project, the higher or the greater the odds of the adoption or practice of procurement management systems.

However, other factors such as insufficient knowledge of procurement management system, inadequacy of capital, and inadequacy of human resources all negatively influence the practice or adoption of procurement management systems in the construction industry. That is to say, the more construction firms are less equipped with the financial capability, the human resource capability and the technical know-how, the lower their probability or odds of adopting or employing procurement management systems.

#### 4.3.1 Rank of factors influencing contractor's choice of procurement management system

This section of the study ranks the factors influencing contractor's choice of procurement management systems. To achieve this objective, the respondents were presented with 16 factors identified by several researchers in the reviewed literature in different study settings to indicate their level of agreement to them as factors affecting the construction firms choice of management procurement system by choosing from 'Strongly Disagree' [1] to 'Strongly Agree' [5]. For each factor affecting the construction firm's choice, the Relative Importance Index (RII) was calculated and by extension their ranks. The result of the frequency responses of the surveyed respondents and the weight, RII and ranks of the factors are presented in Table 4.4.

**Table 4.4: Rank of factors influencing contractor's choice of MPS**

| Factors  | 1 | 2 | 3  | 4 | 5  | Weight | RII   | Rank |
|--|---|---|----|---|----|--------|-------|------|
| Minimization of construction time                | 0 | 0 | 5  | 9 | 89 | 496    | 0.963 | 1    |
| Project completion at estimated cost             | 0 | 7 | 5  | 5 | 86 | 479    | 0.930 | 2    |
| Quality assurance                                | 0 | 5 | 10 | 3 | 85 | 477    | 0.926 | 3    |
| Minimization of design time                      | 0 | 4 | 13 | 2 | 84 | 475    | 0.922 | 4    |
| Consultancy service offered                      | 0 | 5 | 16 | 2 | 80 | 466    | 0.905 | 5    |
| Availability of information at project inception | 0 | 5 | 18 | 2 | 78 | 462    | 0.897 | 6    |
| Technical complexity of construction             | 6 | 2 | 19 | 2 | 75 | 450    | 0.874 | 7    |

|   |    |    |    |   |    |     |       |    |
|---|----|----|----|---|----|-----|-------|----|
| Risk avoidance                              | 9  | 1  | 20 | 1 | 72 | 435 | 0.845 | 8  |
| Insufficient knowledge of the system        | 9  | 1  | 20 | 2 | 71 | 430 | 0.835 | 9  |
| Inadequacy of capital                       | 10 | 1  | 21 | 1 | 70 | 429 | 0.833 | 10 |
| Flexibility to entertain change for clients | 15 | 17 | 26 | 1 | 44 | 351 | 0.682 | 11 |
| Dispute resolution                          | 18 | 16 | 26 | 1 | 42 | 342 | 0.664 | 12 |
| Inadequacy of human resources               | 20 | 25 | 27 | 2 | 29 | 304 | 0.590 | 13 |
| Nature of the client                        | 28 | 27 | 28 | 4 | 15 | 257 | 0.499 | 14 |
| Nature of the project                       | 29 | 30 | 30 | 3 | 11 | 246 | 0.478 | 15 |
| High degree of control                      | 30 | 37 | 31 | 3 | 2  | 219 | 0.425 | 16 |

Rank: [1-Strongly Disagree, 2-Disagree, 3-Fairly Agree, 4-Agree, 5-Strongly Agree] Source: Field Survey, 2014

Table (4.4) shows the factors that influence the choice among the variants of traditional procurement method. Project completion at estimated time ranks highest with RII of 0.963, followed by project completion at estimated cost with RII of 0.930. Quality assurance was ranked third with RII of 0.926 and design time minimization with RII of 0.922 was ranked fourth. The consultancy service offered and the availability of information at project inception were ranked fifth and sixth with RII of 0.905, and 0.897 respectively. The seventh, eighth, ninth, and tenth ranked factors influencing contractors choice of management procurement systems were the technical complexity of the construction project, the possible risk avoidance involved, the insufficiency of knowledge of the system, and the inadequacy of capital with RII of 0.874, 0.845, 0.835 and 0.833 respectively. However, some of the low ranked factors considered in the choice of procurement management system with RII below 0.700 included flexibility to entertain change for clients, dispute resolution, inadequacy of human resources, nature of the client, nature of the project, and the high degree of control. This results indicate that the variants of the traditional procurement system is made in order of consideration of project completion at estimated time (ranked highest); project completion at estimated cost; assurance of quality, minimization of design time and the availability of information at project inception. The fact that consultancy service

offered and capital adequacy were ranked low does not, however, implied that stakeholders do not consider these as important factors affecting projects delivery. This result also shows that much more factors are considered in making choice of the variants of the procurement methods.

#### 4.4 Effect of Management Procurement System on the Success of Building Project

This section of the study assesses the effects of management procurement systems on the success of building projects in the construction industry in Ghana. To achieve this objective, the respondents were presented with 9 possible effects of management procurement system practice on the success of building project in the construction identified in literature to indicate their level of agreement to them by choosing from ‘strongly disagree’ [1] to ‘strongly agree’ [5]. After the information for this section was collated, the relative importance index (RII) analytical method or formula was used to identify the most important effects or impact of management procurement systems on the success of building projects in Ghana. Table 4.5 therefore presents the frequencies of the respondents, weight, RII and by extension the ranks of the possible effects.

**Table 4.5: Effects of MPS on the success of building project**

| Factors  | 1  | 2 | 3  | 4  | 5  | Weight | RII   | Rank |
|--|----|---|----|----|----|--------|-------|------|
| Reduce project cost                              | 0  | 0 | 0  | 4  | 99 | 511    | 0.992 | 1    |
| Reduce conflict of interest                      | 0  | 0 | 0  | 15 | 88 | 500    | 0.971 | 2    |
| Risk reduction                                   | 0  | 0 | 0  | 25 | 78 | 490    | 0.951 | 3    |
| Design flexibility                               | 0  | 0 | 12 | 20 | 71 | 471    | 0.915 | 4    |
| Fast tracking or quicker delivery                | 0  | 3 | 12 | 18 | 70 | 464    | 0.901 | 5    |
| Achieve full control of the construction process | 0  | 9 | 11 | 16 | 67 | 450    | 0.874 | 6    |
| Improve project quality                          | 8  | 6 | 11 | 14 | 64 | 429    | 0.833 | 7    |
| Ensure affirmative procurement/empowerment       | 15 | 7 | 9  | 11 | 61 | 405    | 0.786 | 8    |
| Others please specify                            | 24 | 9 | 5  | 9  | 56 | 373    | 0.723 | 9    |

Rank: [1-Strongly Disagree, 2-Disagree, 3-Fairly Agree, 4-Agree, 5-Strongly Agree]  
Source: Field Survey, 2014

From Table 4.5, a critical observation of the ranked measures reveals the following results in terms of the effect of the adoption of management procurement systems on the success of building project in the descending order of rank. From the table (4.5), the highest ranked effects of management procurement system on building project success was reduction in project cost with RII of 0.992, followed by reduction of conflict of interest in building project delivery with RII of 0.971, then contractor's reduction of risk in the delivery of services with RII of 0.951, then by design flexibility with RII of 0.915. The fifth and sixth ranked effects of management procurement system on the success of building projects were fast tracking or quicker delivery and achievement of full control of the construction process with RII of 0.901 and 0.874 respectively. Thus, the result shows that construction firms enjoy major benefits in their adoption of management procurement systems including reduction of project cost, reduction of conflict of interest, reduction of possible risks associated with construction, enjoy design flexibility, and enjoy fast tracking or quicker delivery of building projects. However, irrespective of the importance of the effects of procurement management systems such as improvement in project quality, and ensuring affirmative procurement/empowerment were relatively ranked lower as shown by the RII of 0.833 and 0.786.

#### **4.5 Challenges of the practice of management procurement system**

This section of the study identifies the various challenges of the adoption of procurement management systems in the construction industry. Respondents were presented with a list of 10 challenges revealed in literature as a shortcoming of the adoption of construction management system. The task of each respondent was to indicate the level at which the listed factors challenge construction firms in their delivery or adoption of procurement management systems by choosing

from Strongly Agree [5] to Strongly Disagree [1]. The Table 4.6 displays the mean ranks and by extension, the ranks of the problems as adjudged by the 103 participating construction professionals of the study. The result of Table 4.6 was obtained following the non-parametric test for k-related samples in SPSS 17. The level of agreement between the 103 surveyed construction professionals was tested using the Kendall's coefficient of concordance since there are three or more judges or respondents.

**Table 4.6: Challenges of construction management system**

| <b>Obstacles of the construction management system</b>                  | <b>Mean Rank</b> | <b>Rank</b> |
|---|------------------|-------------|
| Increased level of risk for the client                                  | 6.79             | 1           |
| Lack of a firm price when construction commences                        | 6.45             | 2           |
| More administration for client  | 6.12             | 3           |
| Need for meticulous and comprehensive administration                    | 5.34             | 4           |
| Construction project manager must be an expert and control process well | 5.08             | 5           |
| Price needs to be fixed beforehand                                      | 4.78             | 6           |
| Lack of understanding of construction management by industry            | 4.45             | 7           |
| Unsuitable projects with high aesthetic and prestige requirement        | 4.18             | 8           |
| Rigid tender procedures make conditions difficult to implement          | 3.90             | 9           |
| Client is unlikely to know whom he is dealing with                      | 3.67             | 10          |
| <b>Test Statistics</b>  |                  |             |
| N   |                  | 103         |
| Kendall's W <sup>a</sup>  |                  | 0.738       |
| Chi-Square  |                  | 664.2       |
| Degree of Freedom   |                  | 9           |
| Sig.  |                  | 0.000       |

Source: Field Survey, 2014

From Table 4.6, the major or highest challenges of construction management system adoption was the increased level of risk for the client with a mean rank of 6.79. The second, third and fourth ranked challenges of the adoption of construction procurement management system in the

construction industry were lack of a firm price when construction commences, more administration for clients, and need for meticulous and comprehensive administration with mean ranks of 6.45, 6.12 and 5.34 respectively. The fifth and sixth ranked challenges of the adoption of construction management systems were the need for construction project manager to be experts in the system and control process well and the need for price to be fixed beforehand with mean ranks of 5.08 and 4.78 respectively. However, the three least ranked challenges of the adoption of procurement management systems in the construction industry were unsuitable projects with high aesthetic and prestige requirement, rigid tender procedures that make conditions difficult to implement, and client's unlikeliness to know the person they are dealing with; with mean ranks of 4.18, 3.90 and 3.67 respectively. This therefore implies that though much emphasis is put on risk reduction during the adoption of procurement management system, the construction firms rarely achieve that to their fullest satisfaction.

The test statistics (chi-square) indicates that the respondents agreed to the ranking order of the listed challenges in Table 4.6. This is because the significance of the chi-square test at 1% indicates the rejection of the null hypothesis of 'no agreement' between the judges or respondents. The level of agreement as indicated by the Kendall's coefficient of concordance value of 0.738 is approximately about 74%.

#### **4.6 Summary of Chapter Four**

The chapter presents the findings of the study in terms of the major objectives of the study. The chapter revealed that the construction firms in the study area consider all possible procurement systems at the start of new construction projects. The procurement system or method predominantly used by construction firms in the Accra metropolis was the traditional method, though the other conventional methods are also used. The factors identified in the study to

influence construction firm's choice of procurement management systems include project completion at estimated cost, quality assurance, minimization of construction time, minimization of design time, high degree of control, flexibility to entertain change for clients requirement, technical complexity of construction, availability of information at project inception, risk avoidance, insufficient knowledge of the system, inadequacy of capital, inadequacy of human resources, and dispute resolution. The highly two ranked effects of the practice of procurement management system by construction firms revealed in the study include reduce project cost and reduce conflict of interest. Some of the major identified challenges of the practice of procurement management system to construction firms revealed in the study include increased level of risk for the client, lack of a firm price when construction commences and others

## **CHAPTER FIVE**

### **SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATION**

This chapter mainly focused on key finding of the research problem analysis, measures to be taken in order to improve the benefits of the practice of building procurement management systems, and conclusion of the study. The recommendations constitute principally managerial level policies.

#### **5.1 Summary of Finding**

This research was set: (1) To identify the extent to which management procurement is practised in Ghana; (2) To identify the factors that influence the choice of management procurement system for building construction; and (3) To examine the effects of management procurement system on building project success. Rigorous field works was conducted and below are the main findings:

##### **5.1.1 Practice of management procurement system**

The construction firms in the study area consider all possible procurement systems at the start of new construction projects. The procurement system or method predominantly used by construction firms in the Accra metropolis was the traditional method, though the other conventional methods are also used. Relatively, the non-traditional method of procurement system predominantly used was the design and construct system. Among the Public Private Partnership (PPP) variants of the non-traditional procurement methods, BOT is the most practiced among the construction firms in the study area.

### **5.1.2 Factors influencing management procurement system practice**

The factors identified in the study to influence construction firm's choice of procurement management systems include project completion at estimated cost, quality assurance, minimization of construction time, minimization of design time, high degree of control, flexibility to entertain change for clients requirement, technical complexity of construction, availability of information at project inception, risk avoidance, insufficient knowledge of the system, inadequacy of capital, inadequacy of human resources, and dispute resolution.

The most highly ranked of the factors influencing construction firm's choice of procurement systems included minimization of construction time, project completion at estimated cost, quality assurance minimization of design time, consultancy service offered, availability of information at project inception, and technical complexity of construction, in that order of rank.

### **5.1.3 Effect of Management Procurement System on the Success of Building Project**

The highly six ranked effects of the practice of procurement management system by construction firms revealed in the study include reduce project cost, reduce conflict of interest, risk reduction,

design flexibility, fast tracking or quicker delivery, and achieve full control of the construction process; in that order of rank.

#### **5.1.4 Challenges of the practice of management procurement system**

Some of the major identified challenges of the practice of procurement management system to construction firms revealed in the study include increased level of risk for the client, Lack of a firm price when construction commences, more administration for client, need for meticulous and comprehensive administration, construction project manager must be an expert and control process well, price needs to be fixed beforehand, and lack of understanding of construction management by industry; in that order of rank.

#### **5.2 Conclusion**

This study reveals more than half (58.3%) of construction projects are often executed using variants of traditional procurement method; 43.5% of the non-traditional methods are through design and construct; and 50.0% of the variants of public private partnership (PPP) are executed through BOT in Ghana. The results give a general indication that both the traditional and nonconventional procurement methods are currently embraced in Ghana. The results, however, show that the procurement methods in use are still much of variants of traditional method. This may be presumably due to long age existence of the traditional procurement systems. It could be noted that despite the fact that almost all variants of the non-conventional method have been applied to construction contracts (except DBFO), the percentages of the use of design and build method is still significantly low, indicating that stakeholders are still not well familiar with this variant of non-conventional procurement system, or are yet to appreciate their advantages. The results of the study further indicate that the choice of variants of the procurement system is made in order of

consideration of project completion at estimated time; project completion at estimated cost; availability of information at project inception; Quality assurance; Minimization of design time; High degree of control; Flexibility to entertain change for clients requirement; Consultancy service offered; Technical complexity of construction; Availability of information at project inception; Risk avoidance and others. Building procurement system employed by construction firms ensures reduce project cost; reduce conflict of interest, risk reduction, design flexibility, fast tracking or quicker delivery, and full control of the construction process.

However, there are several challenges in the practice of the variants of the procurement systems or methods including increased level of risk for the client, lack of a firm price when construction commences, more administration for client, need for meticulous and comprehensive administration, the need for construction project managers to be an expert and control process well and the need for prices to be fixed beforehand.

### **5.3 Recommendation**

Based on the findings of this study, the following general recommendations are made:

All forms and types of construction clients should consider the usage of building procurement management systems, as they may offer time and cost benefits and hence profit maximization.

On commencement of construction project, principal agents must advise their clients about other building procurement systems available. If possible, there should be a thorough feasibility study of a suitable procurement system for a contracted project. Furthermore, an established model needs to be used to assist in the selection of a suitable building procurement system for contracted project.

To fully achieve the benefits that could possibly accrue from the usage of procurement management system, a construction manager that is suitably qualified and experienced in procurement management systems should be selected. This could ensure that such a person or entity provides the necessary leadership and guidance to the rest of the professional team, which may not be experienced in the usage and application of this system.

Clients should endeavour to appoint suitably qualified and experienced organisations that are either specialist construction project managers (where construction management “not at risk” is desired or required) or building contractors (where construction management “at risk” is desired or required).

On commencement of the project, the project team needs to be taken through a project kick-off meeting and training (training on procurement management system) that could incorporate a team building exercise and at worse a basic understanding of the variants of procurement management methods. The purpose of such an exercise and meeting could be to provide thorough brief on the project, explain the selected building procurement management concept, how it works, its pitfalls and recipes for success.

There is the need to utilise the available current guidelines for the implementation of building procurement management system, such as those published by the CMAA in the planning, training or education and implementation of the project procurement system.

Furthermore, there is the need to clearly define and communicate the roles and responsibilities of all players in the project to avoid any form of conflict that could derail the effects that can be chalked from the implementation of building procurement management systems.

#### **5.4 Limitations and Areas for Further Studies**

This study has attempted to make an important contribution to the constructions firms in their attempt to selecting procurement management methods in the execution of contracted building projects. However, as is the case with most empirical investigations, certain limitations are evident and should be considered when making interpretations and conclusions from the study's findings. Future research regarding this topic can be extended to include other geographical areas, for example, other construction firms in other regions in Ghana. This would therefore assist in the generalisability of the results from the empirical investigation. Further study could expatiate on the situation by assessing factors influencing construction firm's selection of specific management procurement systems by using multinomial logistic regression analysis.

# KNUST

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**APPENDIX**  
**QUESTIONNAIRE**

**Dear Respondent,**

I am a Post-Graduate Planning Student of KNUST undertaking a study to assess the viability of management procurement system in the Building Industry in Ghana. This study forms part of the requirement for the program of Master of Science (MSc) in the College of Architecting and Planning, KNUST. Please, read each question carefully before responding, and then circle or tick the appropriate answer in the designated space. Please answer to the best of your ability. You are rest assured that the study is for only academic purposes; all and every information provided will therefore be treated with the utmost confidentiality. Thank you for your help.

**Demographic Characteristics**

Type of Organization of Respondents

Public institutions

Consulting firms

Contracting firms

Professional background of respondent

Construction project manager

Construction manager

Quantity surveyor

Architect

Civil and/or structural engineer

Electrical and/or mechanical engineer

Others (Please specify) .....

Respondent's Academic Qualification

HND

PDG

BSc/B. Tech

MSc/MPhil

Others (Please specify) .....

Nature of projects undertaking by respondents

Office buildings

Residential buildings

- Industrial buildings
- Civil engineering projects
- Combination of above

Respondent's years of experience in the construction industry

- 0-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- Over 20 years

### **Practices of Management Procurement systems**

Do you consider all possible building procurement systems at start of new construction projects?  
Yes  No

How often are construction management systems practices in your outfit?  
Very often  often  not often  not at all

What type of procurement method or systems is practiced by your company?

- Traditional method
- Non-traditional methods

What form of non-traditional procurement system (Design and build variants) is employed by your outfit?

- Design and construct
- Package deal
- Management contracting
- Construction management

What form of Public Private Partnership variants is employed by your outfit? DBFT

- 
- BOT
- BOO
- DBFO
- BOOT
- ROT
- BLT

Please indicate the extent of your knowledge and understanding of the underlisted procurement systems by choosing from a scale of 1 to 5 where 1 = no knowledge and 5 = excellent knowledge.

(1-no knowledge, 2-fair knowledge, 3-good knowledge, 4-very good knowledge, and 5-excellent knowledge) ‘no knowledge’ to ‘excellent knowledge’

|   | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Traditional system (with or without project management)       |   |   |   |   |   |
| Construction management                                       |   |   |   |   |   |
| Management contracting  |   |   |   |   |   |
| Design and build (including turnkey)                          |   |   |   |   |   |
| Design and manage (including build, operate and transfer etc) |   |   |   |   |   |

### Factors Influencing the Choice of Procurement Management System

With regard to the procurement management practice systems of your firm, please tick the appropriate number to indicate the reasons for your outfits’ choice of the conventional procurement system over the traditional procurement practices. The item scales are five-point Likert type scales with 1 = strongly disagree, 2 = disagree, 3 = fairly agree, 4 = agree, 5 = strongly agree. Please use the numbering 1 – 5 to indicate your choice.

| Factors   | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Project completion at estimated cost                              |   |   |   |   |   |
| Quality assurance   |   |   |   |   |   |
| Minimization of construction time                                 |   |   |   |   |   |
| Minimization of design time                                       |   |   |   |   |   |
| High degree of control  |   |   |   |   |   |
| Flexibility to entertain change for clients requirement           |   |   |   |   |   |
| Consultancy service offered                                       |   |   |   |   |   |
| Technical complexity of construction                              |   |   |   |   |   |
| Availability of information at project inception                  |   |   |   |   |   |
| Risk avoidance  |   |   |   |   |   |
| Nature of the project   |   |   |   |   |   |
| Nature of the client  |   |   |   |   |   |
| Insufficient knowledge of the system                              |   |   |   |   |   |
| Inadequacy of capital   |   |   |   |   |   |
| Inadequacy of human resources                                     |   |   |   |   |   |
| availability of technologies                                      |   |   |   |   |   |
| Responsibility (i.r.o. product quality, design, and construction) |   |   |   |   |   |
| Dispute resolution, etc.  |   |   |   |   |   |

### Effect of Management Procurement System on the Success of Building Project

Do you believe in the relationship between building procurement selection and project success?  
 Yes [ ] No [ ]

Please indicate whether the underlisted factors are effect of the management procurement system on the success of building project of your company by choosing from a five pointer scale of 1 to 5 where 1 = Strongly Disagree and 5 = Strongly Agree. (1 = Strongly Disagree, 2 = Disagree, 3 = Fairly Agree, 4 = Agree, 5 = Strongly Agree)

| Factors  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
| Improve project quality                          |   |   |   |   |   |
| Reduce project cost                              |   |   |   |   |   |
| Reduce conflict of interest                      |   |   |   |   |   |
| Achieve full control of the construction process |   |   |   |   |   |
| Ensure affirmative procurement/empowerment       |   |   |   |   |   |
| Fast tracking or quicker delivery                |   |   |   |   |   |
| Design flexibility                               |   |   |   |   |   |
| Risk reduction                                   |   |   |   |   |   |
| Others please specify                            |   |   |   |   |   |

Please indicate whether the underlisted factors are shortcomings of the practice of management procurement system in the construction industry by choosing from a five pointer scale of 1 to 5 where 1 = Strongly Disagree and 5 = Strongly Agree. (1 = Strongly Disagree, 2 = Disagree, 3 = Fairly Agree, 4 = Agree, 5 = Strongly Agree)

| Shortcomings of the construction management system                              | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Increased level of risk for the client  |   |   |   |   |   |
| Lack of a firm price when construction commences                                |   |   |   |   |   |
| More administration for client in terms of payments, guarantees, contracts etc. |   |   |   |   |   |
| Need for meticulous and comprehensive administration                            |   |   |   |   |   |
| Construction project manager must be an expert and control process well         |   |   |   |   |   |
| Price needs to be fixed beforehand  |   |   |   |   |   |
| Lack of understanding of construction management by industry                    |   |   |   |   |   |
| Unsuitable projects with high aesthetic and prestige requirement                |   |   |   |   |   |
| Rigid tender procedures make conditions difficult to implement                  |   |   |   |   |   |
| Client is unlikely to know whom he is dealing with                              |   |   |   |   |   |