

UNIVERSITY OF EDUCATION, KUMASI CAMPUS

**TOOLS/METHODS FOR DETERMINING QUALITY OF CONSTRUCTION
PROJECTS IN THE CONSTRUCTION INDUSTRY: A STUDY OF PUBLIC
SECTOR PROJECTS IN GHANA**



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**A Dissertation in the Department of construction and wood Technology
Education, Faculty of Technical Education, submitted to the School of Graduate
Studies, University of Education, Winneba in partial fulfilment of the
requirements for award of the Master of Philosophy (Construction Technology)**

MAY, 2020

DECLARATION

STUDENT'S DECLARATION

I, KIRK KOFI KUDOZIA declare that this Dissertation with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE:.....

DATE:.....



SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidance for supervision of Dissertation as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: Dr. Nongiba Alkanam Kheni

SIGNATURE:.....

DATE:.....

DEDICATION

I dedicate this dissertation to my spouse and kids: Mrs. Rejoice Kudozia, Kaleb Kudozia, Kelvin Kudozia and Karney Kudozia.



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ABSTRACT

There is a growing concern with the quality of construction projects in the public sector in Ghana. The study explored the determinants of quality of construction projects in the public sub-sector of the construction industry in Ghana within the context of Metropolitan, Municipal and District Assemblies (MMDAs) in the Ashanti region. The study was both quantitative and qualitative in nature. A total of 207 respondents out of the sampled 210 respondents took part in the study. The study identified quality performance, cost performance, time performance and beneficiaries' satisfaction were the common approaches the various Assemblies adopted in ensuring and measuring the quality performance of construction projects. In addition, most MMDAs adopted the stakeholder role model, beneficiaries' satisfaction as some of the strategies for measuring quality of construction projects. Internal determinants of construction project quality included design, contract, materials, labour and equipment determinants. External determinants of construction project quality included economic environment, social environment, technological environment, procurement process and the physical environment. The study identified lack of competitive bidding process, weak capacities of project management teams, bribery and corruption in the construction industry among others as the key constraints to enhancing the quality performance of construction projects. The study recommended capacity building on project management for key staff of MMDAs, strict adherence to procurement best practices, ensuring participatory project planning and implementation, leveraging on the internal determinants to minimize the effects of external determinants, utilization of realistic designs and budgets and sustaining an Effective Monitoring and Evaluation Systems as measures for enhancing the quality of construction projects within the public sub-sector.

CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

The significance of the construction sector to sustainable development and progress in any economy globally cannot be undervalued. Nearly every sector of a country economy depends partly or solely in the construction industry for their existence (Ofori-Kuragu et al., 2017, Al-Momani, 2000, Hussain, *et al.*, 2017). More also, the combined effects of a rapid population growth and urbanization in developing countries is the increasing demand for infrastructural facilities (Ahmed *et al.*, 2014). Thus, the construction industry in Ghana has never been critical than now as population growth and urbanization are in the ascendance in recent times. To sum it up, the Sustainable Development Goal 9 and the Africa Union Agenda 2063 goal 10 seeks to build resilient infrastructure, promote inclusive and sustainable industrialization as well as foster innovation and a world class infrastructure across Africa. This place the quality of construction performance especially in the public landscape on the watch-line as the quality of public construction projects will be used to measure these goals greatly. Hence, a well-functioning construction industry is thus critical to the overall global development and Ghana being no exception. This is reflected in the extent of resources invested into the sector in areas of educational facilities, health facilities, and roads among others from government, donors and the private individuals.

In this line, Oketet *al* (2017) concludes that, the quality of construction projects is one of the traditional and global measure of project performance in the construction industry. Thus, in the execution of construction projects, the ultimate interest of every

stakeholder is quality performance (Ofori, 2006). Quality which is described as the meeting of specifications and approved standard agreed by all stakeholders is becomes a major concern in the construction industry in the public space. Rustom & Amer (2013) has stated that, quality in the construction industry has become a subject of discussion. The need for achieving quality of the finished product in the building construction industry is no less than in any other industry (Chan & Tam, 2000). The high cost of buildings makes it necessary to ensure quality of the finished product (Abdel-Razek (1998).

Notwithstanding the progress made in the quality of construction projects in the advanced countries, but that cannot be said of Ghana (Ofori-Kuragu et al., 2012). This has created in a situation where large-scale construction projects are executed by foreign owned companies (1999). Many of the small-scale construction projects executed by Ghanaian companies' exhibit major defects even during the Defects Liability Period of 6 months. Thus, this study seeks to examine the determinants of quality of construction projects in the construction industry and develop a framework for improving the quality performance of construction projects in Ghana.

Quality has become a typical issue in services and products delivery recently especially in the construction industry as a result the cost involved. This is triggered by the increasing competition in the service and products environment. The definition of quality is not precise. According to Zakari (2016), over the years, the definition of quality has triggered a lot of debates among academicians. Quality is either viewed from the customer point of view or the producer/service provider point of view (Goran, 2014). Lovelock & Wirtz (2007), contends that, the definition of quality must be from the customers' perspective. This supports the adage that, "the customer is king".

According to Goran (2014), the term quality emanates from the latin word “qualitas”. The term gain prominence in the 1910th where the Ford Company was introduced. Armstrong (2011) defined quality as the degree of excellence which an entity can achieve in its service provision. In the 1970s, Juran defined quality as the suitability of requirements determine by the customers (Juran, 1970). According to Hammer and Champy (2003), quality encompasses the processes and activities that begin from the input stage to the output stage in order to have a satisfied consumer.

The after mentioned definitions of quality indicate that, the term is a subjective term which definition is relative to the individual defining and measuring it. The subjectivity of quality has made the term volatile in its measurements. Quality in the context is considered as the meeting of specifications and approved standard agreed by all stakeholders is become a major concern in the construction industry in the public space. Thus, the level at which construction projects meet contract conditions.

1.2. Statement of the Problem

The perception of poor-quality performance of construction projects in the public sector in Ghana is widespread (Ofori-Kuraguet *al.*, 2017). As argued by Raphael & Phillip (2016), a number of public funded construction projects have failed to successfully attain the quality performance standards. To buttress this, Wells (2015) argued that several construction projects had been closed either without achieving quality performance standards or completed with variations to the original quality requirement. Thus, this is an increasing negative perception about the quality of construction projects in recent times in Ghana.

Regarding the quality of construction projects in the public sector, Ofori-Kuragu *et al.*, (2017) positioned that, construction projects quality in the public sector is a major concern in recent times. These concerns are attributed to a varied of factors ranging from procurement lapses, contract management and funding. It is therefore an undeniable fact that, there are problems of quality in construction projects in developing countries with the public sector being the commonest culprit (Gyadu-Asiedu, 2009). Similarly, Oyegbile et al (2012) have stated that, for the past ten years, the number of collapsed building in Nigeria is alarming. This assertion is not different from the Ghanaian setting as the Melcom incidences among others are still fresh in the minds of the public. Currently, the Madina-Adenta highway has been subject matter of public discussion. These all point to disturbing issues on the quality of projects in Ghana. Within the various Metropolitan, Municipal and District Assemblies, a number of projects has been abandoned due to structural defects or completed and cannot be use due to specification challenges. Ahadzie et al (2008) posit that, the rampant failures in the quality performance targets within the Ghanaian construction industry are blamed on limited knowledge in the application of requisite management practices. Federation of International Des Ingenieurs-Conseils (FIDIC) (2006) has documents that, within the construction industry, the failure to achieve the required quality results in construction projects in a global problem.

To address these widespread concerns about construction project quality in Ghana especially in the public domain, government has introduced the National Building Code act of 2018, Act 1207 to ensure adherences to standards of quality in the construction industry. This is an admission that, the quality of construction projects do not meet requirement.

According to Anvuur et al. (2006), successive reviews of construction activities revealed considerable weakness and that value for money audit was not achieved asking quality questions. That, the industry is characterized by late deliveries, budget and quality problems. The structure of the Ghanaian construction industry is characterized by cost, time and quality problems as indicated by Tadayon et al. (2012). Qammaz (2007) show that construction risk is an event that influence project objectives such as cost, time and quality due to the fact that the construction industry inherits amount of risks. The levels of risk are usually associated with the nature of the project (Darnall & Preston, 2010). That is, each project with its level of risk depending on the nature of the project (Gould and Joyce, 2002). There still exist various consultancy firms that do not appreciate the project management process to effectively deal with risks and quality issues at each stage of the project cycle.

Notwithstanding the varied concerns presented on the quality of construction of projects in the country, few studies exist explicitly investigating the quality of construction projects in the construction industry in Ghana with a focus on the public sector. Available studies have tendered to blame the issues on delays in payments and limited knowledge level on quality management practices while turning a blind eye on detail analysis of quality management of construction projects. This study therefore, explored the determinants of quality of construction projects in the public sector and accordingly develop a framework of recommendations for improving the quality of performance of construction projects in Ghana.

1.3. Aim and Objectives of the Study

The aim of the study explored the determinants of quality of construction projects in the public subsector of the construction industry in Ghana and to make recommendations for improving the quality performance of construction projects in Ghana. Specifically, the study worked on:

- i. to identify existing tools/strategies for ensuring quality of construction projects in the construction industry in Ghana;
- ii. to identify the key drivers of quality performance of public sector constructions projects in Ghana;
- iii. to identify key constraints to enhancing the quality performance of public sector construction projects in Ghana; and,
- iv. to make recommendation for improving the quality performance of public sector construction projects in Ghana.

1.4. Research Questions

Based on the study specific objectives, the following research questions were work on;

- i. What are the existing tools/strategies for ensuring quality of construction projects in the construction industry in Ghana?
- ii. What are the key drivers of quality performance of public sector constructions projects in Ghana?
- iii. What are the key constraints to enhancing the quality performance of public sector construction projects in Ghana?
- iv. What measures can be implemented to improve the quality performance of public sector construction projects in Ghana?

1.5. Significance of the Study

The significance of studies in the construction sector is immeasurable. This is because of the number of stakeholders who directly or indirectly affected by construction projects. The study immediate outcome is the determination of the determinants of quality of construction projects in the construction industry in the Ghanaian public sector. This will result in the development of a framework for improving the quality performance of construction projects in Ghana.

Based on this outcome, the significance of the study will include but not limited to following;

Firstly, the study outcome will contribute to national and sectorial decision making in the construction industry. National and sectorial decisions making deliberations will be guided by the outcome of the study as the study will explicitly outlined the determinants of quality of construction projects in the construction industry in the Ghanaian public sector.

Another area worth relevant of significance as a result of the study will be its impact on construction projects implementation. The outcome of the study will guide stakeholders including clients, constructors, consultants, financiers in construction projects be as they will have first-hand information of determinants of quality of construction projects in the construction industry in the Ghanaian public sector. They will as well follow the framework for ensuring quality constructed projects as developed by the study. This will ensure value for money. Finally, the study outcome will guide private individuals in the construction industry to able implement measures in ensuring quality in the construction industry.

1.6. Limitations

The study was being conducted in the public sector. The problem of access to information was encountered by the study. However, this challenge in no way compromised on the quality of the study as the researcher himself is a public servant and had a way that was used to circumvent this challenge.

1.7. Delimitations

The study primarily discussed the determinants of quality of construction projects in the construction industry among Metropolitan, Municipal and District Assemblies in the Ashanti Region. This formed the contextually scope of the study. Geographically, the study was conducted among Metropolitans, Municipals and District Assemblies in the Ashanti Region of Ghana. The study was limited to only the old 30 Assemblies in region. This was to avoid including the new Assemblies who have not implemented any construction projects at the time of this study.

1.8. General Layout of Study Report

The study report is organized in six chapters. Chapter one presents the introduction of the research study and the thrust of the chapter is to provide an overview and justification of the study. It comprises the background of the study, statement of the problem, aim and objectives of the study, research questions, significance of the study, limitations of the study, delimitations of the study, definition of terms and the general layout of the research report.

Chapter Two presents an exhaustive but incisive review of relevant literature related to the study area. The literature review is geared towards justifying the specific objectives of the study, and the theoretical framework upon which the study is built. In addition,

the identified gap in the related literature is highlighted in this chapter. Chapter Three involves the research methodology adopted for the study. It outlines the research design and approach employed and their justification. It provides information on the participants and other objects of the study, by identifying the target population for the study as well as the sample size and the appropriate sampling techniques. In addition, the chapter describes the data collection instruments used in collecting primary data, pilot testing of instruments, validity and reliability of the instruments used, data collection procedures, data analysis and the relevant ethical considerations.

Chapter Four involves the presentation of the results of the study under suitable sections based on the aim and objectives as well the pertinent research questions. The chapter presents the analysis of the field data and the results are presented in the form of summary tables. Chapter Five presents the discussion of the major findings of the study and the inferences made from such findings with reference to related prior studies. The major findings of the study are discussed under suitable themes developed from the research questions.

Chapter Six presents a summary of the major findings of the study, and the relevant conclusions drawn from the findings indicating how the study has achieved the research objectives and contributed to knowledge. Relevant recommendations and suggestions for further research based on the findings of the study are also presented in this chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The second chapter of the study is devoted to reviewing relevant literature on the subject area under investigation. This is necessary as it provides the baseline information on the critical components of the study and will guide the questionnaire development and the analysis of the primary data. Basically, the chapter presents secondary data on quality management as a concept as well as quality management frameworks and techniques. Details of the chapter are discussed below.

2.2. Overview of the Ghanaian Construction Industry

The role of the construction industry in the socio-economic development of a country cannot be overemphasized. The construction industry remains very critical in the socio-economic development of every nation (Callistus, Felix, Ernest, Stephen, & Andrew, 2014). Agyakwa-Baah (2010) has argued that, the construction industry is one of the crucial sector of every developing economy. The sector plays a central role in the development of local and rural communities and creates employment to a greater number of people. Several studies have described the construction industry as critical or the backbone of the Ghanaian economy (Ofori, 2006, Ofori-Kuragu et al, 2017 etc). According to Williams (2016), infrastructure is key for development of any nation. However, the construction sector is fraught with serious challenges. In the view of Chan, et al., (2004), the construction industry is dynamic in nature to the increasing uncertainties in technology, budgets and development processes. It also contributes to the economy of any nation and is seen as a very critical contributor of a nation's Gross

Domestic Product (GDP). Construction industry is quite broad. The housing sector is one of the sector's backbones that determines the success and failure of the industry. Construction projects have difficult and complex to manage.

The construction industry when talked about plays a significant role in the socio-economic development of Ghana. That is, there exist greater correlation between economic growth and the nature of construction industry as economic growth influences the nature of construction projects in any economy (Hull, 2009).

The numerous benefits derived from the industry cannot be underestimated which ranges from bringing infrastructural development to the country, through to the provision of a sanctuary for coordinated development, to the creation of employment to the people. The construction industry as found in Ghana is made up of civil infrastructure, transport infrastructure, telecommunication infrastructure, irrigation and agriculture systems (Osei, 2013).

The construction industry is estimated to contribute about 5 percent to 10 percent to the country's Gross Domestic Product and provides employment to about 10 percent of the active labour force (Asamoah & Decardi, 2014 and (Ankomah *et al.*, 2010). Williams (2016) posits that, public sector organizations (Metropolitan, Municipals and District Assemblies spent a significant amount of their budget on the construction projects. In a similar work by (Ofori, 2012), it was found that the construction industry in Ghana gives sporadic employment to the local people thereby, reducing extreme poverty to an appreciable level. In spite of the numerous benefits highlighted, the construction industry according to Twumasi-Ampofo *et al.*, (2013) is constrained with issues such

are improper planning, high cost of building materials, *low quality of infrastructure projects*, as well as inadequate stakeholder engagements amongst players in the industry as the major treats facing the construction world in the country. Again, Ofori (2012), also found long gestation periods of construction projects in the country as a worrying trend. He stated that these long periods are as a result of complex procedures one need to follow in the implementation of construction projects. He therefore, recommends the need for strong mitigation measures to ensure projects are implemented within their planned timelines. Gyadu-Aseidu (2009), identified clients, professional consultants and contractors as the key stakeholders in the construction industry in Ghana.

The discussion above reveals both the importance and the challenges within the sector especially in the area of quality. Countries globally such as China, United Kingdom (UK) have experienced construction sector booms and has benefited from such booms. A critical look into the Ghanaian construction industry is imminent to discover if the same economic growth and citizen satisfaction through infrastructure development is obtainable in the Ghanaian context.

The manifestation of local government and central government policies are evidenced in projects and programmes (Love & Goodman, 1980). Thus the instruments for measuring local and central government gains are through projects and programmes (Alzahrani & Emsely, 2013). It is more practical in developing countries where infrastructure projects are the signs of development. Most of the government projects in Ghana are found in the area of education, health, road, markets, water and sanitation among others (Damoah, 2015). However, some of these projects according to the

Africa Development Bank-AfDB (2006) and the World Bank (2012) and media reports are faced with various challenges ranging from non-completion, collapsing, poor quality and eventual abandonment. Causes of these project failures include poor communication, poor project planning, socio-cultural factors, scope change and poor resource planning. This results in financial, materials and time losses.

As a result of local governance and decentralization, local authorities such as the Metropolitans, Municipals and District Assemblies are responsible for the actual implementation of most these infrastructure projects with supervision from the mother ministries.

2.3. Procurement of Public Sector Construction Projects

Public procurement in Ghana started in the late 1960s. However, before the introduction of this act, the Ghana National Procurement Agency and the Ghana Supply Company Limited were doing all government procurements (public goods, works, and services). This was because the country had not put down laws to guide the principles of public procurement (Anvuur & Kumaraswamy, 2006). According to the World Bank (2003), the Public Procurement Act, 2003 (Act 663) operates on five (5) key principles. Namely independent control systems, efficient procurement staff, anti-corruption strategies, standardized procurement procedures and tender documents, legal and institutional framework. It thus ensures that there are regulatory mechanisms as well as institutional arrangements for decentralized fiscal control, transparency and accountability regarding the delivery of public goods and services.

In 2010, Ghana joined Marrakech Task Force (MTF) which was incorporating sustainability measures in public procurement practices in the country. A Switzerland led Sustainable Public Procurement Project (SPP) is been implemented to correct the challenges found with the Act, 663. Again, portions of Act, 633 have been amended to suit sustainability demands. The amended law is the Public Procurement Amendment Act, 2016 (Act 914). This act is to ensure procurement meets current demands of the population (PPA, 2012).

Procurement in Ghana is done according to the nature of goods, works and services in question. The nature of the commodity at hand will determine the method that should be used and the amount involved in the procurement process. Procurement entities in the country are entitled to use four (4) procurement methods in the delivery of goods, works and services in the country. They include; competitive tendering (Section 35 & Part V of Act 914) which involves international competitive tendering and national competitive tendering, Request for quotations (Sections 42-43 of Act 914) which deals with asking for at least 3 quoted prices either locally or internationally from bidders or competitors using work orders, Restricted Tendering (Sections 38-39 of Act 914) where few suppliers are invited to tender say 3 to 6 bidders, and Single Source Procurement (Sections 40-41 of Act 914) where goods, services and works are purchased from a single supplier. All these methods operate within a certain framework of the law stipulating when a particular method should be used. Notwithstanding these stipulations in the act regarding the application of the law, there are still several abuses of the act by stakeholders.

It is a fact that the enactment of the Public Procurement Act, 2003 (Act 633) and the Public Procurement Amendment Act, 2016 (Act 914) have made significant impacts in achieving value for money in the delivery of public projects in the country. In light of these impacts, Agorku (2014) identified that the procurement process in Ghana is deviled with little commitment to sustainable procurement. He therefore, recommends more efficient sustainable measures in public procurement so that there would be maximum satisfaction achieved in terms of project design, implementation, and completion geared towards positive impacts with the outcomes of services delivery in the country. This borders on quality of works executed. Hence, knowledge on the determinants of quality of construction projects will provide a relationship with these determinants and public procurement and how public procurement can be used a process of ensuring the efficiency of these determinants.

According to Lysons and Farrington (1989), public procurement is an organizational tool a government uses to ensure responsible supply of goods, works and services to achieve value for money. Procurement takes into consideration timing, quantity, pricing, quality and the overall management of supplies. Procurement is defined by Arrowsmith (2010) as the execution of government's purchasing power on goods, works and services which are needed to meet specific corporate goals. In the view of Odhiambo and Kamau (2003), public procurement describes the purchasing, acquisition or earning through contractual ways, goods, construction works and services by a public entity. It encompasses the purchase, supply or delivery of items/goods, construction works and services. The procurement becomes public when it involves resources from state budget or grant in aid from development partners.

This study defines public procurement as the process through which government and its decentralized bodies (Metropolitans, Municipals and District Assemblies) acquire or contracts an entity in the supply and delivery of public goods, works and services through laid down procedures and laws which are meant to ensure quality and efficiency in works delivery and effective resource allocation. Public procurement projects are usually funded from the national purse using taxpayers' money and other funds from development partners. This study is focused on the procurement of public construction works within the local government setting/system.

2.4. The Concept of Quality

The term quality has become paramount in standardization. In the world of competition, quality has become the benchmark for measuring performance. Quality has remained the forefront of factors used to determine the degree or success or failure of a project. In executing construction project, achieving quality among others is the ultimate objective of all stakeholders (Ofori, G. 2006). As put by Shobana & Ambika (2016), quality is one of the important features in all projects. Thus, success parameter in construction projects depends on the quality performance. It is one of the main factors in the success of construction projects (Mane & Patil, 2015). Also, Oke, Aigbavboa & Dlamini (2017), quality of construction projects is one the traditional and global measures of project performance. For construction, the goal and desire of clients, contractors and consultants is to ensure that, projects are delivered according to acceptable and agreed standards. The definition of quality has received a lot of literature. Few of such literature on the concept were reviewed and inculcated in this study.

Quality as defined by Mallawaarachchi & Senaratne (2015, Arditi & Gunaydin, 1997), is the meeting of the legal, the aesthetic and functional requirements of a project. Another sense, Shobana & Ambika (2016), quality is the ability to ensure complete customer satisfaction in totality which may include all aspects such comfort and appearance. In addition, Oke, Aigbavboa & Dlamini (2017), defined quality described as meeting specification and approved standard agreed by stakeholders. The term has also been construed simply by Mane & Patil (2015) that, it represents the fulfillment of expectations of project participants. Quality in construction industry can be defined as the attainment of acceptable levels of performance from construction activities. This performance would be attained when the activity meets or exceeds the requirement of the client or the owner. The quality of any product or service is achieved when it conforms to the desired specifications. Quality can therefore be generally defined as meeting specifications agreed by stakeholders.

Thus, quality of construction projects is associated with client's satisfaction. Also, quality is defined as the meeting or exceeding the requirement of clients/owners of a project. Quality in the construction industry relates to satisfying the specification mentioned in the contract, completing the project time, fulfilling the owner's requirement within budget, avoiding disputes claims and ensuring the faculties perform its intended purpose.

The understanding of the concept of quality can be interpreted in three levels: quality of production (this measures the satisfaction of the internal needs), quality of product (this measures the client satisfaction) and quality of process (this aim is to get it right the first times).

Another perspective of viewing quality is from the client, contractor and third party (quality assurance companies or local authorities) perspectives. The client view of quality in terms of value for money and fit for purpose. The contractor on the hand view quality in terms of client's satisfaction and fashion. The third-party measure quality relating fit for purpose and material quality level. Thus, quality can be considered a complex concept gauging from the various perspectives it takes.

However, for the purpose of this study, quality is defined as implementing a construction project in accordance with the terms and condition of the contract. Thus, the contract terms and conditions are respected by all parties involved in the contract design and implementation process.

The main objectives of quality in construction projects include the following

- a. Satisfaction of contract specifications
- b. Completion of project within time
- c. Enhancing customer/owner satisfaction
- d. Motivation and empowerment of employee
- e. Avoiding disputes and claims
- f. Performance based on purpose

There are three key elements of quality in construction projects. They include quality characteristics, quality design and quality conformance. Quality characteristic is related to the parameters with respect to which quality – control processes are judged. Quality characteristic includes strength, colors, texture, dimension, height etc. Quality of design refers to the quality with which the design is carried out. It primarily related to meeting

the requirement of the standard, functionally efficient system and economical maintainable system. Quality of conformance referred to the degree to which the constructed facility conformed the design and specification. Quality of conformance is affected by field construction methodology and Inspection.

2.4.1 Dimensions of Quality

Garvin (1984) also provides discussion of eight critical dimensions of product quality. The summarized key points concerning these dimensions of quality are provided below;

- Reliability

It talks about probability of not failing of components of say automobiles or airbus while on service for a specific time period. Less the reliability, more the chances of repair or replacement.

- Durability

This is the effectiveness life of the product or longevity before it is declared as unfit for use. Repair is not possible after this phase of life.

- Serviceability

Customer's view on quality is also influenced by how quickly and economically a repair or routine maintenance activity can be accomplished. This is mentioned as serviceability.

- Aesthetics

This is all about visual appeal of the product, often taking into account factors, such as style, color, shape, packaging, tactile characteristics, and other sensory features.

- Features

Customers tend to purchase products that have more value-added features. This can be beyond basic criteria to enter into the market. A spreadsheet package may come with

built-in statistical quality control features while its competitors did not in the same price range. Feature may also be definite as addition or secondary characteristics attached and supplements primary function of a product. Thus, car stereo is a feature of an automobile whose primary function is transportation.

- Perceived quality

This is all about impression of a customer after using the product and/or service. This dimension is directly influenced by any failures of the product that are highly visible to the public or the way customer is treated when a quality-related problem with a product is addressed. Customer loyalty and repeated business are closely related with perceived quality.

- Reliability

Reliability refers to the dependability of customers on specific service. It is all about what is promised and what is delivered.

- Conformance

Conformance is the precision with which the product or service meets the specified standards

2.5. Overview of Quality Management

Achieving quality in construction industry in long run is a tough issue and has been a problem. Inefficient or no practice of quality management procedures will result in great loss of time, money, material, resource. Quality Management is the umbrella term for approaches in quality. The concept of quality management has evolved over the years. A well-managed quality management system is the medium for ensuring and achieving quality. The concept of quality management is to ensure efforts to achieve the needed level of quality of product or a process which are well planned and organized

(Chin-Kenge & Abdul-Rahman, 2011). The principle of quality management is applicable to every industry, within all organization at every level.

The meaning of quality management has contextual variations. The following are some of the interpretations of quality management found in literature.

Quality Management according to Chin-Kenge & Abdul-Rahman (2011), is defined as a complete management philosophy that permeates every aspect of a company and places quality as a strategic issues. It represents an integrated management effort at every level of a company to enhance customers' satisfaction through a constant and consistent improvement in performance. This definition interprets the concept in the spirit of company development and growth (company level definition). In their work, Harris et al (2006) stated that quality management has seen a transition from reacting to the outcome of site production activities to becoming a strategic business function accounting for the raison d'etre of construction companies.

In other perspective, by the definition adopted by Mane & Patil (2015), quality management is a whole web of activities of the overall management function that determine the quality of policy, objectives and responsibilities and their implementation through system such as quality planning, quality control, quality assurance and quality improvement within a framework of quality system. According to Agbenyega (2014), the main thrust of a quality management system is in defining the processes that will result in the production of quality products and service rather than in detecting defective products or services after they have been produced. Thus, quality management is prevention mechanism than defective. Harries *et al.*, (2006), theorizes that, quality

management has witnessed a transition from reacting to the outcome of site production activities to becoming a strategic business function for construction companies.

Quality management is guided by three fundamental principles as indicated by Sabah (2011), Evans & Lindsay, (2008). These include customers and stakeholders focus, participation and teamwork by everyone in the organization and a process focus supported by continuous improvement and learning.

The purpose of quality management as alluded by the United States Army Corps of Engineers in 2004 include performance tasks, that ensure that is construction is performed according to plans and specifications, on time, within a defined budget and a safe work environment. In the study context, the purpose of quality management is the government's (MMDAs) efforts, separate from, but in coordination and cooperation with the contractor, assure that, the quality set by the plan and specifications are achieved. Thus, quality management is a combined effort by contractors and governments (MMDAs). Quality Management is relevant in the sense that, it ensures the meeting of customer requirements, communicating customer requirements and doing it right first time (McCabe, 1998).

Quality management first emanated from the business world as a result of failures which were seen in the 20th century. Soliman and Spooner (2000) postulated that management is the most important aspect in any attempt to bring together complex, integrated, subsystems and other related components in a systems approach to development. The various components management the researchers found includes human resource management information management, fact-based management, project management.

All these management systems have Total Quality Management (TQM) embedded in them. As Kettunen (2008) puts it, Total Quality Management entails a process of activities which include strategies, objectives, resources allocation, reporting and evaluation.

The dynamics of the project that is to be implemented will influence the strategic management activities that will be employed in solving a particular problem. Measuring quality in project implementation has been a bone of contention amongst project managers and various scholars across the globe. Some scholars are of the view that quality is a process of continuous growth and change whereas others say quality must be viewed as a satisfaction model that views quality as a bundle of excitement by customers and beneficiaries (Sahney et al. 2008).

According to Toremén et al. (2009), Total Quality Management has various strategies and tools at all organizational levels through a human focused approach and at the center of it is continuous data collection, synthesis, analysis and effective planning. The ideal strategies for ensuring total quality management include continuous improvements, performance measurement and benchmarking (Croud et al., 2000). Analysts have developed various quality management tools through a combination of most effective tools to solve current issues. Thi (2012) found nine (9) basic tools when he studied project managing procedures in Thailand. He states Process flow chart; Check sheets, Histograms, Fishbone Diagrams, Control chart, Standardization, Scatter diagrams, Pareto analysis, and Quality-related cost. All these tools are used based on the project or programme needs, objectives and long-term goals. Quality Management leads to total and effective resource allocation based on equity and equality. It also dwells on the principles of basic needs approach and employs a multidisciplinary

approach since it uses knowledge from different fields such as economics, statistics, mathematics, business, and geographical ideologies (Scarborough, 2012) and for Tummala and Tang (1994), the core concepts that can cause significant impacts in total quality management include fact-based management, people participation and partnership, strategic quality planning, continuous improvement, leadership, customer/beneficiary focus, leadership, design quality, speed and prevention, amongst other. For a period between 1993 and 2017, the most widely used management tools are benchmarking, strategic planning, and mission statement (Kádárová & Durkáčová, 2018). However, lack of training and employee development, lack of leadership support, resistance to change, complexity of implementation, and little commitment towards sharing responsibilities amongst various players and negative implementation records are found as the challenges bedeviling total quality management practices around the world (Abd-Elwahed & El-Baz, 2018).

The use of quality management concepts has an influence on the cost effectiveness of projects and yields positive results in terms of project performance and this view is supported by research (Rumane, 2011).

Project management institutes (2013) have three sub-divisions for quality management:

- Quality planning
- Quality control and Assurance
- Quality system

2.5.1 Quality planning

It is document specifying activities and the resources a project requires; drawn from the quality system, the contract documents and includes training requirements of employees, inspection and quality procedures. Quality plan is usually undertaken before contraction activities commence. It is undertaken in conjunction with other project planning activities such as selection of sub-contractors and supplies, determination of construction methods etc. it is updated periodically to reflect contractual requirements and other changing circumstances (Chung, 1999).

According to Harris and McCaffer, (2001), quality planning is a set of activities whose purpose is to define quality system policies, objectives, and requirements and to explain how these policies will be applied, how these objectives will be achieved, and how these requirements will be met. Subsequent to this definition, Construx, (2003) stressed that quality plan is different from a test plan. The study continued that quality plan defines the quality goals, is realistic about where defects come from, selects appropriate detection and prevention methods, and has means not to “go dark”. The Project Management Book of Knowledge “PMBOK” 4 also addressed quality planning from a different position to enhance the thoughts earlier expressed.

It said that quality planning has a process input generated by predecessor processes referred to as the project Scope Statement and Project Management Plan. These processes are introduced by external units like Enterprise Environmental Factors and Organizational Process Assets. PMBOK4 further defined quality planning as the process for "identifying which quality standards are relevant to a project and determining how to satisfy them": In other words, it means planning how to fulfill

process and product (deliverable) quality requirements: "Quality is the degree to which a set of inherent characteristics fulfill requirements". By planning the quality one has to respect some principles, and these are:

- Customer satisfaction comes first: quality is defined by the requirements of the customer.
- Prevention over inspection: it's better to avoid mistakes than to inspect the result and repair the defects.
- Management responsibility: costs of quality must be approved by the management.
- Continuous improvement: becoming better is an iteratively structured process.

2.5.2 Quality control and quality assurance

Quality control/quality assurance is sometimes wrongly used synonymously with each other (Fick et al., 2012). As a result of the confusion between quality assurance and control, one cannot be certain of what quality assurance in a company is unless the activities represented by the term are determined (Juran & Gryna, 1980). Certain industries have viewed quality control as a contractor responsibility and quality assurance as the consultant's responsibility (Fick et al., 2012), however a more comprehensive approach is to consider quality control as an element of quality assurance (Fick et al., 2012; Oberlender, 2000). In the early days of the international standards organization (ISO), work was done to harmonize internationally, the meanings and terms such as quality assurance and quality control. ISO 9000 (2005 p.9) defines quality assurance as "part of quality management focused on providing confidence that quality requirements will be fulfilled" and quality control as "part of quality management focused on fulfilled quality requirements"

ACI 121R-08 (2008) defines quality assurance as;

“actions taken by an organization to provide and document assurance that what is being done and what is being provided are in accordance with the contract documents and standards of good practice for the work’ whilst quality control is defined as ‘actions taken by an organization to provide control and documentation over what is being done and what is being provided so that the applicable standard of good practice and the contract documents of the work are followed”

Quality control and quality assurance has a lot in common, each of them compares and evaluate performance to the objectives. The difference however lies in the fact that quality control maintains control and the comparisons are made during the operation phase; any results received is used in operations. Quality assurance on the other hand verifies that control is bring maintained and performance is measured after the operations have ended.

The results achieved is used both by the operations team and others who may need to know such as management (those not directly involved in the operations but who need to be assured that all is well) (Juran& Godfrey, 1999).Quality assurance can be compared to an insurance policy where each involves expenditure of a small sum to secure protection against a bigger loss. In the case of quality assurance, the protection against loss is the early warning that helps to avert a bigger loss (Juran & Godfrey, 1999).

According to the Project Management Institute (2013) control of quality process makes use of tasks and operations to ensure that the products meet requirements; it is used during the execution and closing phases to demonstrate with relevant data that the customer's acceptance criteria have been met. Quality assurance on the other hand is used during planning and execution stages to provide confidence that customer's requirements will be met. Kerzner (2009) asserts that quality assurance includes external efforts to the processes that provide information for improving the internal process; this function attempts to integrate scope, time and cost functions of projects. Quality control activities eliminate or prevent causes of unsatisfactory performance during production; it controls incoming material; monitors production process and tests finished products (Chung, 1999).

According to Chung (1999), the guiding principle of quality assurance is "doing it right the first time, every time". He asserts that quality assurance has been Client led in the construction industry, but there are obvious benefits for the contractor. He adds that there is a general move towards making the implementation of quality system a contractual requirement, therefore the basis for competition will shift from price only to a combination of quality and price. Quality assurance starts with the Client defining the requirements which are specified in the drawings and specifications and for a quality-based contract, the supervision and verification shifts to the contractor, but the client reserves the right to monitor verification, he notes.

2.5.3 Quality System

“A quality system is a framework for quality management and it embraces the organizational structure, processes, procedures and resources needed to implement a quality management system” (Santos, L., & Escanciano, C. 2002 as cited in Chung, 1999). Its purpose is to satisfy the requirements of quality management and assuring customers of the quality of the products. The features of the framework are as follows (Harris et al., 2013); Policies, plans, functions, processes, resources, responsibilities, authorities and relationships.

A quality system must cover all the activities leading to the finished product such as planning, design, development, purchasing, production, inspection, storage, delivery and after sales services (Chung, 1999). Establishing a quality system puts the house in order by clarifying every one's responsibility, putting the current practices into writing and ensuring that they are adhered to at all instances. For instance, a common task of inspecting material before usage is recorded any time it is undertaken (Chung, 1999).

2.6. Project Quality Performance Measurement

Construction quality according to Battikha, (2002) is a critical factor in determining project acceptance and resultant contractual payment levels. This has made participants in the construction industry to become notably conscious of the role of quality as an essential means to achieve client satisfaction and gaining competitive advantage in the industry.

To be rightful project managers, we need to have more insights on the available total management tools and techniques. We need to know the strengths and weaknesses of each of the tools and understanding how a blend of any of the tools and techniques lead to solving the right problems to enhance project performances (Kádárová & Durkáčová, 2018). Measurement of project performances has been widely practiced worldwide especially in countries where there are megaprojects implemented. Although there have been numerous studies on the performances of megaprojects, little has been done in the construction industry in Ghana (Leong et al., 2014). In looking out for performances of projects, effectiveness and efficiency are the top two (2) parameters which researchers acquaint themselves to prove the success of construction projects. Basically, for a project to achieve effectiveness and efficiency means there is a high or good performance.

According to Neely et al. (2005), effectiveness deals with the extent or level to which beneficiary needs are met whereas efficiency is described as a measure of how judiciously resources are allocated in the implementation of a particular project. There is a direct relationship between these variables. High effectiveness and efficiency indicate high performance level.

The relationship is determined by factors such as contractual managements, power, influence and role of stakeholders involved in the project, and capacity of project managers to overcome internal turbulence. Performance measurement is essential since it allows project managers to track, forecast, and control project variables to maximize project outcomes (Berry et al., 2004).

It has widely been approved that time, cost, and quality (also *known as the golden triangle*) are the key elements to consider when it comes to project performance management. Other performance measures that have been established include stakeholders' satisfaction, safety and health, and transfer of technology.

According to Takim, et al. (2003), performance measurement in the manufacturing and construction industries is used as a holistic way. Moreover, the existing system tends to focus more on product and less on process and design. This can lead to the suboptimal quality of the performance measurement system, the misjudging of relative performance, complacency and the denying of appropriate rewards to the deserving. Prevision studies have revealed that performance can be measured in terms of financial and non-financial measures, or the combination of both. When measurements are being implemented, contractors, consultants and the management team's performances are blamed as the major reasons for the failure of a particular project. The other project stakeholders such as client, suppliers, trade contractors and the community at large are neglected. Similarly, other researchers have found other important elements such as design performance, environmental performance; expectations and satisfaction of the beneficiary, and commercial value are used to determine the performance of construction projects (Harper & Porter 2004).

These performance measurement indicators are further refined into four (4) main components by Yulia (2010), which are cost performance, time performance, quality performance, and beneficiaries' satisfaction.

- Cost Performance

This element is about the extent to which the project falls and operates with its estimated budget. Cost variance is the specific performance indicator used to measure cost performance in the construction industry. It is measured in unit cost or percentage of net difference between the estimated cost and actual cost of the project. This cost involves not just the contract sum but any additional costs such as modification works and arbitration costs incurred as a result of the implementation of the project. Apart from the use of cost variance to determine the cost performance of a project, Cost Performance Index (CPI) can be used to measure the difference between reliability and the confidence of implementation of a project. Mathematically, cost variance is calculated as budgeted cost of project – Actual cost of project whereas Cost Performance Index is calculated as budgeted cost of project divided by actual cost of project. A good project is supposed to have a CPI of 1 or near which means it is actually on budget. Above 1 means under budgeted while below 1 means the project has been over budgeted.

- Time Performance

Time performance of a construction project is usually viewed from the perspective of beneficiaries. This is the very first parameter to check whether or not the implementation of a project is successful. It is very prudent that the completion of the project should be on time since beneficiaries judge success from the macro view. Time variance is calculated as Budgeted Time for the project – Actual Time of completing the project.

- Quality Performance

This is a performance measure which checks the level at which a project satisfies its purpose. It deals with matching the outcome of a construction project to already established standards. The quality standards are supposed to be determined by stakeholders responsible for the implementation of the project. A fully completed project is then matched to the predefined standards to assess the quality of the project.

- Beneficiaries' Satisfaction

Beneficiaries' satisfaction has been a difficult task to overcome by project managers since it deals with a thin line between the perceptions and expectations of beneficiaries of a project before completion and the actual outcome of the project. In the construction industry in Ghana, studies have shown that beneficiaries always complain of over budgeted project costs, delay in the completion of projects, poor performance of project contractors and subcontractors, and use of poor quality inputs in the implementation of projects. Beneficiaries become satisfied with the outcome of a project when the outcome of the project directly addresses or meets their needs and ensures their safety and healthy living. It has also been found that beneficiaries' satisfaction has a potential of increasing project performance by 70 percent. Achieving complete beneficiary satisfaction in the outcome of a project is five times more expensive than any other performance measure in the construction industry.

In Ghana, the construction industry has seen a lot of successes but studies have found that even though there are good stories one can talk about, there are also challenges thwarting the operations of the industry.

Poor planning, unclear goals and objectives, weak communication and reporting channels, changes in designs, as well as unrealistic budget estimates for projects is common in Ghana (Vleems, 2018). There is therefore the need for project managers to critically examine the complexities of projects in the Ghanaian context in meeting the satisfaction of beneficiaries

All around the world, a systematic review of literature has shown all quality improvement frameworks and techniques in the construction industry are based on similar models. Serpell et al. (1996) developed the flow and process model which is meant to manage flow and waste of information in the construction process. Flows are crucial in the construction project management process since they have direct impacts on beneficiaries' satisfaction on the outcomes of the project (Womack et al., 1990). Another model that can be discussed is that of Formoso et al. (2002) which focused on the roles of various stakeholders in the construction development process. Also, key stages in the process were identified and communication issues were rectified to achieve greater project impacts. The roles, influence, interest and power of each stakeholder either directly or indirectly involved in the project.

Both beneficiaries' satisfaction and organizational self-assessment models were developed by Arditi and Lee (2003) and Maloney (2002). The models use the viewpoints of beneficiaries by asking for their expectations and anticipations of a particular project. The models also consider performances from the viewpoint of project managers so as to be able to conduct self-assessment for improvement in the implementation of projects. The logic in proposing an improvement framework or technique is that it makes allowances for the provision of a format and guidelines for

quality initiatives in a systematic manner and gives a structured path on how to work towards the achievement of specified goals and objectives. At each stage of the construction process, an improvement framework is needed to check the level of improvement attained at that particular stage in the process. This allows for effective allocation of resources to achieve maximum results from the project (Yasamis et al., 2002).

According to Tzortzopoulos et al. (2004), all quality framework models must satisfy two (2) most basic and mandatory requirements. They are “expected categories” and “attractive categories”. Expected categories are the elements that must be met in order to answer questions on “what is” and “how to” in the implementation of a construction project. The attractive categories are also those elements that enhance the performances of the construction project but are not essential to the success of the project (Yusof and Aspinwall, 2000). For Dale (2003), a framework must be able to answer ‘What is quality in construction?’ (i.e. present the elements that constitute quality; display a general picture of the activities that could be applied to build in quality, and determine the role of various quality improvement methods within the whole construction process, be simple, easy to understand, systematic, well structured, comprehensive, practical, and applicable.

In going through “what is quality in construction?” studies have been found that the concept of quality in the construction industry can be grouped into three (3) sets. They are corporate quality, product quality and service quality (Owlia & Aspinwall, 1996).

2.7. Quality Management System

The concept of quality management is to ensure efforts to achieve the required level of quality of a project is well planned and organized (Agbenyega, 2014). According to Harris et al (2006) stated that Quality Management has seen a transition from reacting to the outcome of site production activities to becoming a strategic business function accounting. The concept existed for many years. However, its meaning has changed and evolved over period. Quality management system is a management technique used to communicate to employee what is required to produce the desired quality of products and services and to influence employee actions to complete tasks according to the quality specifications. The concept of quality management is based on three principles. These include focus on customer and stakeholders, participation and teamwork by everyone in the organization and a process focus supported by continuous improved and learning.

Quality assurances are certain schemes that are implemented in construction in order to maintain the standard or the quality of the work in a consistent manner. Quality assurance forms the integral management system in a construction company. Harris and McCaughey (2001), defined quality assurance as a set of activities whose purpose is to demonstrate that, an entity meets all quality requirements. Quality assurance functions are performed to inspire the confidence of both the customers and managers that quality requirement are being met. The main objective of quality assurance according to Svard, (2006) is to fulfill a required quality level. Quality assurance emphasizes defect prevention, unlike quality control that focuses on defect detection after construction. The relevance of quality assurance is premised on the principle of getting things right first time.

Quality control in construction involves periodic inspection of the construction activities and facilities in order to meet the desired standardization as per the contract. Quality Control is undergone by the team of QC engineers or special trained teams. Quality control according to Agbenyega (2014) is a process through which a firm seeks to ensure that product quality is maintained or improved or construction errors are reduced or eliminated. According to the Groene, O., Botje, D., Suñol, R., Lopez, M. A., & Wagner, C. (2013), quality control is the process of evaluating whether a construction projects adhere to specific standards. The main purpose of quality control is safety. Also, quality control is ensure reliability and sustainability of projects. In the construction sector, quality control is the process of verifying that, a construction projects is built to plan, that the tolerances allowable by industry standard and engineering practices have been met or bettered and that the completed projects meet the quality standards of the architect, engineer, owner and general contractor (Agbenyega, 2014).

2.7.1 The Effectiveness of Implementing a Quality Management System

Successful implementation of a QMS, as espoused in the relevant ISO 9001 standard, requires effective planning, operation and review, as well as continuous improvement of the system at all levels of an organization. Effectiveness has been defined by the British Standards Institute (BSI) (2009) as the extent to which planned activities are realized and planned results are achieved. The term ‘effectiveness’ is particularly pertinent to quality management system implementation, as companies that adopt a QMS must meet their specified quality requirements and prescribed quality objectives without any shortfalls, in order to be seen to have successfully implemented their QMSs.

However, according to Al-Nakeeb et al. (1998), the definition of „effectiveness“ from BSI appears to mislead people into thinking that it implies that the effectiveness comes from solely meeting the specified requirements and the prescribed quality objectives. In fact, it refers to the effectiveness of the system in meeting and complying with the specified requirements of the adopted standard. This means that *effectiveness* in the overall sense should really mean both things; the *full* meeting of a company’s own specified quality requirements, together with meeting the prescribed quality objectives (Kam and Tang 1997), referred to in the eight quality management principles and the elements of ISO 9001. In addition, Oztas, Güzelsoy and Tekinkus (2007) argue that the *effectiveness* of a system needs to be judged by how well a construction company operates and whether it achieves its goals in meeting customer expectations.

Effective implementation of a quality management system, and espousing quality values or adopting a high-level quality philosophy, whether by virtue of operating a QMS-ISO 9001 or applying a TQM approach, potentially provides benefits that are needed, even in the most competitive environments. There are also a number of Barriers of implementing quality management systems.

A number of researchers in the area of QMS implementation are of the opinion that ISO 9001 is not a standard for use in construction firms. For example, Landin (2000), in studying the Swedish construction sector argues that ISO 9001 is difficult to apply by construction companies because its clause are too general. Construction projects, practices, contracts and specifications are regarded as unique and specific in every project, and they usually provide different specific products and services outcomes that are difficult to be fully incorporated within a generic system such as ISO 901.

Bubshait and Al-Atiq (1999), in describing a Saudi Arabian case, indicate that overload of work for the quality assurance team and the tendency for disputes to arise concerning quality issues in internal organizations, are also among the among the major causes of difficulties in implementing the ISO 9001 quality standard in construction companies. According to Oztas, Güzelsoy and Tekinkus (2007), the differences and uniqueness of the construction industry from other industries (e.g., a long time for project completion; human relationships generally formed once; difficulty in defining quality standards and feedback relating to the construction processes) make it difficult for construction companies to implement QMSs, which can be fragmented and slow in their attempts at quality improvement (Leonard 2010). In addition, the fact that the construction industry has historically been reluctant to deal with changes (Haupt and Whiteman 2004; Low and Hong 2005) is reflected in slower implementation of ISO 9001 especially in developing countries.

2.8. Theoretical Framework

Theoretical frameworks or models are set of constructions or statements or principles developed to explain a phenomenon or fact that has been tested repeatedly (Lucia & Lepsinger, 2009). These frameworks or model are tools used for understanding, explaining and making predictions about a subject matter under consideration. Generally, models and theoretical frameworks help policymaking in several ways including improving the understanding of the possible consequences of the policy choices and deepening policymakers' comprehension of the underlying problems and issues. These functions of models or theoretical frameworks are very critical in influencing the completion of construction projects and ensuring the quality of such construction projects. The following theoretical frameworks relevant to the study are discussed briefly below.

2.8.1. The Stakeholder Theory

This theory is purely a management instrument. Fundamentally, the theory position that every construction project encompassed by an assortment of stakeholders and these stakeholders can influence the outcome of the project. It is subsequently critical to comprehend the interest of all stakeholders in the project. Thus, stakeholder examination is very helpful in mapping stakeholders' interest in a project and recognizing their individual advantages in the project. The management of any project must consider every stakeholder aggregate interest in the ensuring quality of a construction project.

2.8.2. Systems Dynamic Model

According to Wolstenholme (1990) was founded by Jay Forrester in 1961. According to Pruyt (2013), this model is a method that used to describe, model, simulate and analyze dynamically complex issues or system in the terms of processes, information, organizational boundaries and strategies. Thus, system dynamic model is the application of principles and techniques of a control system in organizational and social-economic-environmental problems in society.

As noted by Kalolaa & Kavaleb (2017), using system dynamic model is very essential in strategic project management that will include project design, project risk assessment and management, determining monitoring indicators, incorporating lessons from past projects in the new ones among others. Thus, a whole system assessment is considered and all necessary consideration made. This guides all stages of the project implementation. Thus, infrastructural projects are considered as dynamic system in the

sense that, they vary from sector to sector and project to project. Hence, every project has its unique characteristics and requirement.

Though the model fits perfectly in the management of construction projects in the local government system, however, the issue of poor documentation which characterized the local government system makes the application of the model practically impossible. In addition, relying on the past experience and performance to plan and predict the future is problematic due to the uncertainties associated with development especially in the construction sector. Thus, silence of the model on the management aspect of construction projects is flawed.

2.8.3. Management Theory

Another relevant theory considered by the study is the management theory. According to Koontz & Weihrich (2000), this theory explains the process of planning and sustaining the environment in which different group of individuals function as a group to efficiently accomplish a task. Relating this theory to construction projects includes process design for creating the enabling environment for all stakeholders in local government construction project for effective delivery.

This theory seeks to portray the relevance of team work and how management of construction projects should ensure team. However, the theory failed to appreciate the discontinuity in management of most local government construction projects. In addition, the model failed to appropriate the importance of past experience in resolving or avoiding similar challenges in the construction projects completion.

Relative to the weakness pointed out in the two models discussed above, the study suggest a combination of the system dynamic model and the management theory as the surer way of promoting effective completion of construction projects within the local government system.

2.9. Overview of Ghanaian Government Projects and Construction Projects

The manifestation of local government and central government policies are evidenced in projects and programmes. Thus, instruments for measuring local and central government gains are through projects and programmes (Alzahrani & Emsely, 2013). Thus, it is more practical in developing countries where infrastructure projects are the signs of development. Most of the government projects in Ghana are found in the area of education, health, road, markets, water and sanitation among others (Damoah, 2015).

The construction industry when talked about plays a significant role in the socio-economic development of Ghana. The numerous benefits derived from the industry cannot be underestimated which ranges from bringing infrastructural development to the country, through to the provision of a sanctuary for coordinated development, to the creation of employment to the people. The construction industry as found in Ghana is made up of civil infrastructure, transport infrastructure, telecommunication infrastructure, irrigation and agriculture systems (Osei, 2013).

The construction industry is estimated to contribute about 5% to 10% to the country's Gross Domestic Product and provides employment to about 10% of the active labour force (Asamoah & Decardi, 2014). In a similar work by (Ofori, 2012), it was found that the construction industry in Ghana gives sporadic employment to the local people

thereby reducing extreme poverty to an appreciable level. In spite of the numerous benefits highlighted, the construction industry according to Twumasi-Ampofo et al., (2013) is constrained with issues such as improper planning, high cost of building materials, low quality of infrastructure projects, as well as inadequate stakeholder engagements amongst players in the industry are the major treats facing the construction world in the country. Again, Ofori (2012), also found long gestation periods of construction projects in the country as a worrying trend.

As a result of local governance and decentralization, local authorities such as the Metropolitans, Municipals and District Assemblies are responsible for the actual implementation of most these infrastructure projects with supervision from the mother ministries.

2.10. Project Implementation and Completion

Implementation is the process of undertaking a set of activities that are geared towards the achievement of set objectives. In terms of project implementation, it is the carrying out of a set of proposed interrelated activities which are meant to achieve objectives in the short term and goals in the long term. Implementation success of a project largely depends on both internal and external forces. However, the ability of the project to achieve its set objectives means it has to overcome both internal and external obstacles.

For this study, project implementation has been defined as all the activities and actions required of a project manager to translate what ideas he/she has on paper into reality. This stage of the project cycle ensures that materials are utilized to achieve set goals

and objectives. The success of a project does not only rely on how well it has been designed but also how well it has been implemented to achieve its targets.

So long as man wants to develop, projects will continue to be with us because any developmental activity carried upon comes in the form of a programme or project.

Programme is a set of related projects whereas projects are a set of related activities meant to achieve specific objectives and goals. Projects form an avenue for investments and direct the expenditure patterns of governments, international donors, development partners, non-governmental organizations and beneficiaries , Obiora, D. N., Idike, J. I., Oha, A. I., Soronnadi-Ononiwu, C. G., Okwesili, N. A., & Ossai, M. N. (2018).

According to the Howell (2017), project life cycle can be put into six (6) broad stages which are depicted in the figure below.

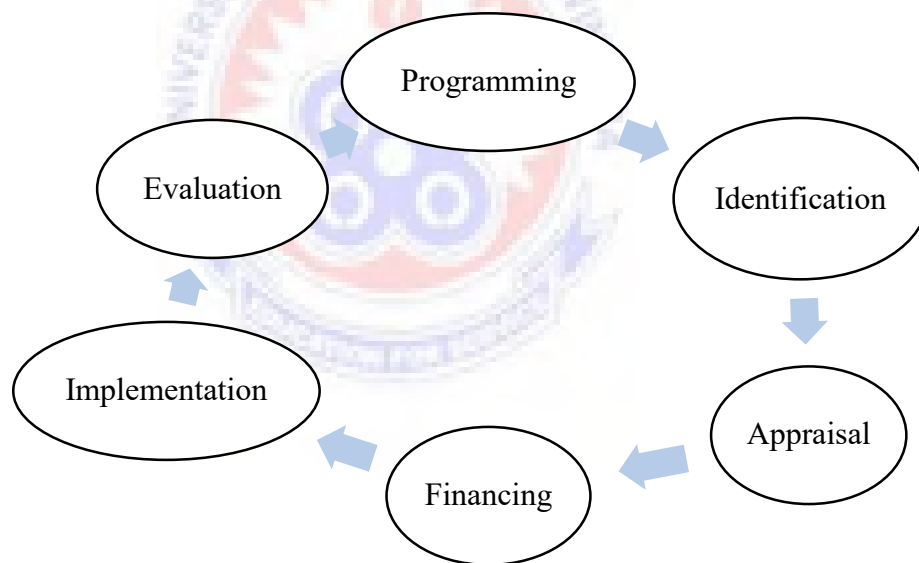


Figure 2.1: Project Cycle

Source: Howell (2017)

From Figure 2.1, the European Commission propounds these steps in the life of all projects it is implementing in Africa. The steps begin with programming and ends with evaluation but for the purposes of this study, more emphasis will be placed on the fifth (5th) stage which is the *implementation* stage of the project life cycle.

In project implementation and completion, the Office of Tasmanian Assessment, Standards and Certification (2018) has identified three (3) implementation periods which need to be fulfilled. The periods include; Inception / start-up period, Main implementation period and Final / closure period. These periods are generally based on a lot of modalities setup in the previous stages of the project life cycle which include timelines for the project implementation and completion, interest, influences and power of all stakeholders involved in the project, secured financial resources, project objectives and goals, amongst others.

The actual implementation of the project usually requires the project manager do re-planning. This involves regular visits of the planned activities in the logical framework, work plan, financial plan, etc. for revisions, updating and corrections to suit current project environment. Also, there is monitoring alongside the implementation of projects. The project manager is tasked to assess the progress of work done towards the achievement of the project objectives and goals. At this instance, monitoring provides a continuous learning process in the implementation stage which serves as a feedback for informed decision making in the re-planning process. At the implementation stage of the project life cycle, there is a systematic reporting procedure on the progress of work done. This is to ensure there is a basis and reliable information to make future decisions (Office of Tasmanian Assessment, Standards and Certification, 2018).

2.11. Factors Affecting Construction Projects Completion

Construction projects delay or non-completion is one of the fundamental problems in the construction industry in many developing countries including Ghana (Banaman, 2015). Similarly, Oluwoye (2003) supports Banaman (2015) concluded that,

construction projects globally are encountering delays and non-completion attributed to different factors. Ahmed et al (2002) concord to the above argument however, advances the debate that, these delays and non-completion differs from project to project because of its own difficulties.

A number of studies have identified related factors that influence construction projects completion although these studies are skewed towards the developed nations. These factors were classified variously depending on the interest of the study. Some of the factors that influence construction projects cited in literature include the following;

2.11.1. Construction Projects Financing

Several studies (Muchungu, 2012, Kukwasi, 2012, Sambasivan & Soon, 2007, Gwaya et al, 2014) identified construction projects financing as a critical factor in construction project completion. As indicated by Muchungu (2012), many of government construction projects have stalled; others have been completed but not to standards whilst others have taken too long to be completed. This, Muchungu attributes primarily on construction projects financing. Similarly, Kukwasi (2012) has stated that, construction project financing is one of the critical success factors of construction project completion. Additionally, Haseeb et al (2011) has positioned that, weak construction project financing is one of the major delay factor in construction projects completion. According to a study conducted by Omran & Hussin (2012), about 70 percent of construction projects in Malaysian were abandoned or not completed due to poor construction projects financing. It can be inferred that, construction project financing is fundamental to ensuring the timely completion of projects. In the Ghanaian context, enough evidences exist to support the narrative that constructing project financing is fundamental to a successful project completion.

2.11.2. Construction Project Planning

A construction project undergoes various stages. According to Munyoki (2014), construction projects generally take place in various stages. These stages include project initiation, project planning and project execution. During the project planning stage, design, resources and finances allocated are carried out. Respectively, Olatunji (2010) has concluded that, any defect in project planning has much damaging consequences including litigation and outright abandonment of the projects. Thus the project planning stage helps in the prediction and identification of likely problems that can affect the completion of the project at the early stages of the construction project. Also, Koushki et al (2005) stated that, where project planning is conducted, delays periods are shorter than where it is not conducted. Thus, Mojahed (2005) concluded that, proper planning in all stages of the project life cycle is necessary for timely project completion. Overall, the influence of construction project planning in the successful project completion cannot be overemphasized.

2.11.3. Supervision of Construction Projects

The timely completion of a construction project according to literature is also greatly depended on the level of supervision. As argued by Olatunji (2010), the success of a construction project hinges on the efficacy of the project team. Thus, the timely inspection and monitoring of the process of work, material schedule and other conditions of the contract is key in the completion. In this vain, Wambugu (2013) stated that, inadequate supervision and inspection of projects by the project team can result in delay in completion or non-completion. Similarly, Aibinu & Jagboro (2002) identified inadequate project supervision as one of the factors resulting in project delays or non-completion. Hence, the influence of effective supervision on the timely completion of

construction projects cannot be underestimated. Thus timely supervision is of much significance in ensuring effective operation, material quality and timely progress of the project schedule.

2.11.4. Inflationary Factors

As put by Adamson (2006), frequent increases in the overall price level of goods and service in a country can cause delay or non-completion of construction projects. The continue increase in prices of construction projects materials can increase the cost of a construction project, hence affecting the contract sum. Thus, Nega (2008) stated that, if the degree of inflation increases beyond the estimated level throughout the project period, the prevailing cost estimate will be exceeded. This becomes more worrying when no contingency is allocated for the project. The process of variation is also significantly lengthy.

2.11.5. Access to the Site and Site Ground Condition

As a result of poor or non-consultation and participation by the relevant stakeholders, access to site and site ground condition can affect the project completion schedule. According to Griffith & Watson (2004), access to site and the site ground conditions are influencing factors to the completion of construction project as they restrict the inflow of materials and equipment to site and laborers especially where site has litigation issues. Where the site conditions are not good, it affect the speed of delivery. This can be attributed to poor or non-assessment of risk at the planning and design stages of the project. In addition, Frimpong et al. (2003), indicates that ground challenges and unforeseen geological conditions can result in the non-completion of construction projects.

There are varied opinions regarding the factors affecting the completion of construction projects (Banaman, 2015). Ahmed et al. (2002) classified these factors into internal factors (client, consultants, financial, contract management, design changes, inadequate materials) and external factors (inflation, change in government policies).

Analyzing from available literature on the factors affecting the completion of construction projects, the study categorized these factors into three broad classes namely client related factors, consultant related factors and contractor related factors.

Client related factors that affect project completion emanates from the client or the project owner. Several studies including Olatunji (2010), Zanelidin (2006) & Rahsid et al (2013) identified variation order, oral variation and inability for the client to fund as some of the client related factors. Consultant Related Factors are factor that can influence project completion from the consultant side of the project cycle. Haq & Aslam (2013), Assaf & Al-Hejji (2006), Haseeb et al., (2011) and Olatunji (2010) identified consultant's related factors to include inadequate planning of builders, contractor's poor site management, alteration in designs, low performance of consultants, poor investigation of site and ineffective management of contract The third class of factor is the contractor related factors. These factors emanates from the contractor's side in the project implementation. Yang & Wei (2010) identified unsuitable scheduling, poor site management, inexperience, and inadequate administrative and technical staff, poor cooperation between client and contractor, delays in the mobilization stage, financial problems, and subcontracting difficulties among others.

2.12. Overview of Determinants of Construction Project Quality

Measuring success of construction works is a complex and complicated endeavor that require the performance of the process to be monitored. The quality of construction projects is the traditional and global measure of project performance or success. The overall aim of clients' contractors and consultants alike is to ensure that construction projects are delivered according to acceptable and agreed standards. A number of variables have been identified to have the tendency to influence the quality of construction projects. Chan, et al., (2004) identified project-related factors, procurement-related factors, human –related factors, project management factors, project participants-related factors and external factors as the critical factors construction projects factors that determine the quality of construction projects. In a similar context, Karwitha (2017) identified stakeholder involvement, project funding, construction materials management and Project management competence as the determinants of construction projects quality. In addition, Musa, et al., (2015) classified the determinants of the quality into economics, social and political. For instance, economic factor constitutes the economic environment that influences the flow of funds and affordability in financing. Political factor concerns government support and provision of an enabling environment. However, in most developing countries there is fear of uncertainty in the economic and political environment. Therefore, governments need to provide guarantees to developers in terms of risk management, where the government is best able to manage them. Similarly, social factor concerns issues of culture, health and the general life style of the occupants. In most developing countries, the issue of culture is very important, so end user involvement at the early design stage will help in producing an acceptable design. In addition, Njeri & Were (2017) identified

top management support and project team commitment as the main determinants of the quality of construction projects.

Also, Bansal (2009) identified supplier quality management, teamwork, subcontractor evaluation, site documentation, equipment utilization and communication as some of the determinants of the quality of construction projects.

From the discussion above, the determinants of the quality of construction projects can be grouped into project related factors, external environment, project management actions, project procedures and human related factors. Project related factors include the type of project, nature of project, and complexity of the project and size of the project. Project management actions factors include the communication systems, control mechanisms, feedback capabilities, planning effort, and implementation of an effective quality assurance, overall managerial actions, and control of sub-contractors works, developing appropriate organizational structures and implementing effective safety system. External environment factors include economic environment, social environment, physical environment, industrial relations and technology advancement. In addition, project procedures factors that determine the quality of construction projects include procurement process and the tendering process. Human related factors that determine the quality of construction projects include client's experience, nature of client either public or private, client's emphasis on high quality of construction, technical skills of team leader, organizing skills of project team leaders among others.

There are constraints in every sector and the construction sector is no exception (Lau & Kong, 2014). The construction working environment involves multi-party participation. (Lau & Kong, 2014) categorized constraints into internal and external

constraints. Ahmed, et al., (2014) indicated that, constraints in construction projects can be found in the organizations themselves, the relationships among the different actors and the general considerations such as the economic situation. The Ghanaian construction industry forces major problems which undermines its potential and contribution to overall national development. Performance in the Ghanaian construction industry is therefore a major cause of concern amongst client groups and other stakeholders. Generally, constraints to the quality of construction projects can be group into design constraints, technical constraints, economic constraints, management constraints, legal constraints, time constraints, environmental constraints, social constraints and third parties. Design constraints include

2.13. Public Sector: Decentralization and Local Governance: The Ghanaian Perspective

This section of the chapter provides an overview of decentralization and local governance to contextualize the study sector-the public sector.

Decentralization in the Ghana context is an umbrella concept that consists of administrative, fiscal and political decision-making process established under the 1992 constitution. The essence of decentralization is to transfer political, administrative and fiscal decision-making powers closer to the people at the grassroots level. Writers in local governance such as Ahwoi (2010) as well as the Ministry of Local Government and Rural Development (MLGRD, 2010) posit that, there seems to be conceptual confusion surrounding the concept of decentralization.

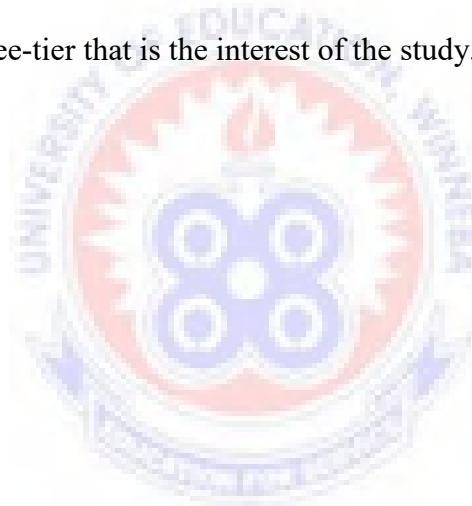
Notwithstanding, the lack of clarity in the definition of the concept of decentralization, several definitions of the concept exist in literature. The concept of decentralization is defined as de-concentration, devolution and delegation of political, administrative and fiscal powers and functions to various level of governments (Ahwoi, 2010). In other studies, decentralization is the transfer of the duties of planning, management and resource distribution from the top (Central Government) and national actors to the grassroots units of government for functioning (Rondinelli, 1989 & Sana, 2011). In the context especially taking resources allocation, mobilization and prudent management, the study defined decentralization as the transfer of decision making for the purpose of development including resource allocation, mobilization and management from Central Government to its representative at the local level (District Assemblies) to ensure grassroots participation in development and sustainability of development.

Taking cognizance of the great responsibilities provided to Assemblies as a result of decentralization, the need to constantly check the utilization of these resources both external and internal is key. This places the internal audit unit central in the operations and management of these Assemblies. It is therefore necessary, regular assessment of the effectiveness how effective the internal audit unit is in safeguarding the public purse for the purposes of sustainable development.

The decentralization concept discussed briefly above establishes the local government system. As discussed above, decentralization consists of three major components; administrative, political and fiscal decentralization. The fiscal and administrative decentralization are utmost importance to this study. The administrative and fiscal

decentralization empowers District Assemblies to make their own decision regarding development and financing of these development (Egbenya, 2009, Akorsu, 2015).

These powers decentralization are being performance by the local government structure. The local government system play and continuous to serves a critical role in sustainable development in Ghana. The structure of the local government system is considered as the three-tier. The structure consists of the Regional Coordinating Councils, the Four-tier Metropolitan Assemblies, the Three -Tier Municipal/District Assemblies, the Urban/Town/Area/Zonal Councils and the Unit Committees. It is the four-tier and the three-tier that is the interest of the study.



<i>CENTRAL GOVERNMENT</i>		
<i>President</i>		
<i>Council of Minister</i>		
<i>Council of State</i>		
<i>Unicameral Parliament</i>		
<i>10 x REGIONS</i>		
<i>Regional Coordinating Council (RCC)</i>		
<i>Regional Ministry</i>		
<i>LOCAL GOVERNMENT</i>		
6x METROPOLITANS	55 x MUNICIPALS	155x DISTRICTS
<ul style="list-style-type: none"> - Metropolitan Assembly - Population threshold (over 250 000) 	<ul style="list-style-type: none"> - Municipal Assembly - Population threshold (over 95 000) 	<ul style="list-style-type: none"> <i>District Assembly</i> <i>Population threshold (over 70 000 inhabitants)</i>
Sub-metropolitan district council	Zonal council	<i>Urban/Town/Area councils</i>
-Town council		
<i>Unit committees:</i>		
<i>In urban areas about 1500 inhabitants</i>		
<i>In rural areas about 500–1000 inhabitants</i>		

Figure 2.2: Local Government Structure

Source: Adopted from the Institute of Local Government Studies (2016)

2.14. Theoretical Framework of the Study

The determinants of the quality of construction projects have been conceptualized in the section. The determinants or variables classified into four groups namely Project related determinants, external environment determinants, project management actions determinants and Project quality. This is presented in Figure 2.2.

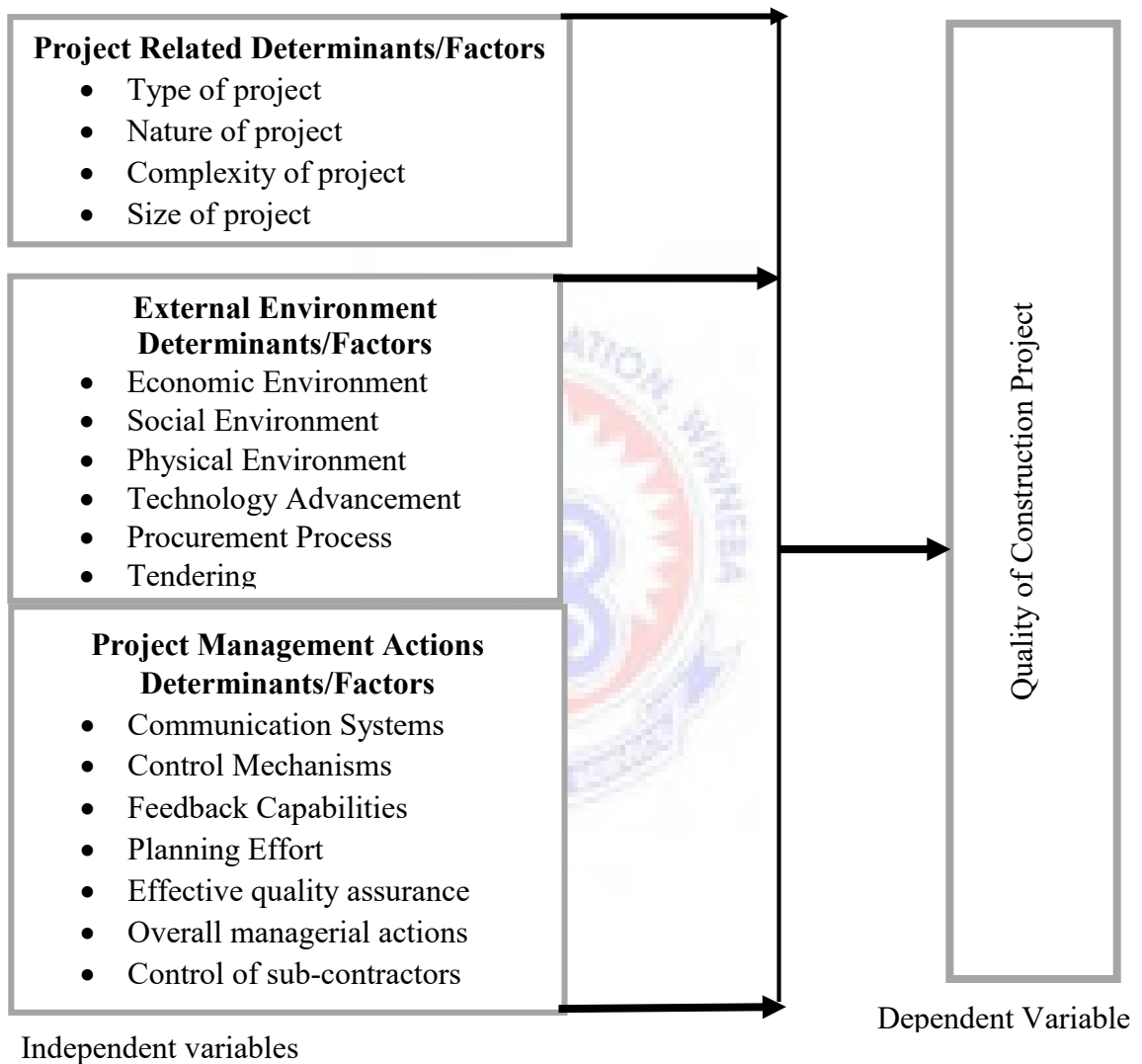


Figure 2.3: Study Conceptual Framework

The conceptual framework presents the groups of determinants or factors that can affect or influence the quality of construction projects.

Project related determinants/factors are factors that emanates from the project side that can determine the quality or otherwise of the project. These factors include the type of project, nature of the project, complexity of the project and the size of the project. They are usually associated with the project planning.

Another group of factors that can influence the quality of construction projects are external environment factors. These are external influences on the construction process including social, political and technical. These factors emanates from the economic environment, the social environment, the political environment, the physical environment, the industrial environment and the level of technological environment. The conceptual framework presents the external environment factors or determinants to include economic environment, social environment, physical environment, technology advancement and procurement process.

The third category of factors that influences the quality of construction projects are project management actions determinants/factors. Project management actions are key determinants for project success. They include adequate communication, control mechanisms, feedback capabilities, coordination effectiveness, decision making effectiveness, monitoring, project organization structure, plan and schedule followed.

All these factors are related in several dimensions and forms. The nature of this coordination must be observed and followed during construction project planning and implementation if quality is to be assured.

Proper recognition of these factors will help in the selection of project team members, identifying development needs of project stakeholders and most importantly for forecasting the quality performance level of construction project before it commencement. From the theoretical framework, these three group of factors complementary influence the quality level of construction projects.

2.15. Summary of Chapter

A critical view of the literature reviewed points to the importance of quality in construction projects especially in the public sector where value for money is paramount. However, the literature suggests a mirage of problems associated with quality in the construction industry. The literature also indicates an emerging quality management approach in the construction sector. Thus, quality management is becoming a necessary requirement in construction projects. Notwithstanding the plethora of research in the area of quality management sector, that of Ghana is exhaustive. Thus, the need to conduct more studies into quality and quality management of construction projects is very necessary.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

The chapter three of the study presents the methods and materials used in conducting the study. It provides the basis for validating the results of the study. The chapter discusses the research design, population of the study, the sampling techniques and sample size, the data collection techniques (questionnaires), ethical considerations and the data analysis. Details of these areas are discussed below.

3.2. Underpinning Philosophical Assumptions/Research Paradigm

Philosophical assumption/research paradigm is the set of beliefs, values and techniques that are shared by members of scientific community that serves a guide in conducting a scientific study. In this study, Philosophical assumption/research paradigm refers to a basic set of beliefs and values that the guide action (Guba, 1990). Common paradigms include post positivism, constructivism, advocacy/participatory, pragmatism, Positivism, Interpretive and critical theory and critical realism (Creswell, 2007). It must be noted that, the choice of a particular paradigm is based on the research objectives and conceptual framework of the study.

The study relied on the positivist philosophical assumption or paradigm for conducting the study. This paradigm involves a realist view of ontological stance considering the research questions posed in chapter one. A realist view is objective and non-value laden. Thus, a deductive approach is largely adopted in the study.

3.2.1. Research Design

Though, there are many views on the definition of research design, the study cited few of them. Research designs defined by Creswell (2007) refer to the plans and procedures that spanned from the decision and broad assumptions to detailed methods of data collection and analysis. As put by Bryman (2008), a research design provides the framework for data collection and analysis. In the context of this survey, research design is a logical sequence that links the empirical evidence (data) to the research problem and ultimately to the conclusions. It is the logical process for realizing the objectives or the road mark that will ensure that the research objectives will be achieved. Several research designs exist in literature such as the case study, panel/longitudinal, experimental, exploratory and participatory. However, the purpose of a study determines the type of design to adopt.

In this study the case study design was used to provide a framework for data collection and analysis. The Case study as will be used in the study is an empirical enquiry that allows the researcher to investigate and understand the dynamics of a particular system. In the case of this research, determinants of construction projects quality. The case study design involved the collection of data: qualitative & quantitative from more than one case and at a single point in time in connection with two or more variables examined to understand the patterns of association (Creswell, 2007). The case study design was therefore, appropriate for the study as multiple sources of evidence are needed in establishing the determinants of construction projects quality within the local government space. This approach supports the use of questionnaire and interview guides as tools for data collection which are the main research instrument for the study. In addition, the case study design was preferred over other research designs based on

the fact that, the design fits well into the time frame for the study (approximately one year). It was also appropriate because of its acceptance of the use of both qualitative and quantitative analysis which is required to establish both quantitative and quality nature of the subject matter under investigation. The unit of analysis of the survey includes heads of departments, other technical staff of local government institution and managing directors of construction companies.

Considering the conditions for the use of the case study method and the significance of the approach, the study adopted the case study design in conducting the study. This design will allow the researcher to investigate and understand the determinants of quality of construction projects in the construction industry in the Ghanaian public sector. The design was appropriate for the study as multiple sources of evidence will be needed in understanding the dynamics of the determinants of quality of construction projects in the construction industry. The study was purely quantitative.

3.2.2. Research Strategy

The quantitative research paradigm comes on the premise that, behavior can be explained with objective reality (in fact and figures). Thus, there is one and only one way of explaining a phenomenon. Qualitative research paradigm on the other hand is premised on the assumption that, there are multiple realities and these realities are socially defined. Thus, varied explanations exist. It is a human centered research paradigm.

A quantitative research paradigm according to Johnson & Onwuegbuzie (2004) focuses on statistical and numeric analysis whilst the qualitative research paradigm according to De Vos et al (2002) elicits participant's accounts of meaning, experience or perception. Thus, qualitative paradigm is primarily a non-statistical method. Brown, *et al.*,(2016) indicate that, quantitative research paradigm uses mathematical models and statistics for analyzing, providing numerical results that are considered more objective. The qualitative research paradigm according to Tavakol & Sanders (2014) uses respondents' observation, in-depth interviews, document analysis and focus groups.

Quantitative research paradigm is advantageous on the grounds that, it is considered reliable because of the statistical methods used, can also be used to generalize where the sample size is large and it is also appropriate for cases where systematic, standardized comparisons are needed (Sharma, 2017). However, the approach is been criticized on the basis that, it does not always shed light on the full complexity of human experience or perception. It can also give false impression of homogeneity in a sample (Sharma, 2017).

The qualitative research paradigm on the other hand is useful on the basis that, it is rich, in-depth details is possible, perception of respondents can be considered, appropriate for situations in which detailed understanding is needed and events can be seen in their proper context or more holistically. However, the approach is accused of not been reliable, not always generalizable due to small sample size and the subjectivity nature of the approach.

Based on the discussions on the two research strategies relative to the research objective at hand, the study adopted only quantitative research strategy. This supported the study in unearthing the quantitative perspectives of the study.

3.3. Measurement of Key Variables of the Study

A variable is defined in this study as an empirical property that can take on two or more values. It refers to the key elements of research problem and its objectives. From the study research problem and its objectives, the variables of the study are segregated into dependent and independent variables. The dependent variable of the study is the quality of construction projects whilst the independent variable is the determinants of quality of construction projects. The independent variables are further broken into project related factors, external environment related factors and project management action factors.

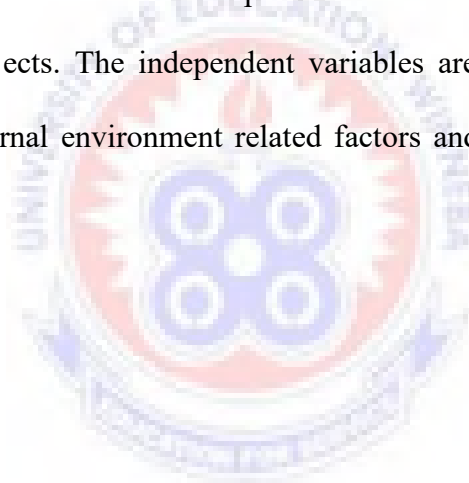


Table 3.1: Operationalization of the Study Variables

Research Objectives	Classification of Variables	Key Variables	Number of Indicators	Research Strategy	Data Analysis Technique
To identify existing tools/strategies for ensuring quality of construction projects in the construction industry in Ghana	Independent	Tools/Strategies for ensuring quality of construction projects in the construction industry in Ghana	5	Quantitative	Descriptive (Frequency, Percentage Mean and Standard Deviation)
To identify the key drivers of quality performance of public sector constructions projects in Ghana	Independent	Key drivers of quality of performance of public sector constructions projects	45	Quantitative	Likert scale, Spearman's correlation factor
To identify key constraints to enhancing the quality performance of public sector construction projects in Ghana	Independent	Key constraints to enhancing the quality performance	20	Quantitative Qualitative	Descriptive (Frequency, Percentage Mean and Standard Deviation)

3.4. Population of the Survey

The decision of what information you need depends on the decision regarding what your population is going to be”. In the exact words of Mujis (2004) “the study population is the group of individuals from whom the researcher wants to generalize his/her results”. In addition, a study population is the accumulation of study elements. To put it differently, it is the entire set of appropriate units or cases or individuals that fit a certain description.

The target populations of the survey were practitioners in the construction industry at Metropolitan, Municipal and District Assemblies level. They include Engineers, Architects, Quantity Surveyors, Planning Officers, Budget Officers, and Finance Officers) and Construction Companies Directors or their Site Managers. The main purpose for selecting this group as the target population was to facilitate the study to get current and past information from people who have participated in the implementation of construction projects and thus have experience when it comes to factors that determines the quality of construction projects in Metropolitan, Municipal and District Assemblies.

3.4.1. Inclusion and Exclusion Criteria

The inclusion criteria for selecting the final respondents for the study questionnaire and interview guide administration included (a) Must an employee of a District, Municipal and Metropolitan Assembly (b) Must be the head of a departments and unit or section (c) Must be a managing director or site manager of a construction companies within the D1K1-D3K3 that active members with the selected Assemblies for the past five years. Supporting staff of the selected departments were excluded from participating in the study.

3.5. Sampling Technique and Sample Size

Sampling is the process of selecting observations. In other words, it is selecting a part to represent a whole. According to Leedy et al., (2005) as cited by Olatunji, (2010) researchers should endeavor to maximize the sample size. The following guidelines for selecting the sample size are suggested.

- Survey the entire population for a population of less than 300 people or units
- Sample 50% of the population if the entire population is 500
- For a population of about 1500 sample 20%

Beyond a population of say 5000 and more, the population size is almost irrelevant and a sample size of 400 should be adequate.

Thus both probability and non-probability sampling methods were employed. The study employed only non-probability sampling technique. The study conducted a census for the selected Assemblies were conducted for the inclusion criteria respondents and the results are presented in Table 3.2.

Table 3.2: Census of Sample Frame

Item	Respondents	Unit of Analysis	Population	Sampled Numbers
A	D1K1-D3K3 construction firms (active for five years)	Managing Director or Site Manager	30	30
B	Heads of works department	Engineers	30	30
C	Heads of Finance Department	Finance Officers	30	30
D	Heads of Budget Department/Unit	Budget Analyst/Officers	30	30
E	Heads of Planning Unit	Planning Officers	30	30
G	Heads of Quantities Section	Quantity Surveyors	30	30
H	Heads of Architectural Section	Architects	30	30
Total			210	210

Source: Human Resource Department, ARCC, 2019

Samples size was chosen purposively due to the scope of work, the knowledge of the population and the purpose of the study. Purposive sampling can be very useful for situations where you need to reach a targeted sample quickly and where sampling for proportionality is not the main concern. The above information was gotten from the Ashanti Regional Coordinating Council.

3.6 Data Collection

The study used both secondary and primary data sources. The secondary was obtained through a desk review of journals, articles, books, and websites among other secondary sources. The primary data collection employed the use of quantitative data collection methods. These are explained below.

3.6.1. Quantitative Data Collection Methods

The most popular quantitative data collection methods are closed-ended questionnaires. The study employed closed and open-ended questionnaire to collect quantitative data for the quantitative aspect of the study.

3.6.2. Questionnaires

The questionnaire used in collecting the primary data for the study contained both closed-ended questions with multiple choice answer options and open-ended questions soliciting respondents' views on certain answers. The questionnaire used contained open questions, multiple choice questions, dichotomous questions and scaling questions. The questionnaires were administered to Planning Officers, Engineers, Architects, Quantity Surveyors, Budget Officers, Finance Officers and contractors. The study adopted the mailed questionnaire, face-to-face and phone call approach in administering the questionnaires. Respondents with active email addresses and who were willing to answer the questionnaire via that the computers were mailed with the questionnaire. Finally, the researcher through the recruited research assistants administered the questionnaires to respondents who wanted the questionnaire administered in their offices using the face-to-face method.

3.7. Reliability and Validity of the Survey Instruments

Reliability and Validity of the survey instruments was considered critical to the outcome of the study. Thus, the study ensured that, the data collection instruments were tested for reliability and validity.

The concept reliability is the degree to which a research instruments produces consistent outcome or information the same way anytime the same instrument is used within same conditions with same population. To put it differently, reliability is a condition in which same results will come out anytime the same method is applied to do same study. Validity on the other hand is the ability of a research instrument to measure what it is been developed to measure (Kumar, 2005). The researcher ensured the validity of the survey instrument working closely with the supervisor who was the expert. In addition, the survey tool was subjected to peer review. Finally, the developed questionnaire was pre-testing and all the necessary corrections made before finally embarking on the entire field work.

The study adopted the Cronbach's alpha to measure the reliability of the research instruments. It measures how closely related a set of items are as a group. In most research especially, in the social science research, it is considered to be a measure of scale reliability. In using the Cronbach's alpha reliability measure, a reliability coefficient of **.70** or higher is considered acceptable especially in a social science research. The study used the SPSS to calculate the reliability of the research instrument (questionnaire).

Reliability results presented in Table 3.3 shows that, all responses had a Cronbach's Alpha value of more than 0.7. This compared to the acceptable standard of Cronbach's Alpha value of 0.7 or above is considered reliable. Thus the research instruments used were reliability and will produce similar results when used under same conditions.

Table 3.3: Reliability Test Results

Variables (Construct)	Cronbach's Alpha	Number of Items
Internal Determinants	.783	18
External Determinants	.860	11
Project Management Determinants	.748	16

Source: Author's Construct, 2019

3.8. Ethical Consideration

Research ethics are the guidelines required for the conduct of enquiry that is relevant to present and future generation and has received approval from relevant authorities as well as the consent of participants for the conduct of the investigation (Patton, 2002). Social scientists face ethical problems and cannot carry out research that involves people without any informed consent (Israel and Hay, 2006). Broadly, efforts have been made to protect participants by seeking approval from relevant institutions and share research findings with participants. The following processes were adhered to from data collection to data analysis with respect to ethical considerations.

Permissions were obtained from the selected Assemblies through an introductory letters detailing the researcher's identity and purpose of the study. In the case of questionnaire administration, participants' voluntary participation and informed consent was sought after reading the summary of the consent forms in the language the respondent understands and speaks (Asante Twi or English). The consent form detailed the identity of researcher, purpose of the study, confidentiality of data, data protection and intended use of the data. A participant can voluntarily decide not to participate in the study at time. Acknowledgement of works of other authors used in any part of the dissertation

with the use of Harvard/APA/Vancouver referencing system was ensured. Thus, the survey was guided by strict adherence to research ethics that did not all the researcher to engage in deception or invasion of privacy.

3.9. Data Analysis

The quantitative data analysis turned raw numbers obtained from the quantitative data collection method (questionnaires) were turned into meaningful data through the application of rational and critical thinking. Quantitative data analysis statistical tools used included bar charts, tables, bar charts, percentages and frequency, mean and standard deviation, regression and correlations.

The Statistical Package for Social Science (SPSS) software programme version 21 was used in processing the primary data collected. The primary data collected were edited to ensure completeness and accuracy of the questionnaires. The edited questionnaires were then coded and entered into the software. Analysis of variance (ANOVA) and multiple regression technique were run using the SPSS software.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1. Introduction

The fourth chapter of the study presents analyzed and discussed the primary data collected from the data respondents. The chapter is presented in four major sections with sub-sections. Section one presented and discussed the demographic characteristics of the study respondents. The section two focused on the existing tools/strategies for ensuring quality of construction projects in the public sector in Ashanti region of Ghana. The third section contained the drivers or determinants of construction projects quality in the public sector in the Ashanti Region of Ghana. The fourth section presented and discussed the constraints to enhancing construction project quality in the public sector in the Ashanti Region of Ghana.

A total of 210 respondents from six categories of respondents were expected to participate in the study. However, a total of 207 respondents from the six categories of respondents representing a response rate of 98.6 percent participated in the study. It thus means that, majority of the sampled respondents participated in the study. The high response rate is due to the fact the researcher himself is an employee of a MMDA.

4.2. Demographic Characteristics of Respondents

This section presents and analyzed the demographic characteristics of the respondents who participated in the study. Category, ages, position, educational level, departments and working experience were the key demographic characteristics of the respondents considered by the study. The results are presented on Table 4.1.

Table 4.1: Demographic Characteristics of Respondents

Item	Frequency	Percentage (%)
1. Category of Respondent		
Planning Officers	30	14.5
Engineers	30	14.5
Architects	27	13.0
Quantity Surveyors	30	14.5
Budget Officers	30	14.5
Finance Officers	29	14.0
Contractors	31	15.0
Total	207	100.0
2. Ages of Respondents		
25-34	12	5.8
35-44	116	57.1
45-54	79	38.9
Total	207	100.0
3. Respondent management level		
Key Management Member	158	76.3
Ancillary Management Member	49	23.7
Total	207	100.0
4. Highest Educational Level		
Degree	96	46.4
Masters	110	53.1
Higher National Diploma	1	.5
Total	207	100.0
5. Department of Respondents		
Central Administration	60	29.0
Works Department	87	42.0
Finance Department	29	14.0
Construction Companies	31	15.0
Total	207	100.0
6. Working Experience		
1-5	6	2.9
6-15	139	67.1
16-25	62	30.0
Total	207	100.0

Source: Field Survey, 2019

From Table 4.1, out of the 207 respondents, 57.1 percent of them were within the age cohorts of 35-44, 45-54 percent were 38.9 percent whilst the 25-34 cohorts were 5.8 percent. Thus, the 35-44 age cohorts were the majority participants of the study. This implied that, majority of the staff of the Metropolitan, Municipal and District Assemblies in the Ashanti region are within the middle age cohort.

Regarding their educational qualification, a total of 53.1 percent of the respondent had masters as their highest educational level. Also, 46.4 percent were degree holders and 0.5 percent had HND as their highest educational qualification.

With respect to working experience, a total of 67.1 percent of the respondents had worked between 6-15 years, 30 percent had worked for 16-25 years whilst 2.9 percent had worked between 1-5 years. Thus, majority of the respondents had enough working experience to appreciate the determinants of construction projects quality.

4.3. Knowledge on Project Management

Based on the demographic characteristics of the respondents as presented and discussed in Table 4.1, this section measured the knowledge level of respondents on project management. Thus, it sought to know whether respondents were aware of project management which encompasses the application of knowledge, skills, tools, and technique to project activities to meet project requirements. The results are presented in Table 4.2.

Table 4.2: Knowledge on Project Management

Options	Frequency	Percent
Yes	206	99.5
No	1	0.5
Total	207	100.0

Source: Field Survey, 2019

The results presented in Table 4.2 indicate a high level of knowledge of respondents on the project management. About 99.5 percent of the respondents indicated they have knowledge on project management whilst 0.5 percent indicated they did not have knowledge on project management. Thus majority of the respondents had knowledge in the fields or areas of specialization that are commonly employed when managing projects. This implied that, majority of staff of Metropolitan, Municipal and District Assemblies in the Ashanti Region were in a better position to provide information on determinants of quality of construction projects in the public sector.

In line with the knowledge level of respondents on project management, the study furthered assessed the perception of the respondents on the quality of construction projects. The results indicated that, majority of the respondents perceived the quality of construction projects in the selected Assemblies as moderately high.

4.4. Satisfaction Level of Quality of Construction Projects

In order for respondents to appreciate the determinants of construction projects quality in the public sector, this section assessed respondents' satisfaction level of quality of construction projects in the public sector. The results are presented in Table 4.3.

Table 4.3: Satisfaction Level of Quality of Construction Projects

Option	Frequency	Percent
Yes	52	25.1
No	155	74.9
Total	207	100.0

Source: Field Survey, 2019

The results indicate that, majority of the respondents were not satisfied with the quality of construction projects in the public sector. A total of 74.9 percent of the 207 respondents from the various categories of sampled respondents indicated that, they were not satisfied with the quality of construction projects in the public sector. However, 25.1 percent of the respondents indicated they were satisfied with the quality of construction projects among Metropolitan, Municipal and District Assemblies. The majority of respondents who indicated that, they were not satisfied with the quality of construction projects in the public sector seek to confirm the public perception on the quality of construction of projects.

4.5. Project Quality Measurement Approaches

Based on the results presented in section 4.4, this section sought the opinions of respondents on the approaches they used in measuring the quality of construction projects in the public sector. The results on the approaches used for measuring the quality of construction projects are presented Table 4.4.

Table 4.4: Project Quality Measurement Approaches

Approach	Usage			
	Yes		No	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Cost Performance	204	98.6	3	1.4
Time Performance	199	96.1	8	3.9
Quality Performance	207	100.0	0	0.0
Beneficiaries' Satisfaction	176	85.0	31	15.0

Source: Field Survey, 2019

From Table 4.4, quality performance is the most common approach to measuring construction projects quality in the public sector. All the 207 respondents indicated they used quality performance approach in measuring construction projects quality in their respective Assemblies and fields of specialization.

Also, cost performance was the second most common approach used by the study respondents. About 98.6 percent of the 204 respondents who responded to this option indicated that, they used cost performance for measuring quality of construction projects in the public sector. A total of 96.1 percent and 85 percent of the 199 and 176 respondents indicated they used time performance and beneficiaries' satisfaction in measuring the quality of construction projects in their respective assemblies and fields respectively.

The results revealed that, different types and combination of approaches are used in measuring the quality of construction in the public sector. These tools are used to measuring quality of construction projects at different components of the projects. For example, cost performance is used for measuring the cost component of the project,

time performance is used in measuring time components of the project, beneficiaries' satisfaction measures beneficiaries' satisfaction of the project. The combination of these approaches form the quality performance approach.

4.6. Quality Assurance Tools/Strategies

Based on the approaches identified in section 4.5, this section identified the tools/strategies used in measuring the quality assurance of construction projects. Three key tools/strategies that included flow and process model, stakeholder role and beneficiaries' satisfaction and organizational self-assessment model were identified by the respondents. The rates of usage are presented in Table 4.6.

Table 4.5: Quality Assurance Tools/Strategies

Tools/Strategies	Frequency	Percent
Flow and Process model	45	21.7
Stakeholder role model	90	43.5
Beneficiaries satisfaction and organizational self-assessment model	72	34.8
Total	207	100.0

Source: Field Survey, 2019

The results presented in Table 4.5, revealed that, stakeholder role model was the commonest tools/strategy in construction projects quality assurance. A total of 43.5 percent of the 207 respondents from the seven groups of respondents who participated in the study indicated they used stakeholder role model as quality assurance tool/strategy in construction projects in the public sector. Also, 34.8 percent of the 207 respondents indicated they used beneficiaries' satisfaction and organizational self-assessment model as a construction projects quality assurance tool/strategy in the public sector. In addition, a total of 207 of the 207 respondents indicated they used flow and

process model as a quality assurance tool/strategy in construction projects quality management in construction projects. It thus implied that, different tools/strategies are used in ensuring construction projects quality assurance in the public sector. These tools/strategies are used by different Assemblies for different projects depending on the project management team decision.

4.7. Internal Determinants of the Quality of Construction Projects

This section of the chapter presents and discussed the key drivers of quality performance of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti Region. To ensure specification in the identification of the key drivers of quality performance of construction projects, the study adopted the project specific component approach. Thus, the drivers were considered under specific aspects of a construction project as presented in Table 4.6. To enable the study ranked the key drivers, the mean and standard deviation as a measure of central tendency were adopted. The results on the key drivers of quality performance of construction projects as indicated by 207 respondents are presented in Table 4.6 and discussed below.

Table 4.6: Internal Determinants of the Quality of Construction Projects

Main	Specific Drivers	Ranking Mean	Standard Deviation
Project	Period of the Project	2.4069	1.24218
	Site Access	2.1921	1.12026
	Scope of Project	2.0483	1.14382
	Location of the Project	1.9662	1.22030
Design	Completeness and consistency of the design documents of project	2.4348	1.37747
	Conformance to codes and standards	2.3578	1.35893
	Adherence to Project specifications	2.3153	1.16428
	Project drawings are prepared in full details	2.2947	1.38477
Contract	Bill of Quantity is detailed and accurate	2.2899	1.35211
	Effective cooperation between parties involved	2.2415	1.44800
Materials	A written contract with clear conditions	2.1256	1.25167
	Availability of a comprehensive materials management system	2.2657	1.28544
Labour	Availability of good quality construction materials	2.2266	1.37080
	Using motivation system	2.7044	1.25127
Equipment	Using labour with high experience	2.6305	1.27677
	Availability of equipment	2.4089	1.40907
	Good utilization of equipment	2.2857	1.31899

Source: Field Survey, 2019

From Table 4.6, three (3) key drivers of quality performance of construction projects under project determinant were identified. Out of the three drivers, period of project was ranked first with a mean and standard deviation of 2.4069 and 1.24218 respectively. Site access, scope of project and location of project were ranked 2nd, 3rd and 4th respectively. Thus in the project class of drivers of quality performance of construction projects, period of the project is major factor that affect the quality performance of a construction project followed by site access with scope of project and project location having minimal effects on the quality of construction projects.

Regarding project design drivers of quality performance of construction projects, completeness and consistency of the design documents of project, conformance to codes and standards, adherence to project specifications, project drawings are prepared in full details and bill of quantity is detailed and accurate were identified as the key drivers. The mean and standard deviation results ranked completeness and consistency of the design documents of project and conformance to codes and standards as the first two key drivers of quality performance of construction projects under project design determinants whilst bill of quantity is detailed and accurate and project drawings are prepared in full details were ranked as the least drivers of quality performance of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti Region under project design determinants.

Under the contract determinants of the quality performance of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti Region, effective cooperation between parties involved and a written contract with clear conditions were identified as the key drivers. The mean and standard deviation statistics ranked effective cooperation between parties involved was the first driver of quality performance of construction projects followed by a written contract with clear conditions.

Also, under construction projects materials, availability of a comprehensive and availability of good quality construction materials were recognized as the drivers of quality performance of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti Region. Using the mean and standard deviation statistics, availability of a comprehensive materials management system was ranked as

the top driver of quality performance of construction project under the materials determinant with availability of good quality construction materials was ranked second.

Under labour as a determinant of the quality performance of construction projects in the public sector in the Ashanti Region, using motivation system and using labour with high experience were regarded as the key drivers of quality performance of construction projects under the labour. Equipment which was the last determinant identified availability of equipment and good utilization of equipment were the key drivers of quality performance of construction projects.

Overall, key drivers of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti Region falls within five broad categories of determinants that included project, project design, contract condition, construction materials, labour and equipment. Under each of these broad determinants, various specifics drivers exist and needs to recognize by the construction project manager and the project management team.

4.8. Internal Determinants of the Quality of Construction Projects Regression

Analysis

The study adopted the simple linear regression to model the linear relationship between the dependent variable quality of construction projects and the independent variable determinants of construction projects quality. This enabled the study estimate the impact of each of the independent variables under determinants of quality of construction projects on the quality of construction projects in numerical terms. Each of the determinants of the quality of construction projects were considered as individual models.

The summary regression models presented on Table 4.7 present a summary of results of the individual determinants of construction project quality measured individually as independent variables against the dependent variable quality of construction projects at different test levels. For the purposes of comparison of the various individual determinants of construction projects quality and their effects on the dependent variable quality of construction projects, the various regression models have been summarized on Table 4.7 and their significance levels have also summarized on Table 4.8.

Table 4.7: Summary Regression Model for Internal Determinants of the Quality of Construction Projects

Model Summary					Variable (Construct)
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.126 ^a	.016	-.004	.43209	Project Determinants
2	.258 ^a	.066	.042	.41287	Design Determinants
3	.089 ^a	.008	-.002	.43515	Contract Determinants
4	.127 ^a	.016	.006	.42763	Materials Determinants
5	.082 ^a	.007	-.003	.42967	Labour Determinants
6	.287 ^a	.082	.068	.41403	Equipment

Source: Field Survey, 2019

Table 4.8: Summary ANOVA Results for Internal Determinants of the Quality of Construction

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.589	4	0.147	0.789	0.534 ^b
	Residual	36.406	195	0.187		
	Total	36.995	199			
2	Regression	2.350	5	0.470	2.757	0.020 ^b
	Residual	33.070	194	0.170		
	Total	35.420	199			
3	Regression	0.309	2	0.154	0.816	0.444 ^b
	Residual	38.628	204	0.189		
	Total	38.937	206			
4	Regression	0.599	2	0.299	1.637	0.197 ^b
	Residual	36.574	200	0.183		
	Total	37.172	202			
5	Regression	0.250	2	0.125	0.676	0.510 ^b
	Residual	36.923	200	0.185		
	Total	37.172	202			
6	Regression	3.060	3	1.020	5.951	0.001 ^b
	Residual	34.112	199	0.171		
	Total	37.172	202			

Source: Field Survey, 2019

The results presented on Table 4.7 and Table 4.8 indicates the existence of association between the independent variables and the dependent variable. From Table 4.7, equipment factors as a determinant of the quality performance of construction project contributes to about 28.7 percent to the quality determination of construction projects. This was significant at 0.00 as indicated in Table 4.9. This implied that, there exist a strong relationship between equipment used in construction projects and the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region of Ghana. Also, design factors contribute to about 25.8 percent to the quality of the construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region. This was significant as it recorded a significant level of 0.020 as indicated on the ANOVA table in Table 4.9. In addition, a material factors as internal determinant of the quality of construction projects contributes to 12.7 percent

of the quality of construction projects. This recorded a significant level of 0.197 in the ANOVA table. Also, project as a determinant of the quality of construction project contributes to 12.6 percent of the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region with a significant level of 0.534. Contract and labour as determinants of construction project quality contribute to 8.9 percent and 8.2 percent to the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region respectively.

The results presented on Table 4.7 and 4.8 suggest that, equipment factors and design factors are the major determinants of construction projects quality among Metropolitan, Municipal and District Assemblies in the Ashanti region. Materials and project contributes moderately to the quality of construction projects whilst contract and factors and labour factors contributes least to the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region.

Measuring the contribution of internal factors determining the quality of construction projects among MMDAs at 100 percent, cumulatively, internal factors contribute to 96.9 percent of the quality of construction projects in the public sector in the Ashanti region of Ghana. That is, project type, design, contract conditions, materials used, labour and equipment cumulatively determined the quality of construction projects by 96.9 percent.

4.9. External Factors Determining Construction Project Quality

The sections 4.7 and 4.8 discussed and established the internal determinants of the quality of construction projects in the public sector in the Ashanti region of Ghana. This section presents and discussed the external determinants of the quality of construction projects in among Metropolitan, Municipal and District Assemblies in the Ashanti region. The mean and standard deviation were used to ranked the identified the external determinants of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region. The results are presented in Table 4.9. The specific factors or drivers were ranked under each of the main external determinants.

Table 4.9: External Factors Determining Construction Project Quality

Main	Specific Drivers	Ranking Mean	Standard Deviation
Economic	Stable inflationary factors	2.1618	1.25093
Environment	Stable Exchange rates	2.0637	1.05553
Social	High political support	2.3498	1.31286
Environment	High level stakeholder participation	2.2217	1.25671
	Stability of political environment	2.0242	1.23634
Physical	Favorable project site conditions	2.5222	1.10501
Environment	Favorable climatic environment	2.3865	1.21696
Technology	Utilization of up-to-up construction technology	2.6087	1.21740
Advancement	Availability of technology and innovation	2.3990	1.17457
Procurement	Effective competitive tendering process	2.5217	1.09645
Process	Effective contract management	2.3842	1.32012

Source: Field Survey, 2019

From Table 4.9 under the economic environment, stable inflationary factors and stable exchange rates were identified as the specific drivers of quality of construction projects in the public sector among Metropolitan, Municipal and District Assemblies in the Ashanti region. Stable inflationary factors were ranked first and stable exchange rates ranked second under the economic environment factors. Under the social environment,

high political support and high level of stakeholder participated and stability of the political environment were the specific drivers identified. Thus, political support, the level of stakeholder participation and the stability of the political environment among Metropolitan, Municipal and District Assemblies in the Ashanti region has a bearing on the quality of construction projects. Within the physical environment, favorable project site conditions and favorable climatic environment were the specific factors affecting the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region. The technology advancement identified utilization of up-to-up construction technology and availability of technology and innovation as the specific factors affecting the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region. Finally, under the procurement process, Effective competitive tendering process and effective contract management were the specific factors affecting the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region.

It is observed that, the internal drivers of the quality of construction projects identified and discussed in sections 4.7 and 4.8 falls within one or two of the external factors presented in Table 4.9. In this regards, though the external determinants are not within the control of the project manager and the project management team, meticulous controlling of the internal determinants by the project manager and project management team will minimized the impact of the external determinants on the quality of construction projects among Metropolitan, Municipal and District Assemblies in the Ashanti region.

4.10. Summary Regression Model for External Factors Determining Construction Project Quality

The study adopted the simple linear regression to model the linear relationship between the dependent variable quality of construction projects and the independent variable external determinants of construction projects quality. This enabled the study estimate the impact of each of the independent variables under external determinants of quality of construction projects on the quality of construction projects in numerical terms. Each of the external determinants of the quality of construction projects were considered as individual models.

The summary regression models presented on Table 4.10 present a summary of results of the individual external determinants of construction project quality measured individually as independent variables against the dependent variable quality of construction projects at different test levels. For the purposes of comparison of the various individual external determinants of construction projects quality and their effects on the dependent variable quality of construction projects, the various regression models have been summarized on Table 4.10 and their significance levels have also summarized on Table 4.10.

Table 4.10: Summary Regression Model for External Factors Determining Construction Project Quality

Model Summary					Variable (Construct)
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	0.253 ^a	0.064	0.055	0.42686	Economic Environment
2	0.150 ^a	0.022	0.007	0.43029	Social Environment
3	0.069 ^a	0.005	-0.005	0.43009	Physical Environment
4	0.130 ^a	0.017	0.007	0.42744	Technology Advancement
5	0.087 ^a	0.008	-0.002	0.42949	Procurement Process

Source: Field Survey, 2019

Table 4.11: Summary ANOVAa Results for External Factors Determining Construction Project Quality

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.470	2	1.235	6.779	0.001 ^b
	Residual	36.077	198	0.182		
	Total	38.547	200			
2	Regression	0.830	3	0.277	1.494	0.217 ^b
	Residual	36.105	195	0.185		
	Total	36.935	198			
3	Regression	0.177	2	0.089	0.479	0.620 ^b
	Residual	36.995	200	0.185		
	Total	37.172	202			
4	Regression	0.631	2	0.315	1.726	0.181 ^b
	Residual	36.542	200	0.183		
	Total	37.172	202			
5	Regression	0.279	2	0.140	0.757	0.470 ^b
	Residual	36.893	200	0.184		
	Total	37.172	202			

Source: Field Survey, 2019

From Table 4.10 and 4.11, there exists a significant association between the external determinants of construction projects quality and quality of construction projects. From all the five models presented in Table 4.10 and 4.11, Economic environment which constitutes the economic environment that influences the flow of funds and

affordability in financing among others was the major external determinant of the quality of construction projects in the public among MMDAs in the Ashanti Region. This determinant contributes to 25.3 percent of the quality of construction projects among MMDAs.

Another significant external factor that determines the quality of construction projects identified by the study was the social environment. It contributes about 15 percent to the quality of construction projects among the studied MMDAs. Thus, issues of culture, health and the general life style of the stakeholders in the construction projects.

In addition, technological advancement also contributes significantly to the quality of construction projects among MMDAs in the Ashanti. It contributes about 13 percent to the quality of construction among MMDAs in the Ashanti region.

In all, economic factors, social factors and technology advancement contribute 53.3 percent to the quality of construction projects among MMDAs in the Ashanti region in Ghana. Thus, these three broad determinants determine more than half of the quality of construction projects among MMDAs in the Ashanti region.

The least external determinants of the quality of construction projects among MMDAs were the physical environment and the procurement processes. Physical environment factor such as site conditions contributes about 6.9 percent to the quality of construction projects. Procurement processes contributes to 8.7 percent to the quality of construction projects among the MMDAs in the Ashanti region.

Considering the contribution of external factors to the quality of construction project among MMDAs at 100 percent, External factors influence the quality of construction projects by 68.9 percent. That is, economic environment, social environment, physical environment, technology advancement and public procurement processes contribute about 68.9 percent of the quality of construction projects.

4.11. Project Management Factors Determining Construction Project Quality

The project conceptual framework illustrated there are project management factors that affects the quality of construction projects. This section of the analysis discussed project management factors determining construction project quality among MMDAs in the Ashanti region. The factors were grouped under communication system, control mechanism, feedback capacity, planning efforts, effective quality assurance, overall managerial action and control of sub-contractors. Under each of these broad factors, specific factors were identified as presented Table 4.12.

Table 4.13: Project Management Factors Determining Construction Project**Quality**

Main Factors	Sub-Factors	Ranking Mean	Standard Deviation
Communication Systems	Shared project vision	2.6784	1.09963
	Regular update on plans	2.5764	1.18063
	Implementation of detailed communication plan	2.3478	1.18845
	Community involvement in the implementation	1.9447	1.17291
Control Mechanism	Availability of monitoring system	2.0637	1.11896
Feedback Capability	Competent project team	1.9420	1.06876
Planning Efforts	Availability of independent evaluation and feedback system	2.2764	1.20143
	Clear project objectives	2.4350	1.26641
Effective Quality Assurance	Level of stakeholder involvement	2.2500	1.27161
	Comprehensive contract documentation	2.0435	1.26301
	Availability and release of financial resources	2.0049	1.34822
	Implementing quality control and assurance system	2.1527	1.21106
Overall Managerial Action	Effective top management commitment and support	2.2029	1.20573
Control of Sub-contractors	Availability of systems for evaluating subcontractors	2.6280	1.08466
	Good and fair subcontractors conditions	2.6207	1.22635
	High cooperation between subcontractors and general contractors	2.4778	1.35824

Source: Field Survey, 2019

As presented in Table 4.13, under communication system, four specific factors were identified. Among these factors, shared project vision was the top factor that affects the project quality. That is, when the shared project vision is well communicated to project stakeholders. They will all play their roles to achieve the vision of the project. This affects the quality of the project. In addition, regular updates on the project plans to all stakeholders also affect the quality of the construction. The other two communication system factors that determine the quality of construction projects among the studied Assemblies included the implementation of detailed communication plan and

community involvement in the implementation. Thus, project communication management in project implement influence the quality of construction projects among MMDAs in the Ashanti region.

Under the control mechanism availability of monitoring system and competent project team were identified as the specific factors influencing the quality of construction projects among MMDAs in the Ashanti region. However, the availability of an effective monitoring system was regarded as the top control mechanism that determines the quality of construction projects among MMDAs in the Ashanti region. The second factor, that is competent project team have its existence of a monitoring system as the team operates within the monitoring system. Thus, monitoring plays an essential part in ensuring the quality of construction projects among MMDAs in the Ashanti.

Regarding feedback capability, availability of independent evaluation feedback system was identified the only factor that can influence the quality of construction projects. Thus, as part of the project implementation management process, periodic independent evaluation of the project implementation activities should be ensured. This will provide an independent assessment of the project implementation and provide an independent feedback that will contribute the quality of the project.

Another, broad factor considered was planning efforts. Specific factors identified under this category of factors included clear project objectives, the level of stakeholder involvement, comprehensive contract documentation and the availability and release of financial resources. In essence, project scope management (clear project objectives), project resource management (availability and release of financial resources), project

stakeholder management (level of stakeholder involvement) and project schedule management (comprehensive contract documentation) determine the quality of construction projects among MMDAs in the Ashanti region.

Overall, the results presented in Table 4.13 indicating the main and specific factors influencing the quality of construction projects among MMDAs in the Ashanti region resonance the need to considered the ten project management areas effectively in construction projects implementation. Thus, MMDAs in implementing construction projects should recognize the role of project integration management, project scope management, project schedule management, project cost management, project quality management, project resource management, project communication management, project risk management, project procurement and project stakeholder management in ensuring the quality of construction project.

4.12. Project Management Factors Determining Construction Project Quality

Regression Analysis

The study adopted the simple linear regression to model the linear relationship between the dependent variable quality of construction projects and the independent variable project management factors. This enabled the study estimate the impact of each of the independent variables under project management factors on the quality of construction projects in numerical terms. Each of the main project management factors were considered as individual models as presented in Table 4.14.

**Table 4.14: Summary Regression Model for Project Management Factors
Determining Construction Project Quality**

Model Summary					Variable (Construct)
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	0.237 ^a	0.056	0.036	0.40961	Communication Systems
2	0.150 ^a	0.023	0.013	0.43406	Control Mechanisms
3	0.114 ^a	0.013	0.008	0.43510	Feedback Capabilities
4	0.197 ^a	0.039	0.019	0.42702	Planning Efforts
5	0.014 ^a	0.000	-0.005	0.43000	Effective Quality Assurance
6	0.107 ^a	0.011	0.007	0.43332	Overall Managerial Action
7	0.174 ^a	0.030	0.016	0.42559	Control of Sub-contractors

Source: Field Survey, 2019

**Table 4.15: Summary ANOVAa Results for Project Management Factors
Determining Construction Project Quality**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.878	4	0.469	2.798	0.027 ^b
	Residual	31.542	188	0.168		
	Total	33.420	192			
2	Regression	.874	2	0.437	2.320	0.101 ^b
	Residual	37.871	201	0.188		
	Total	38.745	203			
3	Regression	.504	1	0.504	2.660	0.104 ^b
	Residual	38.241	202	0.189		
	Total	38.745	203			
4	Regression	1.438	4	0.359	1.971	0.100 ^b
	Residual	35.557	195	0.182		
	Total	36.995	199			
5	Regression	.007	1	0.007	.040	0.841 ^b
	Residual	37.165	201	0.185		
	Total	37.172	202			
6	Regression	.446	1	0.446	2.373	0.125 ^b
	Residual	38.492	205	0.188		
	Total	38.937	206			
7	Regression	1.128	3	0.376	2.076	0.105 ^b
	Residual	36.044	199	0.181		
	Total	37.172	202			

Source: Field Survey, 2019

From Tables 4.14 and 4.15 respectively, communication systems which included a shared project vision, regular updates on project plan, detailed communication plan and Community involvement in the implementation can influence the quality of a construction project by 23.7 percent among MMDAs in the Ashanti region. This implied that, communication system was the major project management factor determines the quality of construction project. The second important project management factor that determines the quality of construction project was the planning efforts. This project management factor determines the quality of construction projects by 19.7 percent among MMDAs in the Ashanti. Thus, clear project objectives, the level of stakeholder involvement, comprehensive contract documentation and the availability and release of financial resources determine the quality of construction projects by 19.7 percent. Other project management that moderately to the quality of construction projects among MMDAs in the Ashanti region included control of sub-contractors (17.4 percent), control mechanism (15 percent), feedback capabilities (11.4 percent), and overall managerial action (10.7 percent). However, based on the regression and ANOVA results presented in Table 4.13 and 4.14, effective quality assurance was the least project management determinants of construction project quality.

Putting the contribution of project management factors to the quality of construction projects among MMDAs at 100 percent, all the project management factors (communication system, control mechanism, feedback capabilities, planning efforts, effective quality assurance, overall managerial action and control of sub-contractors determines the quality of construction projects by 99.3 percent.

4.15. Key Constraints to enhancing Project Quality

The final section of the chapter four identified and discussed the key constraints to construction project quality in the selected Assemblies. The key constraints to construction projects quality in the studied Assemblies identified by the respondents are presented on Table 4.16.

Table 4.16: Key Constraints to enhancing Project Quality

Challenges	N	Mean	Std. Deviation
Processes involved in becoming a construction firm are too easy	207	2.8406	.96978
Poor preparation/planning for projects(unclear goals and objectives)	207	2.4589	.87412
Lack of competitive bidding process	204	2.4559	1.02818
Weak capacities of project management teams	207	2.4010	.91831
Bribery and corruption in the construction industry	207	2.3237	1.04583
Contracts awarded on the basis of one's political affiliation	207	2.1884	1.07859
Weak communication and reporting	207	2.1401	.93720
Low technology available to construction firms	207	2.0966	.82458
Changes in design	207	2.0531	.84306
Changes in bills of quantities during project implementation	207	2.0483	.95408
Weak capacities of contractors	207	2.0242	.77859
Poor stakeholder involvement in project planning and implementation	207	2.0145	.83304
Unrealistic budget estimates for projects	207	2.0145	.91629
Weak monitoring and evaluation systems	207	1.9420	.82822
Inadequate supervision of projects	207	1.8696	.79890
Cumbersome payment process	207	1.8406	.86949
Poor access to credit	207	1.6618	.70480
Delays in payment from government agencies	207	1.5169	.65244
Valid N (listwise)	204		

Source: Field Survey, 2019

The constraints presented in Table 4.16 depicted that, processes involved in becoming a construction firm are too easy. This result in unqualified and incompetent contractors always been able to compete and win contracts. Hence, the in-competencies of the contractors will therefore affect the quality of construction projects.

Another significant constraint identified was poor preparation/planning for projects (unclear goals and objectives). Thus, from the project design and planning phase of the project cycle contributes to this constraint. That is, the project design and planning team inability identified what the project seeks to achieve results in contractors' inability to implement projects according to plan. Thus, poor project planning has consequential negative effects on the quality of construction projects in the studied Assemblies.

Procurement management is one essential component of contract management. The study identified lack of competitive bidding process. Public procurement in Ghana has received negative perception as a result of non-competitive nature of the process. Where the competitive nature of public procurement is compromised, the tendency to affect the quality of the project is very high.

Another constraint identified by the study was the weak capacities of project management teams. Project management is a technical and critical field in project implementation. Constituted project management team need to adequate capacities in project management areas such as communication, coordination among others. The project manager especially should have adequate technical knowledge on the project to ensure compliance and quality.

Also, the study identified delays in payment from government agencies, poor access to credit, and inadequate supervision of projects as some of the weak constraints to the quality of construction projects in the studied Assemblies. That is, although they are constraints, their effects on the quality of construction projects in the studied Assemblies were minimal.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

The fifth chapter of the study highlighted key results from the study as presented and analyzed in chapter four. The chapter discussed the study results against what is available in literature as presented in chapter two of the study. The discussion is done in sections based on the specific research objectives of the study.

5.2. Existing tools/strategies for ensuring/measuring quality of construction projects

The objective one of the study sought to establish the tools. Strategies and approaches the various assemblies adopt in ensuring the quality of construction projects. The study results presented and analyzed in chapter four revealed quality performance, cost performance, time performance and beneficiaries' satisfaction were the common approaches the various Assemblies adopted in ensuring and measuring the performance of construction projects. In most cases, these tools were not used in isolation but a mixture of them. This confirms the assertion that, quality dwells on the principles of basic needs approach and employs a multidisciplinary approach since it uses knowledge from different fields such economics, statistics, mathematics, business, and geographical ideologies (Scarborough, 2012). The approaches identified by the study were similar to those identified by Yulia (2010). Thus, quality performance approaches in the construction industry include cost performance, time performance, quality performance and beneficiaries' satisfaction. All these approaches were widely used by many of the studied Assemblies. However, the study results depicted that, beneficiaries'

satisfaction was the least project quality measurement approach in the studied Assemblies.

Regarding the tools/strategies for ensuring/measuring quality of construction projects, many of the Assemblies used the stakeholder role model. Some also used the beneficiaries' satisfaction. In other cases, mixtures of more than one technique or approaches were adopted. This explains that, various tools/strategies and approaches are used by various Assemblies in ensuring construction projects quality.

The models use the viewpoints of beneficiaries by asking for their expectations and anticipations of a particular project. The models also consider performances from the viewpoint of project managers so as to be able to conduct self-assessment for improvement in the implementation of projects. This confirmed the conclusion made by Arditi and Lee (2003) and Maloney (2002) that, both the beneficiaries' satisfaction and organizational self-assessment models are available and used by many organizations in measuring quality performance of construction projects in the construction industry. This implied that, at each stage of the construction process, an improvement framework is needed to check the level of improvement attained at that particular stage in the process. This allows for effective allocation of resources to achieve maximum results from the project (Yasamis et al., 2002).

The results suggest the existence and availability of tools/strategies as well as approaches in measuring the quality of construction projects. The usage of these tools/strategies and approaches varied from organization to organization. The need for the project manager and the project management team to have the requisite knowledge

and competence in the used of these tools/strategies and approaches cannot be overemphasized.

5.3. Key drivers/determinants of quality performance of constructions projects

After identifying the tools, strategies and approaches used in measuring the quality of performance of construction projects among the selected Assemblies. The objective two of the study identified the key drivers/determinants of the quality of construction projects. The study identified internal, external and project management determinants of construction quality in the construction industry.

The internal determinants of construction project quality revealed by the study included project determinants, design determinants, contract determinants, materials determinants, labour determinants and equipment determinants. That is, project type, design, contract conditions, materials used, labour and equipment cumulatively determined the quality of construction projects by 96.9 percent. Within the broader internal determinants of construction project quality, specific determinants were also established. The internal factors identified by the were similar to the conclusion made by Chan, et al., (2004) & Karwitha (2017), that identified project-related factors, procurement-related factors, human –related factors, project management factors, project participants-related factors and external factors as the critical factors construction projects factors that determines the quality of construction projects.

In addition, external determinants of the quality of construction identified by the study included economic environment, social environment, technological advancement, procurement process and physical environment determinants. External factors

influence the quality of construction projects by 68.9 percent. That is, economic environment, social environment, physical environment, technology advancement and public procurement processes contribute to about 68.9 percent of the quality of construction projects within the selected Assemblies. This confirms the classification of external factors into economic, social and political by Musa, et al., (2015).

Project management practices also affect the quality of construction projects. The study results identified in order of significant communication systems, planning efforts, control of sub-contractors, control mechanisms, overall managerial actions, feedback capabilities and effective quality assurance. Under each of the main factors identified, the study went further to established specific determinants within each of the broad determinants. That is, communication system, control mechanism, feedback capabilities, planning efforts, effective quality assurance, overall managerial action and control of sub-contractors determines the quality of construction projects by 99.3 percent. This is in line with Njeri & Were (2017) that identified top management support and project team commitment as the main determinants of the quality of construction projects. Also, Bansal (2009) identified supplier quality management, teamwork, subcontractor evaluation, site documentation, equipment utilization and communication as some of the determinants of the quality of construction projects.

From the discussion above, the determinants of the quality of construction projects can be grouped into project related factors, external environment, project management actions, project procedures and human related factors. The results also confirmed the classification of project quality determinants by Lau & Kong, (2014) into internal and external constraints. Generally, constraints to the quality of construction projects can

be group into design constraints, technical constraints, economic constraints, management constraints, legal constraints, time constraints, environmental constraints, social constraints and third parties.

5.4. Key constraints to enhancing the quality performance of construction projects

The assessment by the respondents that, the quality of construction projects within their respective Assemblies were moderately high was based on the fact that, the quality of construction projects had some constraints.

The study revealed that, processes involved in becoming a construction firm are too easy, poor preparation/planning for projects (unclear goals and objectives), lack of competitive bidding process, weak capacities of project management teams, bribery and corruption in the construction industry among others as the key constraints to enhancing the quality performance of construction projects. This confirms the assertion by Lau & Kong (2014) that, there are constraints in every sector and the construction sector is no exception. This further reinforced the assertion by Ahmed, et al., (2014 that, constraints in construction projects can be found in the organizations themselves, the relationships among the different actors and the general considerations such as the economic situation. Also, the findings of (Vleems, 2018), that, poor planning, unclear goals and objectives, weak communication and reporting channels, changes in designs, as well as unrealistic budget estimates for projects is common in Ghana was validated by the study results. The Ghanaian construction industry forces major problems which undermines its potential and contribution to overall national development.

CHAPTER SIX

SUMMARY OF KEY FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

The sixth chapter of the study summarized the key findings relative to the specific objectives of the study. In addition, the chapter provided a general conclusion for the entire the study relative to the main objective of the study. The final part of the chapter provided recommendations based on the key findings of the study for improving the quality performance of public sector construction projects in Ghana.

6.2. Summary of Findings

6.2.1 Existing tools/strategies for ensuring/measuring quality of construction projects

The study results presented and analyzed in chapter four revealed quality performance, cost performance, time performance and beneficiaries' satisfaction were the common approaches the various Assemblies adopted in ensuring and measuring the performance of construction projects. In addition, the study found the stakeholder role model and the beneficiaries' satisfaction as the main tools/strategies for ensuring/measuring quality of construction projects.

6.2.2. Key drivers/determinants of quality performance of constructions projects

The study identified internal, external and project management determinants of construction quality in the construction industry. The internal determinants of construction project quality revealed by the study included project determinants, design determinants, contract determinants, materials determinants, labour determinants and equipment determinants. In addition, external determinants of the quality of construction identified by the study included economic environment, social environment, technological advancement, procurement process and physical environment determinants. The study results identified in order of significant communication systems, planning efforts, control of sub-contractors, control mechanisms, overall managerial actions, feedback capabilities and effective quality assurance as the project management related factors determining the quality of construction projects in the studied Assemblies.

6.2.3. Key constraints to enhancing the quality performance of construction projects

The study revealed that, processes involved in becoming a construction firm are too easy, poor preparation/planning for projects (unclear goals and objectives), lack of competitive bidding process, weak capacities of project management teams, bribery and corruption in the construction industry among others as the key constraints to enhancing the quality performance of construction projects.

6.3. Conclusion

The study examined the determinants of quality of construction projects in the construction industry with MMDAs in the Ashanti region. The results of the study established that, there are multiplicities of factors that influence the quality of construction projects in the construction industry among MMDAs in the Ashanti region. Overall, the study established the tools/strategies as well as the performance measurement approaches used by the selected Assemblies in the Ashanti Region. In addition, the determinants of construction project quality and the challenges associated with ensuring construction project quality in the selected Assemblies in the Ashanti region.

The study results affirmed the study conceptual framework that, there project related factors or internal factors, external factors and project management action affects the quality of construction projects. The study was a deductive in reasoning and the results confirmed the study theoretical framework that, stakeholder theory, system dynamic model and management theory are central in project management practices.

A comprehensive project management approach or framework in ensuring that, project quality is safeguard is necessary in the construction project planning and implementation. This comprehensive project management framework must be developed in the context of diverse stakeholders involved in construction industry to ensure participatory planning and implementation.

6.4. Recommendations

Based on the findings of the study and in relation to the fourth objective of the study, this section of the chapter provides key recommendations for improving the quality of construction projects in the construction industry among MMDAs in the Ashanti region.

6.4.1. Capacity Building on Project Management for key Staff

The study results revealed that, poor preparation/planning for projects (unclear goals and objectives), weak communication and reporting and weak capacities of project management teams were some of the constraints hampering the quality of construction projects among the studied Assemblies. It is therefore recommended that, key staff of the Assemblies who are usually involved in planning and implementation should be trained on project management areas. These areas should include project integration management, project scope management, project schedule management, project cost management, project quality management, project resource management, project communication management, project risk management, project procurement management and project stakeholder management. This will ensure that, project management teams have the requisite skills and competencies to implement projects to meet the objectives of the projects, satisfy stakeholder's expectation, increases the chance of project success as well as ensure effective resources utilization. This capacity can take the form of internal or external training.

6.4.2. Strict Adherence to Procurement Best Practices

The study also found that, processes involved in becoming a construction firm are too easy, Contracts awarded on the basis of one's political affiliation and Lack of competitive bidding process as some of the challenges encountered in ensuring the quality of construction projects. The study therefore recommends that, the Assemblies should strictly adhere to procurement best practices as outlined in the Public Procurement Act, Act 663 of 2003 and Act 914 of 2016 as amended. This will ensure competition, transparency, accountability and value for money in construction projects. This will promote quality in construction projects implementation.

6.4.3. Ensuring Participatory Project Planning and Implementation

The study identified poor stakeholder involvement in project planning and implementation as a constraint to quality of construction projects in the studied Assemblies. It is therefore recommended that, participatory project planning and implementation be should be ensured. Project stakeholders are very necessary in effective and efficient project management. Hence, Assembly should ensure that, relevant stakeholders participate at every stage or cycle of a project from initiation to completion.

6.4.4. Leveraging on the internal determinants to minimize the effects of external determinants

The study identified both internal (project related factors and project management related factors) external determinants of construction project quality. The internal determinants are within the purview of the project organization whilst the external determinants are not within the purview of the organization. To minimize the effects of

the external determinants on the quality of the project, the study recommends that, Assemblies take advantage of the internal determinants to reduce the impact of the external determinants on the project quality. This can be done by ensuring that, all internal determinants of construction projects quality are met rightly.

6.4.5. Utilization of realistic designs and budgets

The study again identified changes in design, changes in bills of quantities during project implementation and unrealistic budget estimates for projects as some of the limitations to construction projects quality among the Assemblies. It is therefore recommended that, persons responsible for designs and estimates provide such designs and estimates should do it in line with prevailing market conditions and technology. This will avoid the changes in designs and estimates that eventually affect the quality of construction projects.

6.4.6. Sustaining an Effective Monitoring and Evaluation Systems

Finally, the study results revealed that, weak monitoring and evaluation systems and inadequate supervision of projects affect the quality of construction projects. The study therefore, the study recommends sustaining an effective monitoring and evaluation systems in the various MMDAs as a means of enhancing the quality of construction projects. This can be done by providing the necessary trainings, resources and equipment required by the monitoring team to ensure sustainable effective monitoring and evaluation of construction projects in their respective Assemblies.

6.5. Suggestions for Further Research

The study suggests that, further research should be conducted into the factors affecting the Ghanaian contractor performance in the construction industry especially in the public sector. This is because, the study was limited to the determinants of construction projects quality, however, performance of a contractor is central to quality of construction projects and therefore, having a study that will contribute in that direction will be very commendable.



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APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA-KUMASI CAMPUS

COURSE: MPhil CONSTRUCTION TECHNOLOGY

Thesis Topic: Determinants of Quality of construction projects in the construction industry: A study public sector projects in Ghana

Section A: Demographic Characteristics of Respondents

1. Name of Assembly :.....
2. Category of respondent: (a) Planning Officers [] (b) Engineers []
(c) Architects [] (d) Quantity Surveyors [] (e) Budget Officers []
(f) Finance Officers []
3. Position of Respondent. (a) Key Management Member []
(b). Ancillary Management Member []
4. Department of the respondent:.....
5. Age of Respondent:years
6. What is your educational level? (a) Degree [] (b) Masters [] (c) High National Diploma (HND) [] (d) others (specify).....
7. How long have you worked in the public sector?.....years

Section B: Existing tools/strategies for ensuring quality of construction projects in the construction industry in Ghana

8. Do you have any knowledge on project management? (a) Yes [] (b) No []
9. Are you satisfied with the quality of construction projects in the Ghanaian construction industry? (a) Yes [] (b) No []

10. Indicate the approaches used in measuring quality of construction projects at your Assembly

Approach	Response	
	Yes	No
Cost Performance		
Time Performance		
Quality Performance		
Beneficiaries' Satisfaction		

11. Which of the following tools/strategies is use for ensuring quality of construction projects in your Assembly? (a) Flow and Process Model []
 (b) Stakeholder role model [] (c) Beneficiaries satisfaction and organizational self-assessment model []

Section C: Key drivers of quality performance of public sector constructions projects in Ghana

12. Indicate the level of influence the following project related factors determines the quality of construction project in Ghana

Main Factor	Sub-Factors	Likert Scale				
		<i>1-Highly Influence</i>	<i>2-High Influence</i>	<i>3-Influence</i>	<i>4-Moderately</i>	<i>5-No Influence</i>
Project	Scope of the project					
	Location of the project					
	Site access					
	Period of the project					
Design	Completeness and consistency of the design documents of projects					
	Project drawings are prepared in full details					
	Conformance to codes and standards					
	Adherence to project specifications					
	Bill of quantity is detailed and accurate					
Contract	Effective cooperation between parties involved					
	A written contract with clear conditions					
Material	Availability of good quality construction materials					
	Availability of a comprehensive materials management system					
Labour	Using labor with high experience					
	Using motivation system					
Equipment	Income level and wage of labor					
	Availability of equipment					
	Good utilization of equipment					

13. Using the likert scale provided, rate how the following external environment factors determine the quality level of construction project in Ghana.

Main Factor	Sub-Factors	Likert Scale				
		<i>1-Highly Influence</i>	<i>2-High Influence</i>	<i>3-Influence</i>	<i>4-Moderately</i>	<i>5-No Influence</i>
Economic Environment	Stable exchange rates					
	Stable inflationary factors					
Social environment	Stability of political environment					
	High political support					
	High level stakeholder participation					
Physical Environment	Favorable climatic environment					
	Favorable project site conditions					
Technology Advancement	Availability of technology and innovation					
	Utilization of up-to-up construction technology					
Procurement Process	Effective competitive tendering process					
	Effective contract management					

14. Using the likert scale provided, rate how the following project management action factors determine the quality level of construction project in Ghana

Main Factor	Sub-Factors	Likert Scale				
		<i>1-Highly Influence</i>	<i>2-High Influence</i>	<i>3-Influence</i>	<i>4-Moderately Influence</i>	<i>5-No Influence</i>
Communication Systems	Implementation of a detailed communication plan					
	Shared project vision					
	Regulate update on plans					
	Community involvement in the implementation					
Control Mechanisms	Availability of monitoring system					
	Competent project team					
Feedback Capabilities	Availability of independent evaluation and feedback system					
Planning Efforts	Level of stakeholder involvement					
	Availability and release of financial resources					
	Comprehensive contract documentation					
	Clear project objectives					
Effective quality assurance	Implementing quality control and assurance system					
Overall managerial action	Effective top management commitment and support					
Control of sub-contractor	Availability of systems for evaluating subcontractors					
	Good and fair subcontractors conditions					
	High cooperation between subcontractors and general contractors					

Section D: Key constraints to enhancing the quality performance of public sector construction projects in Ghana

15. If yes, indicate your level of agreement or disagreement with the following constraints to enhancing the quality of public sector construction projects in Ghana using the likert scale; 1=Strongly Agreed (SA), 2= Agreed (A), 3= Disagreed (D) and 4=Strongly Disagreed (DA).

Identified Constraints	Scale			
	1=SA	2=A	3=D	4=DA
Poor access to credit				
Delays in payment from government agencies				
Cumbersome payment processes				
Lack of competitive bidding process				
Weak capacities of contractors				
Weak monitoring and evaluation systems				
Weak of capacities of project management teams				
Bribery and corruption in the construction industry				
Low technology available to construction firms				
Inadequate supervision of projects				
Poor preparation/planning for projects (unclear goals and objectives)				
Changes in bills of quantities during project implementation				
Contracts awarded on the basis of one's political affiliation				
Processes involved in becoming a construction firm are too easy				
Poor stakeholder involvement in project planning and implementation				
Weak communication and reporting				
Unrealistic budget estimates for projects				
Changes in designs				

Section E: Measures that can improve the quality performance of public sector construction projects in Ghana

16. How will you rate the general construction project quality level in Ghana? (a) Very High [] (b) High [] (c) Moderately High [] (d) Low [] (e) Very Low []

17. Can the currently level of construction project quality improved? (a) Yes [] (b) No [] (c) Don't Know []

If yes to Qn. 18, kindly, state the measures you think can be implemented to improve the quality of performance of public sector construction projects in Ghana.

- i.
- ii.
- iii.
- iv.
- v.



Thank You