

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,  
KUMASI, GHANA.**

**THE EFFECT OF TECHNICAL AUDITING ON CONSTRUCTION PROJECTS  
PERFORMANCE IN DISTRICT ASSEMBLIES**

**By**

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A Thesis Submitted to the Department of Building Technology,  
College of Art and Built Environment  
in partial fulfillment of the requirements for the degree of

**MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT**

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## DECLARATION

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

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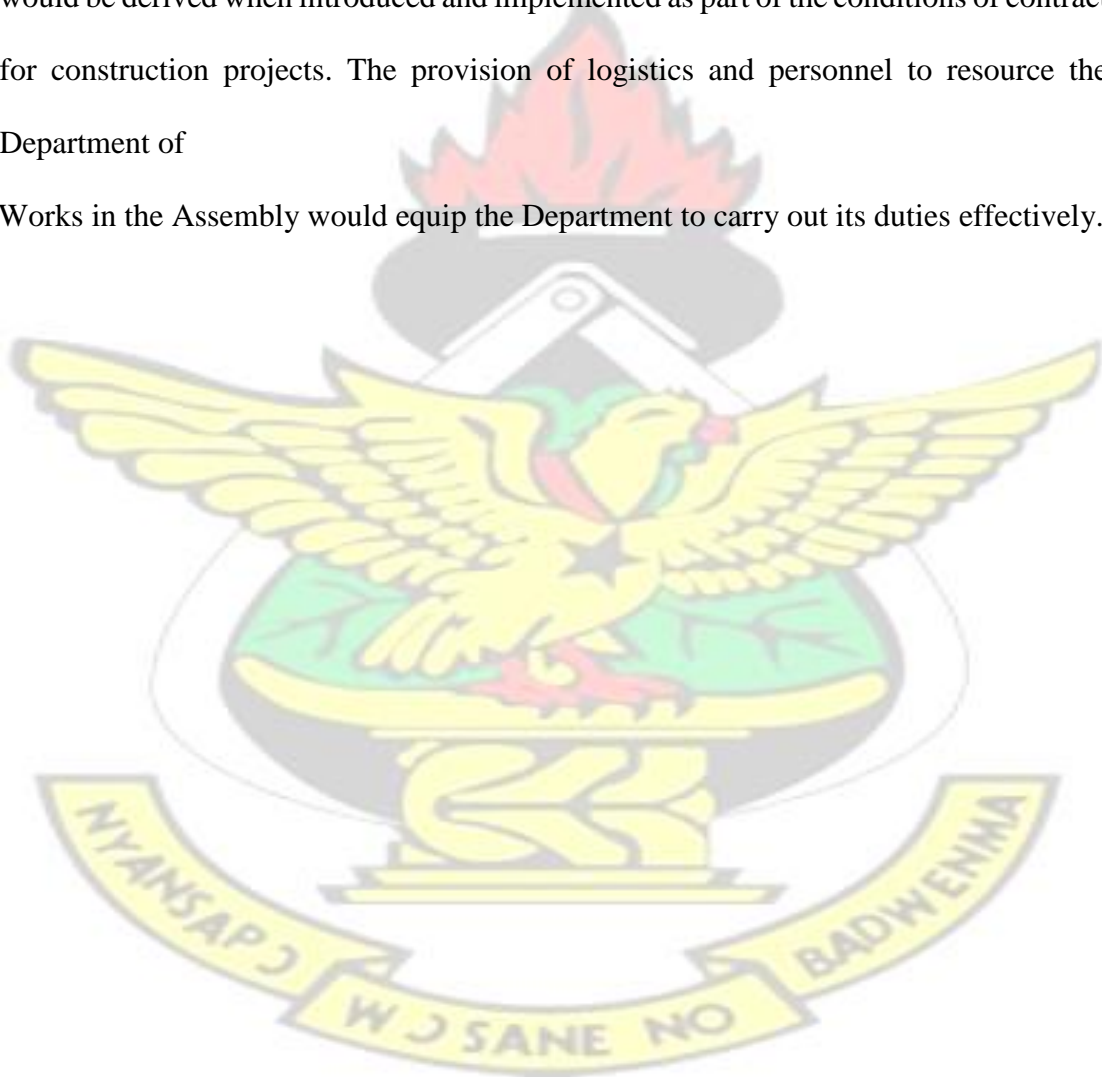
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## ABSTRACT

The objective of clients in undertaking construction projects is that needs and expectations for which substantial resources are committed will be fully met. Clients achieve this objective when projects are completed on time, within budget and meet the needs and expectations of clients as initially specified. These objectives are not always achieved. In 2012, 34% of projects executed were successful (on time, within budget and according to original specifications), 15% failed (abandoned or terminated) while 44% were challenged (completed, over budget, over time and with fewer features). To restore client confidence and justify the resources invested in project planning and execution, audits (financial and technical) have been introduced. Presently in Ghana, all publicly funded construction projects in District Assemblies require that a regulatory financial audit be carried out by the Office of the Auditor General. These financial audits have been effective in serving as a control mechanism against over-payment for work done and payment for works yet to be executed as well as the enforcement of laid down accounting principles in record keeping, payment for work done and the seeking of approval for the use of reserved funds. In spite of these benefits, project performance has left much to be desired as financial audits have focused mainly on budget neglecting quality requirements and work schedules. This study sought to examine the effects that the mandatory introduction and implementation of technical auditing would have on project performance in District Assemblies. The objectives of the study were to investigate the effects that technical auditing would have on construction project performance and ascertain the capacity of District Assembly staff to perform technical auditing functions. The need to generalize findings informed the choice to use the quantitative approach with a survey questionnaire been used in collecting data after a literature review had placed the study in its historical perspective. The study identified that the introduction and implementation of technical auditing on construction projects

would enhance project management processes, reinforce professionalism in the construction industry and enable the independent assessment of project performance. Technical audits were also found to enhance accountability and credibility in the construction industry thereby increasing clients' confidence of obtaining value for money invested. The study also established that over seventy percent of the staff of District Assemblies have the capacity to perform technical audits on construction projects. With majority of the staff having knowledge of technical auditing, its benefits would be derived when introduced and implemented as part of the conditions of contract for construction projects. The provision of logistics and personnel to resource the Department of Works in the Assembly would equip the Department to carry out its duties effectively.



## DEDICATION

I dedicate this work to the Almighty God who has given me the grace and strength to go through this study and to the Akuaku family who supported me in diverse ways.

# KNUST





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I am grateful to God Almighty for helping me complete this academic exercise successfully. I am also full of thanks to my supervisor Hon. Joe Kingsley Hackman who patiently guided me through the production of this thesis.

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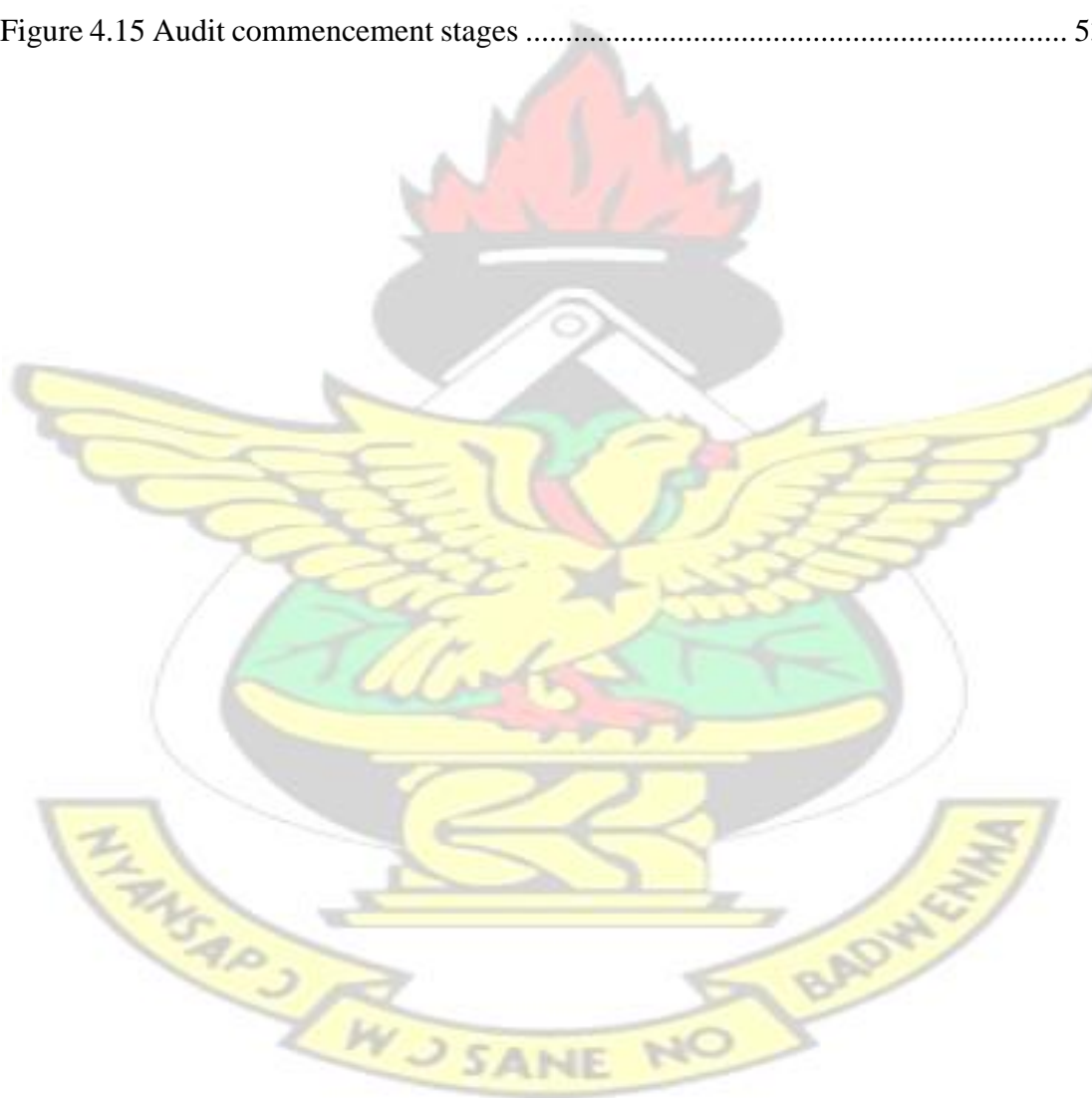


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## **CHAPTER ONE INTRODUCTION**

### **1.1 INTRODUCTION**

This chapter focuses on the introduction of the research study and includes areas such as the background to the study, problem statement, research questions, research aim and objectives. The research methodology, research scope, the significance of the study, and research organization are likewise addressed in this introduction.

### **1.2 BACKGROUND TO THE STUDY**

The construction industry is an important sector in the economy of nations and plays a vital role in their socio economic growth. This is achieved through the creation of employment and the provision of infrastructure such as health facilities, educational institutions, office accommodation, residences, transportation systems, power systems, telecommunications, irrigation and agriculture systems. In every country, the construction industry has wide ranging linkages with various sectors of the economy. These include the manufacturing, agricultural, mining, as well as the services sector of the economy. Lopes (2012) assert that the construction industry forms a large part of the economy of every country and accounts for between 5 and 10 percent of gross domestic product (GDP). The construction industry's share of Gross Domestic Product in Ghana in 2014 stood at 12.3%, an increase from 11.6% for 2013 (Ghana Statistical Service, 2015). Being a strategic industry that stimulates growth, clients (public, cooperate and private) infuse substantial resources to achieve their needs. This is evident by the engagement of professionals (consultants and builders) at substantial fees and the payment for materials and plant used in the execution of projects.

The motive of clients in undertaking projects is that needs and expectations for which substantial resources are committed will be fully met. This is achieved when the project



is completed on time, within budget and meets the needs and expectations of clients as initially specified. Though clients engage and pay professionals to plan and execute projects, the success rates of projects leave much to be desired. According to the Standish Group International (CHAOS Report 2012), 34% of projects executed were successful (on time, within budget and according to original specifications). 15% of projects failed (abandoned or terminated) while 44% of projects were challenged (completed, over budget, over time and with fewer features).

As a measure to ensure that clients obtain what they set out to achieve, audits (financial and technical) have been instituted. An audit takes stock of things, procedures and systems. Audits systematically and independently examine specific activities carried out by a person(s), with the aim of ascertaining whether the procedures and associated outcomes conform to planned schedules, have been executed efficiently and are appropriate to attain set goals (Environment, 2002).

According to NIST (1997), a financial audit is a compliance audit that is instituted by law and is primarily concerned with the examination of financial statements and records, and serves as a control mechanism for reporting and protection of resources and assets. In the light of this, a Federal Act in the United States of America, the Public Company Accounting Reform and Investor Protection Act of 2002, has been created to protect shareholders and public interest. Amongst others it requires that structured companies institute audit committees, record internal controls and assess their effectiveness, and to certify that financial statements objectively represent the financial state and procedures for the period under review.

A technical audit is the independent, objective assessment of performance in relation to the effectiveness and efficiency of a firm's operation in achieving stated goals and objectives (Petts Consulting, 2003). It is an audit that examines the technical aspects of

a construction project from the process of planning, designing, tendering, construction and the use of the facility with the view of ascertaining whether processes and activities have been carried out in line with laid down procedures. In 2001, the Institute of Public Works Engineering Australia (IPWEA) instituted a road safety audit policy with the object of identifying potential safety risks and measures of reducing the risks to road users (IPWEA, 2001). A manual to be used for the technical auditing of works done by the Works Departments has been issued and is in force in Hong Kong (Environment, 2002). A similar manual for the technical auditing of road projects in Botswana is also in force (Roads Department, 2001). The compliance that technical auditing enforces ensures that overruns and specification deviations are checked hence providing value for money (Mwiya, 2009; Environment, 2002).

Auditing of publicly funded projects in Ghana is mandated by Section 187(2) of the 1992 Constitution of Ghana and Section 13(e) of the Audit Service Act and is carried out by the Auditor-General. These audits are aimed at compliance with financial regulations and contracts terms. Despite these audits by the Auditor-General, the success rates of projects leave much to be desired.

### **1.3 STATEMENT OF PROBLEM**

Technical auditing of construction projects provides insight into enhanced project performance in terms of cost, time, quality and safety, and ensures accountability right from the planning process through to the completion period (Mwiya, 2009; Environment, 2002). Being a strategic sector, the construction industry sees lots of investment from public, cooperate and private clients. To maintain clients confidence in investment, ethical and professional standards need to be introduced and implemented. One such ethical standard is financial auditing. Financial audits are primarily concerned with the examination of financial statements and records, and serve

as a control mechanism for reporting (Nalewaik, 2007). These audits are usually carried out when projects have been completed and by persons without an engineering background. This places a limitation on these professionals in evaluating the planning process for projects, resource requirements and compliance with established technical procedures. Mwiya (2009) asserts financial auditing on its own is unable tackle all aspects of deviations from project objectives hence the need for the introduction and implementation of technical auditing. The use of technical auditing procedures ensure reasonable care and skill have been employed by personnel in the discharge of laid down procedures and requirements (Environment, 2002). In Ghana, financial audits by the Auditor-General have not improved on the overall attainment of the objectives of construction projects. Furthermore, there is no clear recognition of technical auditing although the Public Procurement Act recognizes the role of consultants in construction projects. By this lack of recognition, consultants are unable to perform technical auditing functions hence depriving the construction industry of its benefits. It is in the light of this that this study is being undertaken to identify the effect that technical auditing would have on construction projects in Ghana.

#### **1.4 RESEARCH QUESTIONS**

The ensuing inquiries would be advanced in the conduct of this study:

1. What effect has financial auditing had on construction project performance?
2. What effect would technical auditing have on construction project performance?
3. Do personnel have the capacity to perform technical auditing functions?

## **1.5 AIMS AND OBJECTIVES**

### **1.5.1 Research Aim**

The aim of this study is to investigate the effect that technical auditing would have on construction project performance in district assemblies.

### **1.5.2 Research Objective**

To achieve the aim for this study, the following objectives are advanced:

1. To examine the effects of financial audits on construction project performance.
2. To investigate the effects of technical auditing on construction project performance.
3. To investigate the capacity of District Assembly staff to perform technical auditing functions.

## **1.6 RESEARCH SCOPE**

This research was conducted on all publicly funded projects undertaken in the past five years in selected Assemblies in the Brong Ahafo Region of Ghana. Funds for which projects were assessed included the District Assemblies Common Fund (DACF), District Development Facility (DDF) and the Urban Development Grant (UDG).

## **1.7 RESEARCH METHODOLOGY**

A quantitative approach was employed in this study and the survey method of collecting quantitative data adopted. This was chosen because of the standardization that it offers all respondents as well as the need to generalize results to represent the large population. The sampling frame consisted of architects, engineers, planners, quantity surveyors and auditors.



## **1.8 SIGNIFICANCE OF THE STUDY**

Technical auditing of construction projects provides insight into enhanced project performance in terms of cost, time, quality and safety, and ensures accountability right from the planning process through to the completion period (Mwiya, 2009; Environment, 2002). The compliance that technical auditing enforces ensures that overruns and specification deviations are checked hence providing value for money (Mwiya, 2009; Environment, 2002). The Government of Ghana stands to benefit immensely as the major client of the construction industry. While value for money is achieved, investor confidence in the industry will be boosted with clients knowing that measures have been put in place to ensure the success of projects.

With sustained and improved investments, the construction industry's share of Gross Domestic Product in Ghana is likely to increase from 12.3% in 2014, all things being equal. Technical auditing when introduced and implemented at the beginning of a project increases investor confidence with clients knowing that resources invested are fully meeting needs and expectations.

## **1.9 ORGANIZATION OF THE RESEARCH**

This research is ordered in interrelated chapters of five. The first chapter concentrates on the overall overview of the research. Key areas addressed include background to the research, statement of the problem, research questions, aim and objectives of the research, scope of the research, research methodology and significance of the research. Chapter two is solely dedicated to comprehensive literature review. Chapter three deals with the methodological dimension of the research. It highlights the research philosophy, research design, methods, sampling, research instrument design and administration and data preparation for analysis. Chapter four delves into the



presentation of data, analysis and discussion of results while chapter five closes the research by reviewing the research questions and objectives in tandem with the results of the research, recommendations, directions for policy formulation and future research agenda.

## **CHAPTER TWO LITERATURE REVIEW**

### **2.1 INTRODUCTION**

This section reviews studies that have been carried out on the subject matter by going through peer reviewed journals, reports, conference papers and books. The review concentrates on the construction industry and its impact on the economy, the Works Department in the District Assembly, auditing of works (financial and technical), and the role of statutory bodies in Ghana.

### **2.2 CONSTRUCTION INDUSTRY**

The construction industry is an important sector in the economy of nations and plays a vital role in their socio economic growth. This is achieved through the creation of employment and the provision of infrastructure such as health facilities, educational institutions, office accommodation, residences, transportation systems, power systems, telecommunications, irrigation and agriculture systems. By its nature (large, complex, geographically spread out) the construction industry has wide ranging linkages with various sectors of the economy including the manufacturing, agricultural, telecommunication, and the services sector of the economy and employs varying participants. These participants are both skilled and unskilled and comprise of architects, engineers, planners, surveyors, suppliers and professional builders.

Lopes (2012) assert that the construction industry forms a large part of the economy of every country and accounts for between 5 and 10 percent of gross domestic product

(GDP). The industry engages up to 10 percent of the working population and is accountable for about half of the gross fixed capital formation. Hillebrandt (2000) describes the industry as having the potential of being an “economic regulator”. This happens when government, the major client of the construction industry, varies its spending levels to bring about desired changes in the economy. In Ghana, the construction industry’s share of Gross Domestic Product for 2014 stood at 12.3%, an increase of 0.7% from the 2013 share of 11.6% (Ghana Statistical Service, 2015). Government is the major client of the construction industry in Ghana and formulates policies that regulate construction activities with the National Building Regulations and Building Standards Act – No. 103 of 1977 and the Public Procurement Act, Act 663 of 2003 being two of such regulatory codes.

### **2.3 THE ROLE OF DISTRICT ASSEMBLIES IN DEVELOPMENT**

Infrastructural development of the country is the responsibility of the government of Ghana and as such the government commits substantial amount of the country’s resources in the execution of construction projects. These resources, until recently, were expended centrally by the government from donor supports and budgetary allocations. With two-thirds of Ghana’s population being rural, government could not continually finance projects centrally (Osei Assibey, 2005). To enhance the development of these rural areas and the effective administration of resources, it was essential to empower the local people so they could participate in the administration and advancement of their locales. This was to enable the locals initiate projects that were in line with their needs (Osei Asibey, 2005). In pursuit of grass root participation, the Local Government Act, Act 462 of 1993 established District

Assemblies (Municipal and Metropolitan Assemblies inclusive as stipulated in Section 162 of Act 462) after the introduction and implementation of decentralised governance in 1988 (Botchway, 2000).

The District Assembly is the utmost political and administrative body in the district and exercises both legislative and executive functions. Under Section 38 of Act 462, Metropolitan Assemblies have 16 Departments; Municipal Assemblies have 13 Departments while the District Assemblies have 11 Departments. These decentralised departments include the Department of Works, Finance Department, Education, Youth and Sports Department, Social Welfare and Community Development Department, Physical Planning Department, Natural Resource Conservation Department, Central Administration, Trade and Industry, Disaster Prevention Department, Health Department and Department of Agriculture. In addition to these eleven (11) Departments, Municipal Assemblies have two more, namely; Transport Department and Urban Roads Department. Metropolitan Assemblies have in addition to the two of the Municipal Assemblies the Waste Management Department, Legal Department and Budgeting and Rating Department.

The role of the Assembly as stipulated in Section 10 of Act 462 includes exercising overall responsibility for the development of the district. This development is achieved through the effective and efficient mobilization and deployment of human, financial and technological resources. The initiation and execution of infrastructural projects stands paramount in the achievement of the mandate of the District Assembly in developing the people in its catchment area.

Infrastructural projects that meet the needs of populace are suggested by the communities, the District Assembly and government through grass root consultations.

Per the size, resource requirements and the duration of a proposed project, it is either implemented by the Works Department or by contractors and consultants (Botchway, 2000).

### **2.3.1 The Department of Works**

Under the Local Government Act, 1993, Act 462 and Legislative Instrument 1961, the Department of Works is a fusion of the Department of Feeder Roads, Public Works Department, Department of Rural Housing, District Water and Sanitation Unit, and the Works Unit of the Assembly. It is mandated to assist the Assembly achieve its aim of infrastructural development in the various communities (Local Government Act, 1993).

This it achieves by providing technical support for the planning, designing and execution of works to be undertaken by the Assembly. In line with the Public Procurement Act, ACT 663 of 2003, it prepares all requisite documents to aid in the tendering, award and administration of contracts to consultants and contractors. While projects are on-going the Department inspects and monitors them to ensure they are in line with the specifications and conditions of contract thus keeping project objectives of required quality, schedule and budget on track. Based on national policies, the Department also formulates policies to advise the Assembly on settlements, feeder roads, drains and diversion or alteration of the course of any street.

Thus the Department of Works serves as the agent of the Assembly in the planning, execution and monitoring of all construction and engineering projects in the district. The monitoring team is spearheaded by the Chairman of the Works Sub-Committee and is assisted by representatives from the Department of Works, Planning, user department and stakeholders in the community where the project is being undertaken. The mandate of the Department of Works is achieved through its staffing and logistical requirements (Scheme of Service of the Local Government Service, May



2001).

The staffing structure of the Department is divided into the professional and subprofessional class. The professional class comprises Chief Engineer, Principal Engineer, Senior Engineer, Engineer and Assistant Engineer. The Sub-professional Class comprises Chief Technician Engineer/Chief Engineering Technician, Assistant Chief Technician Engineer/Assistant Chief Engineering Technician, Principal Technician Engineer/Principal Engineering Technician, Senior Technician Engineer/Senior Engineering Technician and Technician Engineer/Engineering Technician.

In executing its mandate the Department faces enormous challenges. These include the award of contracts by Central government without notice of such awards to the Department/local government staff, the lack of logistics and the inadequate understanding by the staff of the Department of their roles and responsibilities as regards the monitoring of contracts. These challenges have rendered the Department unable to efficiently monitor and administer contracts (Osae, 2009).

## **2.4 THE AUDITING ROLE OF STATUTORY BODIES IN GHANA**

### **2.4.1 Office of the Auditor-General**

Auditing of publicly funded projects in Ghana is mandated by Section 187(2) of the 1992 Constitution of Ghana and Section 13(e) of the Audit Service Act and is carried out by the Auditor-General or by a team appointed by the Auditor-General. These audits are aimed at compliance with financial regulations and contracts terms.

On completion of a construction project, the Auditor General carries out a financial audit and in line with Section 13 of the Audit Service Act, an examination is carried out



to ascertain whether the project has been executed with due regard to economy, efficiency and effectiveness in relation to the resources utilised and results achieved.

This object is achieved during the audit by the examination of all records covering the project to establish whether all laid down procedures have been followed in expending monies allocated for its execution.

It can be deduced from Section 13 of the Audit Service Act that the basic legal framework for technical auditing is present. What is needed is a policy to enforce and regulate its practice in Ghana. Whereas a detailed financial audit is carried out on a project, no technical audit is carried out to ascertain whether the client has obtained what it paid for. A post-construction inspection only serves as a visual evaluation of the project and is often unable to identify whether the quality of the construction complies with the design specification. This inability on the part of the Auditor-General or the appointed team to detect technical defects and non-compliance is primarily as a result of the lack of a technical background in construction.

This is evidenced in a Performance Audit Report of the Auditor-General on the Construction of Achimota-Ofankor Road Project where the Auditor-General relied on the test results of the Resident Engineer of the Ghana Highway Authority (consultants for the projects) to state that works carried out were satisfactory. The import of the absence of a clear recognition for technical auditing in Ghana is clearly manifested in the report of the above mentioned project.

The objective of the audit was to determine whether Ghana Highway Authority (GHA), consultant for the project, had planned and executed the project to meet specifications, cost and delivery period. Below are some of the findings of the audit.

- The GHA advertised the project devoid of undertaking a feasibility study into detailed engineering drawings and accurate Bill of Quantities. This resulted in major changes to key aspects of the project leading the contractor to raise claims for such changes during the execution of the project.
- The selection of contractor did not satisfy the demands of the Public Procurement Act. Inconsistencies in tender information and technical deficiencies in the tendering process starved bidders of ample period to satisfy the requirements for prequalification and actual tendering thus reducing the competitiveness of the tender process as only one contractor was evaluated.
- GHA increased the scope of works by 217% over the original contract sum before seeking approval from the Ministry of Roads and Highways (MRH) and the Central Tender Review Board (CTRB). This increase without approval rendered the Ministry of Finance and Economic Planning without full knowledge of the financial obligations of the increase in scope.
- Delays on the part of GHA in releasing drawings and information for setting out and resulted in inactivity on the part of the contractor for 10 months hence the postponement of the delivery period.
- Delays in paying Interim Payment Certificates (IPCs) from 2007 to 2011 cost the country GH¢4.40 million, a substantial increase in the cost of implementing the project.

The absence of a technical audit at the beginning and during the construction phase of the project had as at December 2011 ensured that the expected completion date had been exceeded by 25 months with the estimated cost up to GH¢ 128 million, an increase of about 217%. Though financial auditing is being carried out in Ghana, it is unable to solve the problem of declining success rates of construction projects.

### **2.5.1 Construction Project Performance**

An endeavor is said to have been successful when the objective(s) for which the stakeholders set out to undertake the endeavor has been met. This is also true for construction projects. Atkinson, et al., (1997), assert that construction project performance is successfully achieved when stakeholders meet their individual and collective objectives. According to Barkley and Saylor, 1994, quality, time and cost are the generally accepted minimum criteria for measuring the performance of construction projects. Thus a construction project is reckoned to have been successful when it is completed on time, to budget, meets technical specification and client satisfaction (Slevin and Pinto, 1986; Turner, 1993).

Wateridge (1998) however, argues that the criteria for success are much broader and includes understanding the expectations and performance of stakeholders as well as the evaluation of their contributions. This view is corroborated by Atkinson et al., (1997) that a project is successful when the objectives of stakeholders have been met and the intended users of the project are satisfied with functionality, profitability, fitness for purpose, safety and health, and transfer of technology.

### **2.5.2 Indicators of Construction Project Performance**

Performance indicators are used as gauges to evaluate whether construction projects have achieved their expectations or otherwise. These indicators measure actual works executed against planned objectives and goals to ascertain the efficiency of inputs and processes. Performance measures may have one or more indicators, and could be influenced by various project characteristics (A. Enshassi et al., 2009). Studies indicate that project time and cost performances are influenced by project characteristics, project team performance, client representation's characteristics, contractor characteristics,

procurement system, design team characteristics, external conditions, project manager's competence, top management support, project manager's coordinating and leadership skills, monitoring and feedback by the participants, decision-making, coordination among project participants, owners' competence, social condition, economic condition, and climatic condition (Dissanayaka and Kumaraswamy 1999; Iyer and Jha 2005). According to Leong et al., (2004) there are five major indicators that have been identified to measure projects performance. These are clients' satisfaction, cost performance, time performance, quality performance and safety and health.

#### **2.5.2.1 Client's satisfaction**

Locke (1970) views satisfaction as a function of comparison between an individual's perception of a result and its expectation for that result. Though clients continue to invest resources into construction projects, projects satisfaction continues to elude them with the reasons accounting for this elusion including costs and time overruns, inferior quality and incompetent service provision from professionals in the project team (Azlan and Ismail 2009; Contract Journal 2004). In the construction industry, the extent of client's satisfaction is often associated with performance and quality assessment in the context of products or services received by the client (Parasuraman et al, 1988; Soetanto and Proverbs, 2004). Usually the client's requirements are to get construction needs translated into a design that specifies characteristics, performance criteria and conformance to specifications, besides to get the facilities built within cost and time (Ahmed and Kangari, 1995). BSRIA (2003) suggest it is five times more expensive to cultivate a new construction client than to keep a current one and companies could grow their profits by almost 100 per cent by holding onto just 5 per cent more of their clients. Thus to stay competitive in the global market place, construction industry players must



identify the needs of clients first as satisfaction of these needs will ensure their survival in the industry.

#### **2.5.2.2 Cost Performance**

Cost is defined as the degree to which the general conditions promote the completion of a project within the estimated budget (Bubshait and Almohawis, 1994). Cost variance remains as the commonest procedure used to measure design performance as it encompasses not only the tender price, but the overall cost that a project incurs from inception to completion, which includes any costs arising from variations, modification during construction period, and legal claims such as litigation and arbitration (Salter and Torbett, 2003; Chan and Tam, 2000). Cost variance is a very important factor in measuring project performance because it indicates how much the project is over or under budget. For its reliability and the confidence of results, cost performance index (CPI) has also been used to measure project performance. When the cost Variance (CV) of a project is equal to zero, then the project is on budget. When the CV is greater than zero, that means the earning of project has more value than the planned earning; therefore it is under budget. When the CV is less than zero, that means the earning of project has less value than the planned earning; hence it is over budget. Similarly, a project is on budget when the value of Cost Performance Index (CPI) is equal to one. When the CPI value is less than one, that means the project is over budget. When the CPI value is greater than one, that means the project is under budget. A project with good performance must maintain its CPI value as near to one as possible.

#### **2.5.2.3 Safety and Health**

Bubshait and Almohawis (1994) define health and safety as the degree to which general conditions promote the completion of a project without major accidents or injuries. The



measurement of safety is primarily fixated on the construction period as the majority of casualties happen during this phase of project implementation. Known as one of the most hazardous industries in the world, thousands of people are killed and disabled annually through accidents. Sousa and Teixeira (2004) affirm that construction workers worldwide are three times more likely to die and two times more likely to be injured than any worker of other economic activity. These accidents notwithstanding, there is no single reliable measure of health and safety performance as it is measured through injury statistic. The main purpose of measuring health and safety performance is to provide information on the progress and current status of the strategies, processes and activities employed to control health and safety risks. Effective measurement not only provides information on what the levels are but also why they are at this level, so that corrective action can be taken (Azlan and Ismail 2009).

#### **2.5.2.4 Time performance**

According to the Latham Report (1994), the timely delivery of projects is one of the most important needs when projects are initiated as clients, end users, stakeholders and the public use the timely completion of a project as the first criterion for measuring success (Lim and Mohamed, 2000). Time is used to ascertain whether a project is on schedule or otherwise. Time variance is used to measure the amount of time for which a project is on schedule or behind schedule.

#### **2.5.2.5 Quality performance**

Quality in construction is achieved when a project meets the established requirements as stated in contractual agreements such as specifications and design drawings. The quality of a construction project is its totality of features required to satisfy a given need, or fitness for purpose (Parfitt and Sanvido, 1993). Ganaway (2006) assert that for the

quality requirements of the clients to be met, all project participants must understand the requirements and incorporate them into their pricing, contract documents and commit to doing them.

### **2.5.3 Reasons for Non-Performance**

A construction project is reckoned to have been successful when it is completed on time, to budget, meets technical specification and client satisfaction (Slevin and Pinto, 1986). Unfortunately, high project performances are not common in the construction industry. The construction industry has developed in size, complexity and with high demand by clients thus making the achievement of project objectives more difficult. The level of success in carrying out construction projects depend heavily on clarity of project objectives, detailed specifications of plant and a good schedule, client consultation and involvement, and effective monitoring and controlling of the project. The multitude of professions, occupations and organizations involved in project planning and execution also plays on the ability to achieve project objectives as each participant has its own individual objectives. UNRWA (2006) asserts that the unavailability of materials, excessive amendments of design and drawings, poor coordination among project participants, ineffective monitoring and feedback, and the lack of project leadership skills are responsible for poor project performance in the Gaza Strip. In their study of construction projects in Hong Kong, Kumaraswamy and Chan (1997) found five principal factors that contribute to poor performance to include poor risk management and supervision, unforeseen site conditions, slow decision making, client-initiated variations and work variations.

#### **2.5.4 Remedies to Non-Performance of Construction Projects**

The success of a construction project is indicated by project performance. Thus to ensure that clients obtain value for the resources invested, set objectives must be achieved. To enable the achievement of set objectives, all project participants must have clarity of project objectives right from the onset. Mwiya (2009) suggest the introduction of technical auditing in addition to financial auditing would project participants tackle deviations from project objectives. The introduction and implementation of technical auditing on construction projects enhances project management processes, reinforces professionalism in the construction industry and enables the independent assessment of project performance. Audits also enhance accountability and credibility in the construction industry thereby increasing clients' confidence of obtaining value for money invested (Environment 2002; Nalewaik 2007; Mwiya 2009).

#### **2.6 AUDITING OF CONSTRUCTION PROJECTS**

An audit takes stock of things, procedures, projects and systems. Audits are generally grouped into internal and external audits. An audit is internal when it is carried out by an organization on itself while an external audit is performed by one organization on the other. Both audits could be prearranged or unannounced, financial or technical. The objectives of an audit are to detect errors and frauds, as well as to ascertain whether accounts or procedures are a true and fair reflection of what has transpired under the period of review.

The right to audit is mandated by law. Audit conformity is internationally governed by the International Organization for Standardization (ISO). In the United States of

America, the Public Company Accounting Reform and Investor Protection Act of 2002 is in place to protect shareholders and public interest. Amongst others it mandates all structured businesses to institute audit committees, record laid down procedures and examine its potency to meet needs. The audit committee is also to verify that financial statements for a time frame are a true representation of the company's state, both financially and procedurally. Auditing of a company's account is compulsory in India with this mandate stemming from the Companies Act 1913. In Nigeria, the Companies and Allied Matters Act, Cap. C 20, LFN 2004 is in force, mandating and regulating the auditing of companies. Auditing of publicly funded projects in Ghana is mandated by Section 187(2) of the 1992 Constitution of Ghana and Section 13(e) of the Audit Service Act and is carried out by the Auditor-General.

### **2.6.1 Financial Auditing of Construction Projects**

According to NIST (1997), a financial audit is a compliance audit that is instituted by law and is primarily concerned with the examination of financial statements and records, and serves as a control mechanism for reporting and safeguarding of assets and resources. Its objectives are to protect shareholders and public interests by detecting errors and fraud, and ascertaining whether accounts or procedures are a true and fair reflection of what has transpired under the period of review (Nalewaik, 2007).

With statistics suggesting that construction fraud might be as high as 10 percent of total construction activity (Urso, 2012), financial audits have become basic and predictable part of any construction project (Nalewaik, 2007). Audits are mandated by law when projects are financed with public funds and could be carried out continuously, at intervals, or at the close out of a project. As a financial control measure, a financial audit seeks to protect the public against fraud, carelessness and extravagance in the use of public resources in the execution of projects (Auditor General India, 1988). During



a financial review, financial reports are examined to ascertain whether reports agree with actual costs incurred, payment application processing conform to established procedures and internal procedures have been adhered to. The audit is not only interested in the detection of errors and fraud, but also the provision of process improvement recommendations for the project management team in the management of resources (Hauber, Gardner, Reisch, 2013).

In Ghana, funds used for construction projects in District Assemblies are obtained from yearly Government of Ghana allocations, support from donor agencies (World Bank, Danida, etc) and internally generated funds of the Assemblies. As local government administrations, the funds of District Assemblies are subject to auditing as stipulated in Section 11 (1) of the Audit Service -Act, Act 584 of 2000.

In line with the mandate to audit publicly funded projects the Auditor-General carries out periodic audits on construction projects undertaken by District Assemblies and their agents. These audits are usually carried out after projects have been completed and by accountants in line accounting principles. The procedures for the audit are as detailed below.

#### **2.6.1.1 Planning Stage.**

At this stage of the audit, the audit team appointed by the Auditor General informs the Assembly of the impending audit by serving a notice. By the notice, a request for relevant documents to the examined and an office space to be used for the process is made. Timelines for the audit and the scope for the audit are also indicated in the notice issued to the Assembly by the audit team.

#### **2.6.1.2 Opening meeting.**

This meeting is an introductory meeting between the audit team and the Assembly where the identities of both parties are made known. The meeting briefly describes the projects to be audited and their scope, the schedules for the examination of documents and site visits, the standards to be used and the method of reporting findings. During the meeting the audit team makes the Assembly aware that findings of noncompliance with procedures would be made available for their views and explanations to be made before the audit report is prepared.

#### **2.6.1.3 Examination of documents and site visits.**

The audit team carefully examines all documents by inspecting records of financial transactions to ascertain whether laid down procedures have been followed. Computations are made to check the arithmetic accuracy of the financial records and the relationships between the financial data presented. Payment certificates and vouchers are checked to confirm whether retention monies and withholding tax were deducted from the value of works measured. Site visits are also conducted to ascertain whether construction works for which payments have been made have actually been carried out.

#### **2.6.1.4 Closing meeting.**

This meeting is held after the audit but before an audit report is prepared. The audit team makes available to the Assembly findings of non-compliance with laid down financial principles and procedures and asks for the views and explanations from the Assembly.

#### **2.6.1.5 Preparation of the audit report.**

The report is prepared after the closing meeting. Copies of the report are given to the Assembly and the Auditor General. Upon receipt of the report by the Auditor General,

follow up actions are determined in accordance with Section 17 and 29 of the Audit Service Act, 2000 (ACT 584).

As a control tool, financial audits have been effective in checking over payment for work done thereby ensuring that what is paid for is what has actually been done. It also ensures that approvals are sought for the use of contingency sum thereby keeping project within budget. It has also enforced the application of laid down accounting principles in record keeping, payment for work done and the use of reserved funds. Financial auditing has also been effective in enforcing tax compliance. This has been achieved through the withholding of the mandatory five percent (5%) tax on all payments for construction work done.

However, because these audits are carried out by persons without an engineering background, a limitation is placed on these professionals in evaluating the planning process for projects, resource requirements and compliance with established technical procedures. The quality of works, safety standards, works scheduling and the associated cost of what has actually been carried out by the Department of Works or their agents (contractors) as specified in contract documents cannot be ascertained by auditors with an accounting background. At a moment when there is an outcry over the quality of construction projects and the need to curb fraud in the overall construction process, the introduction and implementation of technical auditing in addition to financial auditing will go a long way in addressing deviations from project objectives (Mwiya, 2009).

### **2.6.2 Technical Auditing of Construction Projects**

Environment (2002) defines a technical audit as the methodical and independent investigation of specific processes and activities carried out by a person(s), with the aim of ascertaining whether the activities and processes and their consequent outcomes

conform to set standards, have been executed efficiently and are appropriate to achieve set goals. Whereas a financial audit examines financial statements and reports, a technical audit concentrates only on the technical aspects of a project by principally examining the extent to which personnel have followed agreed processes/standards and exercised reasonable and satisfactory professional skill in performing their duties.

Thus the technical auditing of construction projects assesses the extent to which the specifications and conditions of contract have been adhered to by all parties involved in the planning, designing, construction and management of the project in achieving the project objectives of desired quality, cost, time and safety. Petts Consulting (2003) considers technical auditing as the independent, objective assessment of performance in relation to the effectiveness and efficiency of processes in realizing outlined goals and objectives.

The objectives of a technical audit include (Nalewaik 2007; Environment, 2002):

- the determination of how well established project objectives are being realised, and if not the reasons for non-compliance.
- recommending measures to curb future repetition of non-compliance with procedures and requirements,
- objectively ascertaining whether project staff have exercised reasonable skill and care in executing their technical duties.

A technical audit may be instituted at any stage of the project with the scope varying for each project. According to Singh (2004), detailed areas for an audit include pre-tendering stage, tendering stage, construction stage, as well as the facility operation stage.

#### **2.6.2.1 Pre-tendering stage.**



At this stage the audit reviews land availability, acquisition, usage and conditions by assessing all environmental reports and the impact that the project will have on adjoining properties and land generally in the vicinity earmarked for construction. In addition to cost analysis been carried out to ascertain the economic feasibility of the project, the procurement methods and contract forms to be used for the project are also considered. Associated risks in carrying out the project are identified, documented and planned for at this stage. Design drawings by architects and engineers are examined to ensure they are in line with the client's needs and are constructible (Mwiya, 2009; Environment, 2002)..

#### **2.6.2.2 Tendering stage.**

At this stage of the audit, the tendering process is assessed to ascertain whether the best and most economically responsive tenderer has been selected to execute the project. Issues of bonds, guarantees, payments, works schedule, contract forms and agreements are also assessed at this stage to ensure best practice is adhered with (Mwiya, 2009; Environment, 2002)..

#### **2.6.2.3 Construction stage.**

Works (being) executed are examined to ensure they are in line with the conditions of contract and specifications as regards the project. This includes the examination of the works methods, technologies, changes in the scope of works, delays, supplies, site instructions and records, the performance of contractors, technical consultants and other professionals engaged on the project. The audit also examines advance payments, interim payments, claims, interests, penalties and final accounts (Mwiya, 2009; Environment, 2002).

#### **2.6.2.4 Facility operation stage.**

An audit at this stage examines the defects liability period, warranties, guarantees, the right use of the completed project as well as the occupancy certificate for the project.

### **2.6.3 Technical Auditing Procedures**

Without a policy guideline that outlines desired objectives, standards and requirements, an audit cannot be carried out. A technical audit policy provides the basis by which audits shall be carried out and adopted for projects.

A guideline for the Technical Auditing of Road Projects in Botswana is in place. It details amongst others the roles and responsibilities of auditors, the relationship between auditors, consultants, contractors and clients as well as the scope, stages, procedures and the reporting format for an audit. This is aimed at ensuring that all publicly funded road projects in Botswana are carried out according to specifications and client (government) receives value for monies invested (Roads Department, 2001). A similar policy, road safety audit policy, has been instituted in Australia to enable independent and qualified examiners identify potential safety risks and measures to eliminate them (Institute of Public Works Engineering Australia, 2001). In Hong Kong, a manual to be used for the technical auditing of works executed by the Works Departments has been issued and is in force (Environment, 2002).

A typical technical audit process is as follows:

- 1) Formulation of an audit policy. The policy provides the basis and the legal framework for the conduct of the audit. It outlines procedures to be followed in an audit, the qualification of technical auditors, relationship between project parties as well as the reporting formats for the audit.
- 2) Constitution of an audit team. The audit team is constituted to comprise of recognised professionals with substantial experience in their field of practise.

Amongst others they must be objective, analytical, unbiased, diplomatic, inquiring and open minded. The team is constituted based on the scope of works to be investigated and the information required by the one who instituted the audit.

- 3) Examination of bid and contract conditions. This enlightens auditors as to the project objectives and how they are to be achieved by project parties. Contract conditions and specifications are studied thoroughly by the auditors so as to stay abreast with the requirements by which actual works must be measured against.
- 4) Auditing to verify actual conditions. Works that have been executed and works that are ongoing are studied thoroughly by the auditors. This is achieved by meeting project participants and seeking information from them. Critical questions regarding laid down procedures are asked to enable the team gather the right information. Site instruction books, drawings, specifications, works programme, etc are studied by the team to enable them draw conclusions.
- 5) Determining conformance with agreed procedures. This is carried out by comparing project objectives as stated in the contract documents with actual works carried out by project participants. Areas of conformance and nonconformance are then identified.
- 6) Preparation of a technical audit report. The audit report details the findings of the audit assignment. Areas of non-conformance with project objectives and the project party responsible for such non-conformance are stated clearly and the reasons for non-conformance enumerated. Recommendations to improve on the procedures to enhance the achievement of project objectives are suggested when the project is ongoing. However in the instance where the project has been

completed, recommendations are made to curtail the future repetition of such deviations from project objectives. Recommendations are also given for areas of conformance to ensure improvement in future engagement( Environment, 2002). .

## **2.7 CAPACITY OF STAFF TO PERFORM TECHNICAL AUDITING FUNCTIONS**

The staffing composition of the Department of Works in District Assemblies is made up of architects, engineers, quantity surveyors, artisans, mechanics and tradesmen. The officers charged with project planning, implementation and monitoring are architects, engineers and quantity surveyors. Per the Scheme of Service of the Local Government Service, the minimum qualifications for these officers are a Higher National Diploma (HND) in the respective field of practice, membership of a professional association and at least three years relevant working experience.

Training sessions/ workshops scheduled for officers on the job include Project Management and Reporting, Law of Contract and Contract Administration, Practice of Supervision, Supervision and Management of Works, Quality Control and Quality Assurance as well as Certificate Project Planning and Financing.

These training sessions are aimed at enhancing the knowledge of officers while keeping them abreast with current trends in project planning, implementation and monitoring. Membership with professional bodies also helps keep members in tune with industry standards and the way forward as regards project planning, implementation and monitoring.

These educational qualifications and industry experience prepares and places officers in the position to technically audit construction projects. These qualifications notwithstanding, the Department of Works faces enormous challenges in the execution



of its mandate to plan, implement and monitor projects. The absence of a policy on the technical auditing of construction projects in Ghana has greatly hindered its practice.

Osae (2009) also identifies some challenges to include:

- The award of contracts by Central government without notice of such awards to the Department/local government staff. This lack of notice means the Department is unable to carry out its project monitoring functions to ascertain whether works are being carried out according to specification.
- The lack of logistics. Armed with the requisite qualifications, officers of the Department of Works are hampered in the execution of their duties by the lack of logistics. These logistics include vehicles to visit project sites, computers and accessories to aid in contract administration.
- Inadequate staffing of the Department. This places a limitation on the Department in planning periodic visits to monitor projects. Staff transfers have also led to the loss of institutional memory and the lack of understanding by new staff of the Department as regards their roles and responsibilities in the monitoring of contracts.

These challenges and the lack of a policy on technical auditing have rendered the Department of works unable to efficiently monitor and administer contracts.

## **2.8 BENEFITS OF TECHNICAL AUDITING**

The motive of clients in undertaking projects are that needs and expectations for which substantial resources are committed will be fully met. This is achieved when the project is completed on time, within budget and meets the needs and expectations of clients as initially specified. Technical auditing assures clients of value for money invested in

planning and executing a project (Mwiya, 2009). Amongst the benefits of the technical auditing of construction projects are (Singh, 2005; Environment, 2002):

- a) Identifying weaknesses in project management processes and recommending solutions to same,
- b) Enhancing the credibility and accountability of the construction industry to taxpayers and clients,
- c) Ensuring reasonable care and skill are been employed by personnel in the discharge of laid down procedures and requirements,
- d) Lowering the cost of finance by eliminating corruption,
- e) Reinforcing professionalism in the construction industry,
- f) Enforcing compliance with laid down procedures, requirements and standards,
- g) Provision of information for tax compliance,
- h) Provision of information for dispute resolution,
- i) The audit report forms the basis for decision making and serves as a communication tool amongst project participants.
- j) Provision of an independent valuation of the performance of project participants, with the view of ascertaining how well established goals are being achieved, and with the additional objective of identifying opportunities for improvement.

## **CHAPTER THREE RESEARCH METHODOLOGY**

### **3.1 INTRODUCTION**

The chapter surveys the procedure used for this research by addressing methods, data gathering instruments, and procedures. It spells out thoroughly all the procedures engaged and how the procedures were used to address the aim and objectives.

### **3.2 RESEARCH STRATEGY, DESIGN AND PROCESS**

The research strategy looks into how the study objectives are to be dealt with. Naoum (1998) asserts the three main strategies to be qualitative, quantitative as well as triangulation. The purpose of the research, type and the availability of information determine the strategy to be adopted in the study (Naoum and Coles, 1997).

The methodology provides the direction for the organization and execution of the research in a manner that would enable the attainment of the proposed objectives. Research design outlines the framework for the gathering and scrutiny of data, and includes action research, experimental, ethnographic, survey and case study (Baiden, 2006).

Research process addresses data collection instruments and procedures by providing clarifications to the procedures used and how these procedures have been used to address the aim and objectives of the study. A survey questionnaire was used in gathering data. This was employed because of the need for the generalization on the findings across the District Assemblies. The choice of the questionnaire was to enhance the dependability of interpretations and improve repetitions by reason of the standardized measurement and sampling processes (Oppenheim, 1996).

### **3.3 DATA COLLECTION AND INSTRUMENTATION**

#### **3.3.1 Data collection**

This involved a literature review as well as a field survey. The review formed the basis for the theoretical context of this study. Survey questionnaires were used to gather data during the field survey.

#### **3.3.2 Sampling and Sample Size Determination**

Sampling is the selection of elements of inquiry for a study (Seale, 1999). The criterion for sampling is grounded on the purpose for the study, problem being investigated, design and practical consequences of the research. The Brong Ahafo region is comprised of twenty seven (27) municipal and district assemblies, seven (7) of which are municipals while twenty (20) are districts. Multistage sampling, simple random sampling and purposive sampling were used to obtain the sample from a population of planning officers, engineers, architects and quantity surveyors of the Department of Works and external consultants involved in the planning, implementation and execution of construction projects.

Purposive sampling employs a measured effort to select representative respondents (samples) by specifically choosing certain characteristic groups in the sample (Struwiget *al.*, 2001). According to Pasha (1979), the use of purposive sampling is appropriate in circumstances where it is appropriate to select a sample based on the aim of the research, their knowledge of the population and its characteristics. Samples were intentionally selected by reason of the understanding and the knowledge they possess in the planning, execution and monitoring of projects.

The Multistage sampling was used as a technique to place the districts and municipalities into clusters to enable the coverage of the large geographical area of the



region. All municipal assemblies were clustered into one group while district assemblies were clustered into another group. Simple random sampling was then used to select representatives from each cluster. Four (4) municipals and ten (10) districts were selected to represent the two clusters. Five officers involved in the planning and implementation of projects were selected from the Assemblies to provide the needed data for this study. This gave a sampling frame of 70.

### **3.3.3 Questionnaire Design**

The design of the questionnaire was directed by the review of the relevant literature and thorough probing, leading to only pertinent questions been asked. The questionnaire contained both closed-ended questions and scaled-response questions with the layout been influenced by ease of reading, and appeal to respondents.

Firstly, questions were asked to ascertain the background data of the respondents, that is, their profession and experience in the profession as well as their educational background. The second set of closed-ended and scaled-response questions were asked to inquire about technical and financial auditing of construction projects and its importance. The five point likert scale was used to derive opinion of respondents with the responses to the questions been 1= strongly disagree, 2= disagree, 3= moderately agree, 4= agree, 5= strongly agree.

### **3.4 INSTRUMENT ADMINISTRATION**

Questionnaires were hand delivered and mailed to respondents by the researcher. Most of the questionnaires that were hand delivered were retrieved on the spot as the others were returned through the mail. Seventy questionnaires were administered with sixty one been retrieved over a period of two weeks. The response rate was 87%.

### **3.5 DATA ANALYSIS**

Responses for each question was listed and arranged in forms that were then processed using the Microsoft Excel Package for the analysis to begin. With data been ordinal in nature, descriptive statistical tools were then used to analyze the data.

### **3.6 CHAPTER SUMMARY**

The chapter examined the procedures employed in gathering data for the research and how these procedures aided in the attainment of the aim and objectives of the research. Areas covered under the chapter included research design, research strategy, sample size determination as well as the development of the questionnaires used in the gathering of data. The Microsoft Office Package was used to analyze data obtained.



## CHAPTER FOUR DATA ANALYSIS

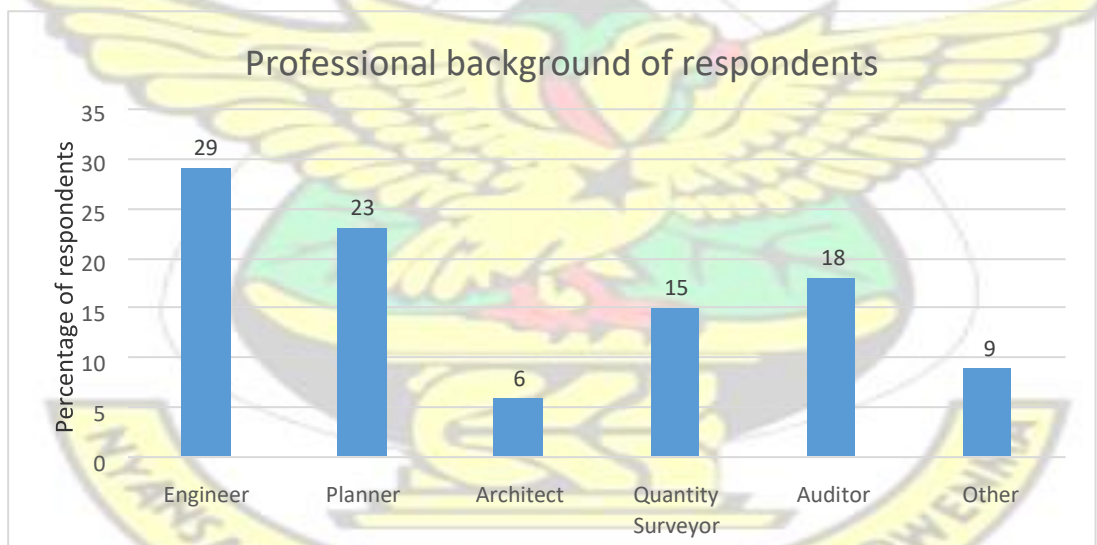
### 4.1 INTRODUCTION

This chapter discusses the outcomes of the data obtained using the questionnaire and displays these using charts and percentages. Sub-headings have been employed to throw more light on questions surveyed.

### 4.2 PROFILE OF RESPONDENTS

#### 4.2.1 Professional background of respondents

Of the 61 respondents surveyed, 29 percent were engineers, 23 percent were planners, 6 percent were architects, 15 percent were quantity surveyors, and 18 percent were auditors while 9 percent represented administrators and supervisors. Figure 4.1 gives a breakdown of the representation.

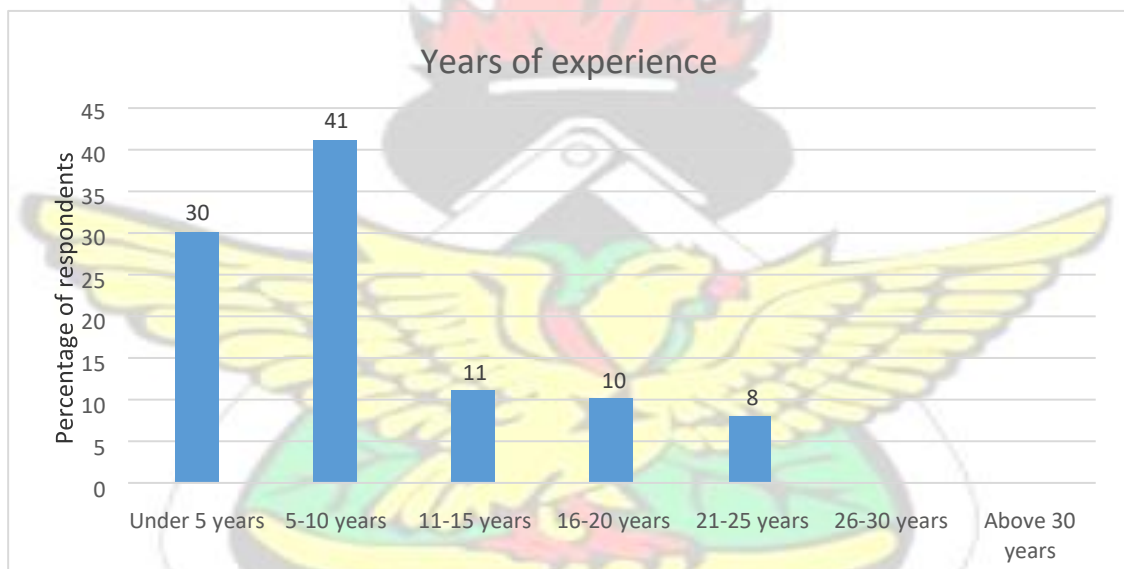


**Figure 4.1 Profession of respondents**

The roles played by these professionals in project planning and implementation at the District Assembly level accounted for their choice. Planners are responsible for identifying and assessing the needs of persons in communities thereby initiating projects to meet such needs. Architects and engineers convert these needs into sketch

designs while ensuring that structural and functional requirements are met. Quantity surveyors on the other hand help shape designs to suit needs within the Assembly's budget.

30 percent of the respondents had practiced for a period below 5 years, 41 percent had practiced between 5 and 10 years with 11 percent having practiced between 11 and 15 years. Additionally 10 percent had practiced between 16 and 20 years while 8 percent had practiced between 21 and 25 years. None of the respondents had practiced their profession beyond 25 years. Figure 4.2 highlights the representation.

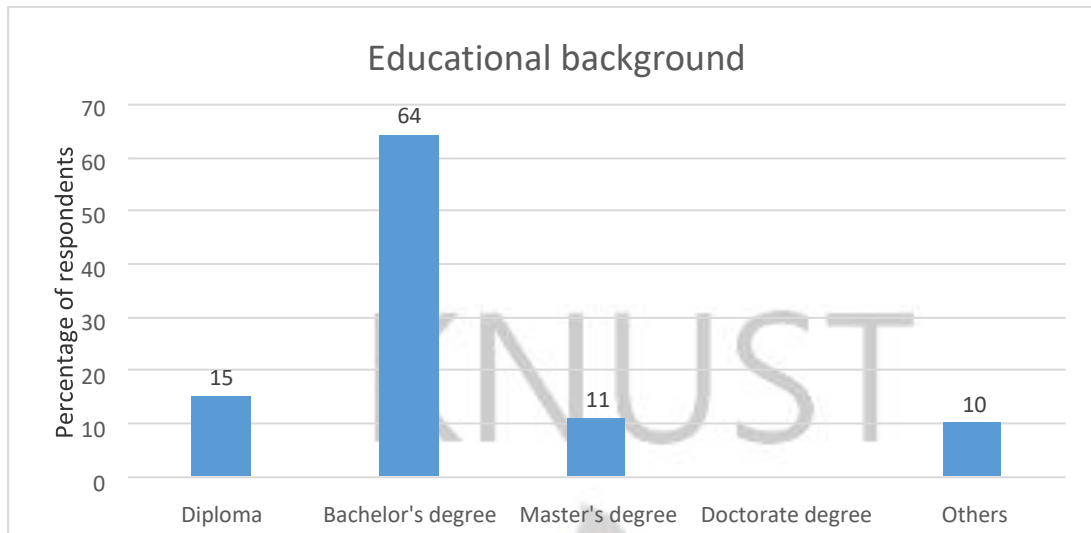


**Figure 4.2 Respondents years of experience practicing profession**

#### **4.2.2 Respondents educational background**

Figure 4.3 shows the academic qualifications of the respondents. 15 percent of the respondents had a Diploma, 64 percent had a Bachelor's degree, and 11 percent had a Post-Graduate degree. 10 percent also had other academic qualifications such as Construction Technician Certificate.

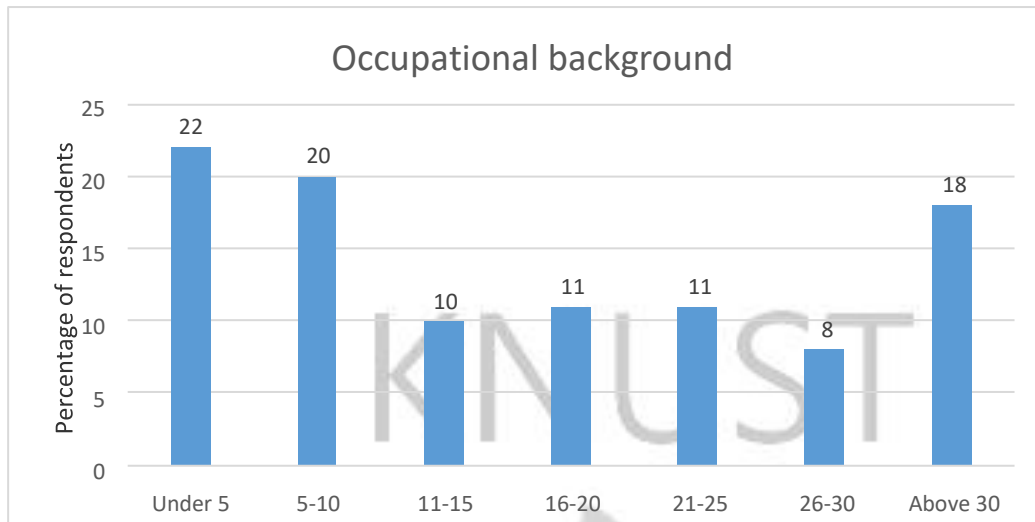




**Figure 4.3 Respondents educational background**

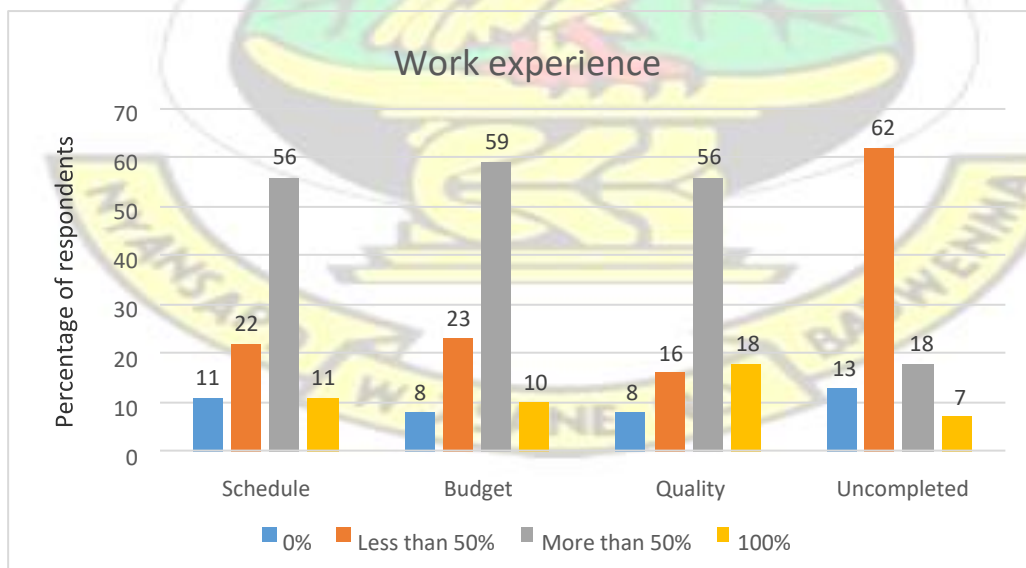
#### **4.2.3 Respondents occupational background**

To ascertain the experience the respondents had acquired in the past five years, construction projects they had been involved in/with and their success rates were assessed. From Figure 4.4, 22 percent of the respondents had been involved with less than 5 projects, 20 percent had been involved with between 5 and 10 projects, and 10 percent had been involved with between 11 and 15 projects. 11 percent had also been involved with between 16 and 20 projects, 11 percent had been involved with between 21 and 25 projects, and 8 percent had been involved with between 26 and 30 projects while 18 percent had been involved with more than 30 projects.



**Figure 4.4 Occupational background of respondents**

Of the projects that had been handled in the past five years, 56 percent of the respondents had more than 50 percent of their projects completed on schedule. 59 percent of the respondents had more than 50 percent of their projects completed within budget while 56 percent of the respondents had more than 50 percent of their projects of the required quality. 62 percent of the respondents had less than half of their projects uncompleted while 18 percent had more than half of their projects uncompleted.



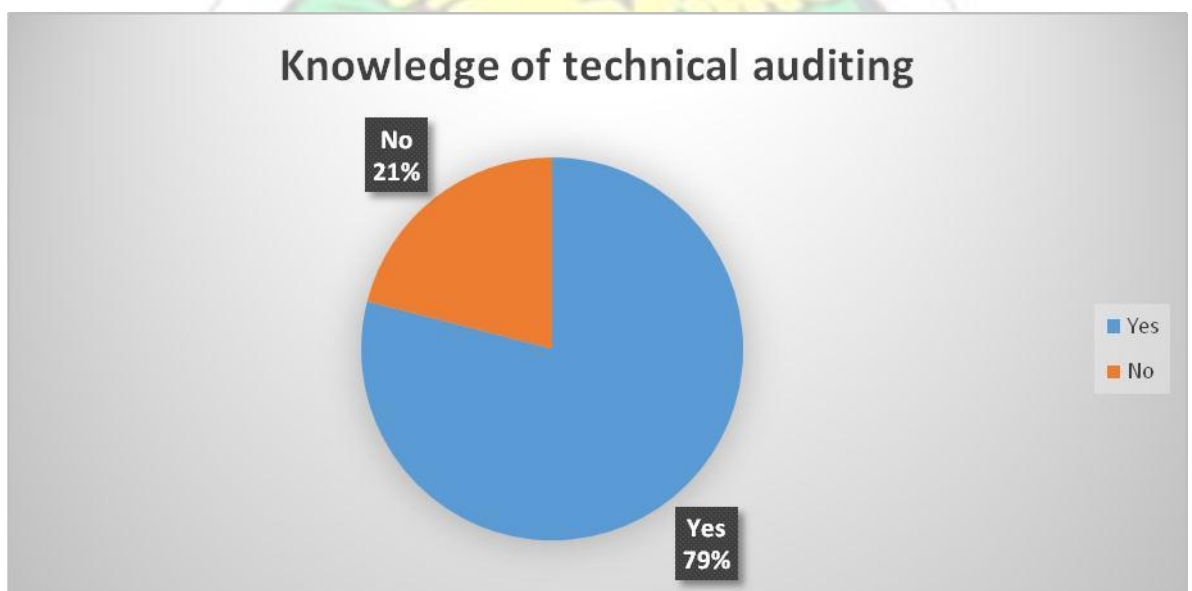
**Figure 4.5 Projects handled in the past five years**

The professional and educational backgrounds of respondents were assessed to ascertain the validity and reliability of information they provided for the study. It was also to ensure the information was a reflection of the realities in the built industry. Projects they had participated in for the last five years were assessed to inform the researcher of the quantum and quality of information that the respondents provided. This was also done to ascertain whether the respondents were in the position to credibly provide information in relation to present realities.

### **4.3 AUDITING OF CONSTRUCTION PROJECTS**

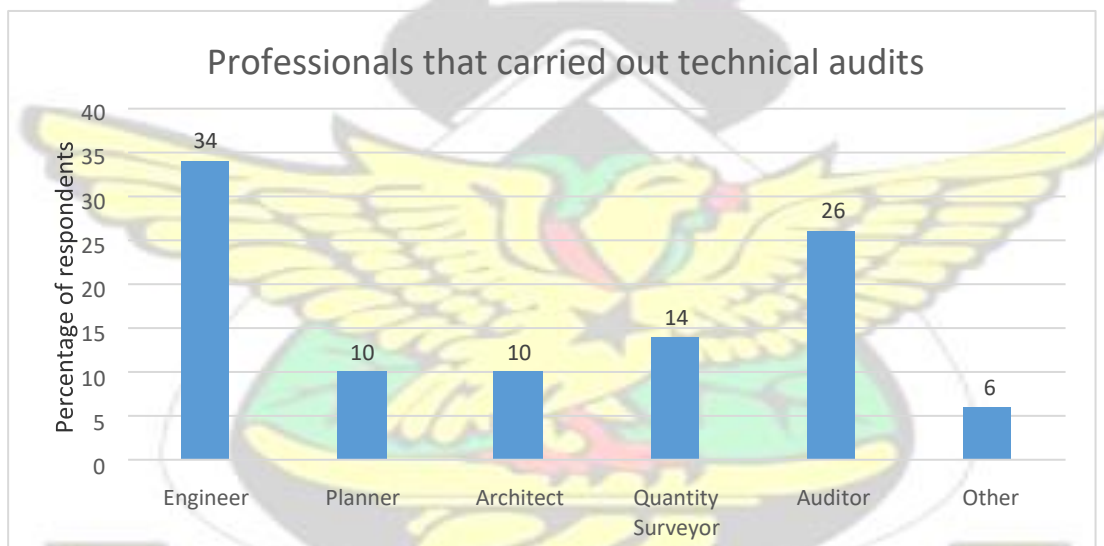
#### **4.3.1 Knowledge of technical auditing**

Figure 4.6 illustrate the percentage breakdown of respondents with knowledge of technical auditing. 79 percent of the respondents had knowledge of technical auditing while 21 percent had no knowledge of technical auditing.



#### Figure 4.6 Knowledge of technical auditing

Of the 79 percent that had knowledge of technical auditing, 30 percent acquired it through formal training while 70 percent acquired it on-the-job. 75 percent of the respondents had had technical audits performed on projects they had handled in the past five years. Architects had carried out 10 percent of these audits, 34 percent had been carried out by Engineers, 10 percent by Planners while 14 percent was carried out by Quantity Surveyors. 26 percent of the audits were carried out by Accounting Auditors with the remaining 6 percent been carried out by other professionals though respondents failed to specify these professional. Figure 4.7 illustrates the percentage breakdown of technical audits carried out on projects by professionals.



**Figure 4.7 Percentage breakdown of technical audits carried out on projects by professionals**

Enquiries about respondents knowledge of technical auditing was carried out to ascertain the capacity and experience of respondents to carry out technical auditing functions should it be introduced and implemented for all publicly funded projects in

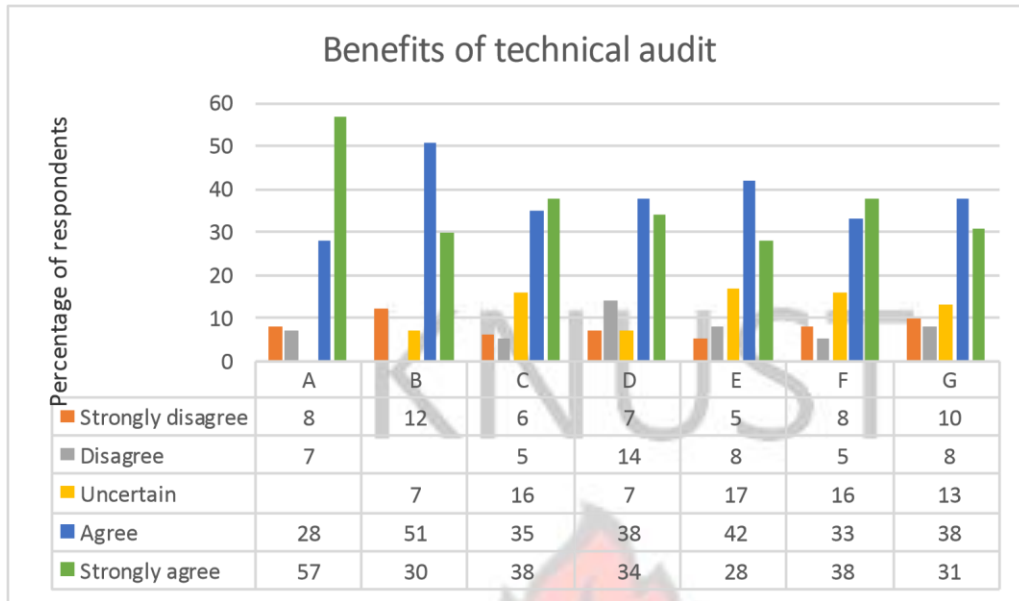


Ghana's construction industry. With 79 percent of the respondents having knowledge and training about technical auditing, its implementation on all publicly funded projects would be easy with the necessary logistics to complement its enforcement.

The benefits that technical auditing gives to the construction industry would also be derived.

#### **4.3.2 Benefits of technical auditing**

The decision to incorporate technical audits into contract conditions is largely dependent on the benefits to be accrued from its implementation. Respondents were therefore asked to rank the benefits of technical audits on publicly funded construction projects. Figure 4.8 details the result of the rankings. Value for money was ranked as the highest benefit with a combined acceptance (agree to strongly agree) percentage of 85. Enhancing project management processes came second with 81 percent followed by the benefit of the audit report been used as a communication tool amongst project parties with a percentage of 73. Technical auditing's ability to reinforce professionalism in the construction industry was ranked fourth with a combined percentage of 72. Compliance with laid down standards followed with 71 percent while the benefit of a technical audit being used as an independent assessment of a project's performance came sixth with 70 percent. Enhancing accountability and credibility in the construction industry was the least ranked benefit with 69 percent.



A- Value for money

B- Enhances project management

C- Communication tool

D- Reinforces professionalism

E- Independent assessment

F- Compliance with procedures

G- Enhances accountability

**Figure 4.8 Benefits of technical auditing**

**Value for money.** Majority of the respondents, 85 percent \_agreed to strongly agree\_ that carrying out a technical audit on a construction project assured clients of obtaining value for money. This serves as a major boost to the confidence of clients knowing that resources invested in projects are being utilized judiciously in the attainment of the client's objective of obtaining a project of the required quality, within budget, on time and safely. This ranking is in line with Mwiya's (2009) assertion that technical auditing assures clients of value for money invested in planning and executing a project.

**Enhancing project management processes.** According to Singh (2005), solutions to weaknesses in project management processes are a major benefit of carrying out a technical audit. 81 percent of respondents surveyed agreed with the assertion that project management processes are enhanced when a technical audit is carried out. During the audit, strengths and weaknesses of project management processes are identified. Strengths are emphasized to ensure its continuation and that maximum benefits are derived. Recommendations are made to address identified weaknesses in order to avoid repetitions of such weaknesses while ensuring the attainment of project objectives.

**Serves as a communication tool amongst project participants.** The audit report, which contains the findings of the audit when presented, becomes a valuable document to the entity that instituted its conduct. It is thus used to convey follow up actions to all project participants. 73 percent of the respondents agreed with its use while 23 percent of the respondents were uncertain or disagreed with its effectiveness in enhancing project performance.

**Reinforces professionalism.** 72 percent of the respondents agreed that technical audits when undertaken will be effective in reinforcing professionalism thus enhancing project performance. With 59 percent of projects having failed and been challenged (CHOAS REPORT, 2012), technical auditing would be effective in ensuring that individuals who hold themselves as professionals would exhibit reasonable care and skill in the discharge of their duties thereby upholding professionalism in the construction industry. 28 percent of respondents however disagreed or were uncertain of the effectiveness of technical audits in enhancing professionalism which goes a long way to promote project performance.

**Compliance with laid down standards.** Environment (2002) assert that a technical audit is effective in ensuring that laid down standards in project planning, execution and use are complied with. 71 percent of respondents agree that during a technical audit, actual processes are measured against standards set out by the industry. By this, conformance and deviations to standards are noted and where necessary corrective action is taken. 13 percent of respondents ‘disagreed to strongly disagree’ with a technical audit been able to ensure compliance with standards while 16 percent of respondents were unsure.

**Independent assessment.** Having been ranked sixth, 70 percent of respondents asserted a technical audit will provide an independent assessment of the performance of construction projects. 30 percent of respondents disagreed and were uncertain of the effectiveness of technical audits in providing an independent assessment of a project’s performance. When carried out by external auditors, the likelihood of concealing poor performance is minimized thus presenting project participants with a true reflection of project performance.

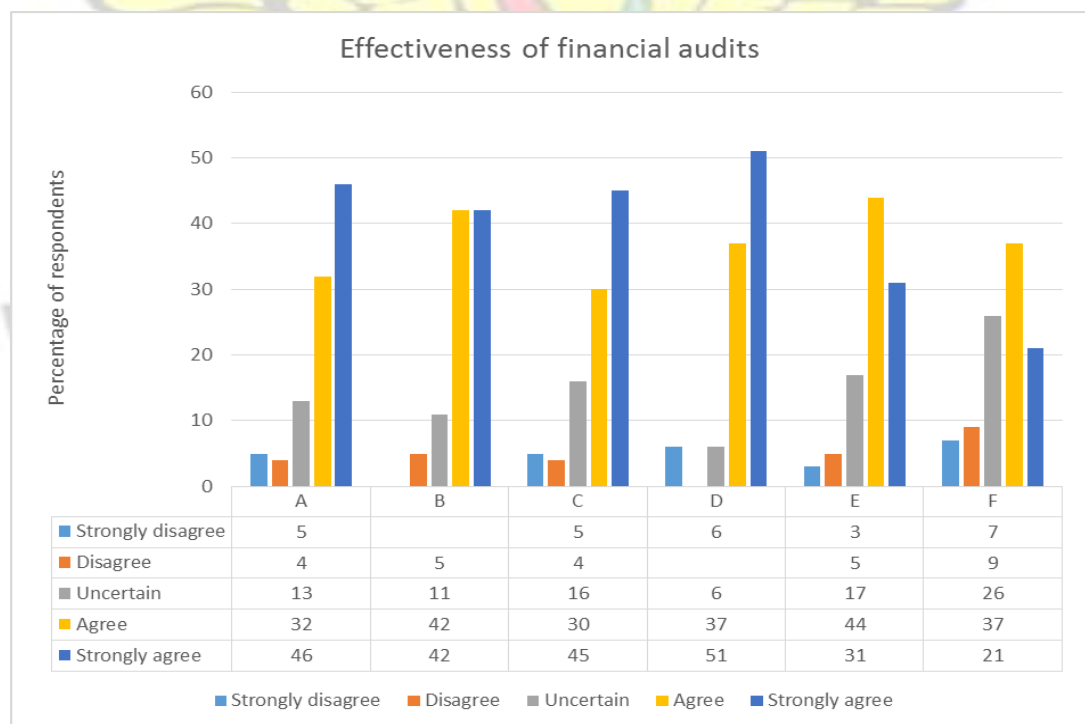
**Enhancing accountability.** 69 percent of respondents agreed that technical audits of construction projects would enhance accountability and credibility in the construction industry. 18 percent of respondents ‘agreed to strongly disagree’ that accountability would be enhanced.

#### **4.3.3 Effectiveness of financial auditing**

With financial auditing of construction projects in force for all publicly funded projects, respondents were asked to rank its effectiveness in project performance at the District Assembly level. Figure 4.9 details the outcome of the survey. The effectiveness of financial audits as a control mechanism was ranked first with a combined (agree to strongly agree) percentage of 88. As a control mechanism financial audits check against



over-payment for work done and the payment for works yet to be executed that do not have mobilization guarantee. Project management improvement was ranked second with 84 percent with 5 percent of respondents disagreeing while 11 percent were uncertain. With 78 percent compliance with tax regulations was ranked third by respondents. This is achieved through the mandatory withholding of 5% percent on all payments for work done on publicly funded construction projects. Compliance with laid down accounting procedures and enhancing accountability were both ranked fourth with 75 percent. Accounting principles for record keeping, payment procedures for work done as well as seeking approvals for the use of reserved funds ensure project costs are kept within budget. This compliance with laid down procedures enhances accountability amongst project participants. Respondents ranked the reduction of project finance cost least at 58 percent. This view was held by respondents as financial audits are able to detect fraud and corrupt practices that tend to increase project cost.



A- Enforces tax compliance

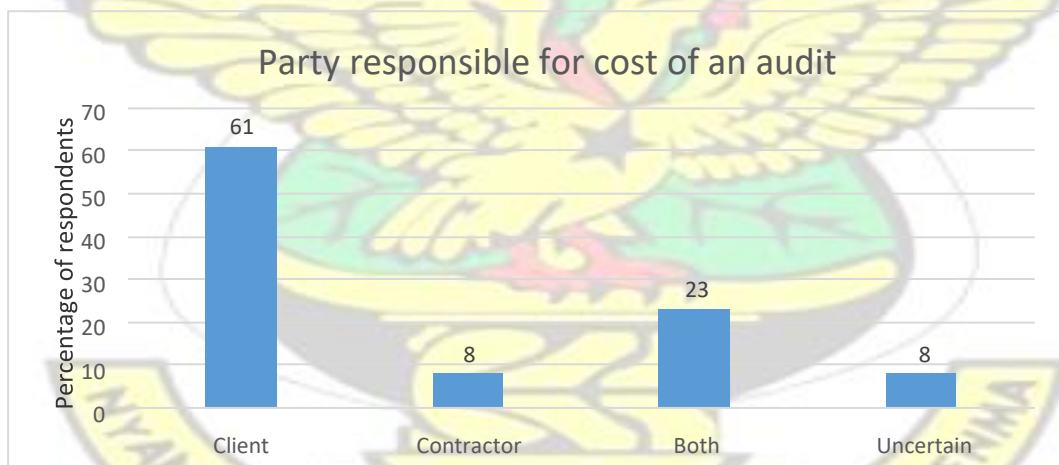
B- Project management improvement

- C- Compliance with procedures
- D- Control mechanism
- E- Enhances accountability
- E- Reduces project finance cost

**Figure 4.9 Effectiveness of financial audit**

#### **4.3.4 Party responsible for cost of an audit**

With clients benefiting most from technical audits, 61 percent of the respondents agreed that the cost of a technical audit be borne by the client. 23 percent however agreed that the cost of the audit be borne by both the client and the contractor. 8 percent of the respondents laid the cost of the audit on the contractor/project executor while 8 percent of the respondents were uncertain on whom to bear the cost of the audit.



**Figure 4.10 Party responsible for paying for a technical audit**

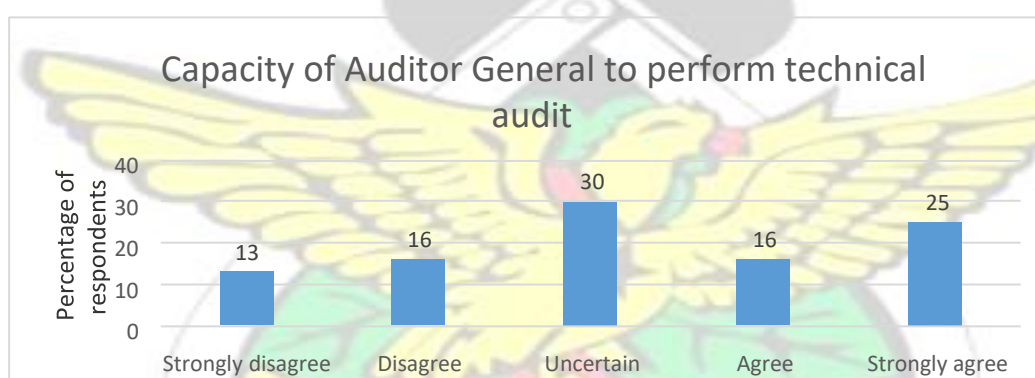
#### **4.4 EXISTING INSTITUTIONS THAT CARRY OUT AUDITING FUNCTIONS**

In Ghana the auditing of publicly funded construction projects is carried out by the Office of the Auditor General and or his team. Respondents were asked to assess the capacity of the Auditor General and the team to carry out technical auditing of

construction projects. Traditional audit firms in Ghana were also assessed by respondents to ascertain their capacity in performing technical auditing tasks.

#### 4.4.1 Auditor General's office

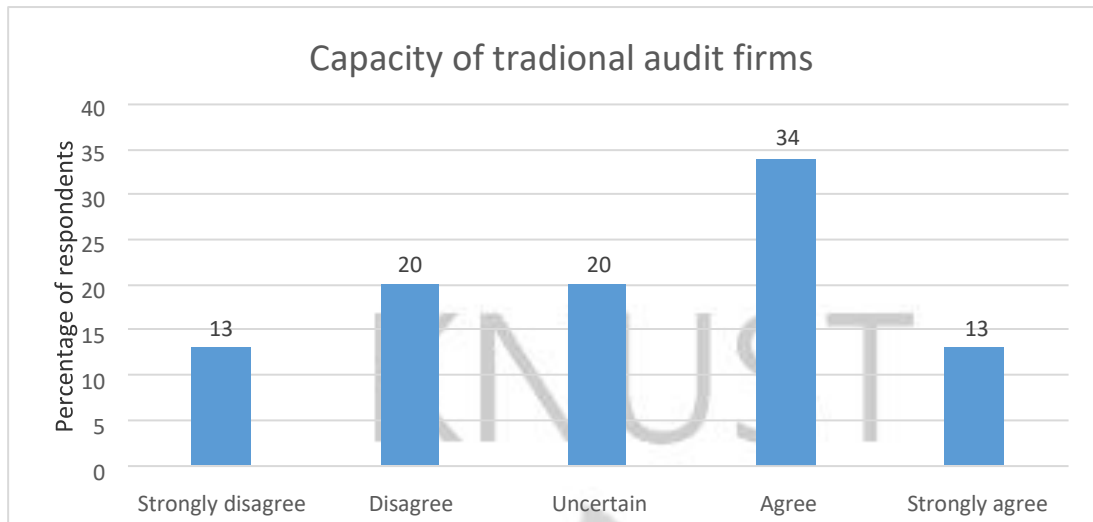
41 percent of the respondents (‘agree to strongly agree’) were of the view that the Office of the Auditor General and his team had the capacity to perform technical audits on construction projects. 29 percent of those surveyed were however of the opinion the Office of the Auditor General and his team did not have the capability to perform technical audits on construction projects. 30 percent of the respondents were not certain on the capacity of the Auditor General and his team to perform technical audits on construction projects.



**Figure 4.11 Percentage breakdown of the capacity of the Auditor General to perform technical audits**

#### 4.4.2 Traditional Auditing firms

47 percent of those surveyed held that traditional auditing firms had the capacity to perform technical audits on construction projects while 33 percent disagreed. 20 percent were not certain on the capacity of traditional auditing firms to perform technical audits on construction projects.



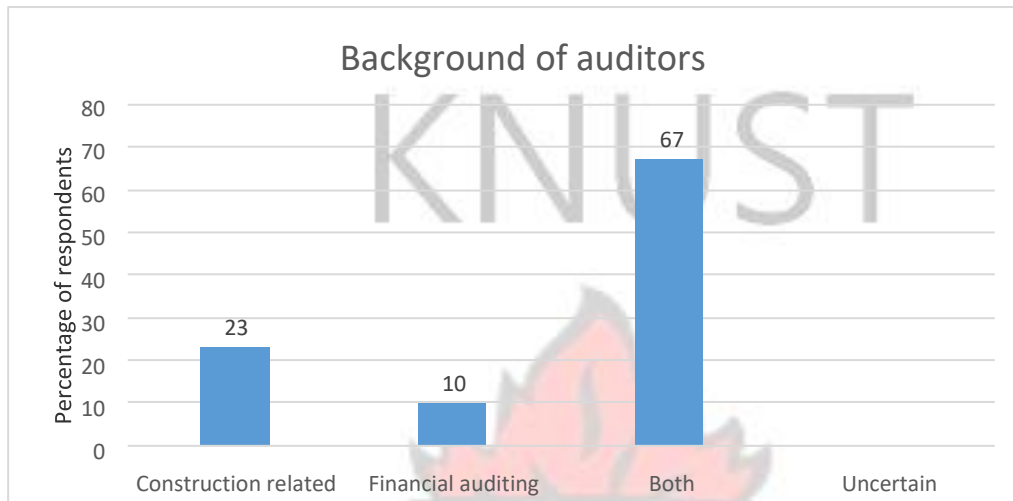
**Figure 4.12 Percentage breakdown of the capacity of traditional audit firms to perform technical audits**

#### **4.4.3 Background of Auditors**

Figure 4.13 gives a breakdown of the training needed to carry out technical audits. This was ascertained to inform and equip institutions tasked with the responsibility of performing such audits to know the requisite training appropriate for technical auditors. 67 percent of those surveyed held that training in construction related fields such as architecture, engineering, planning, quantity surveying and the like in addition with financial accounting would place auditors in pole position to carry out technical auditing functions on construction projects. 23 percent of those surveyed held that been trained in construction related fields alone would suffice for auditors to carry out technical audit functions. 10 percent of the respondents suggested that training in financial accounting alone was sufficient to enable auditors carry out technical audits on construction projects.



The acquisition of knowledge in both construction related and financial accounting fields would equip auditors to understand the financial implications of technical decisions as well as the technical implications of financial decisions during audits.



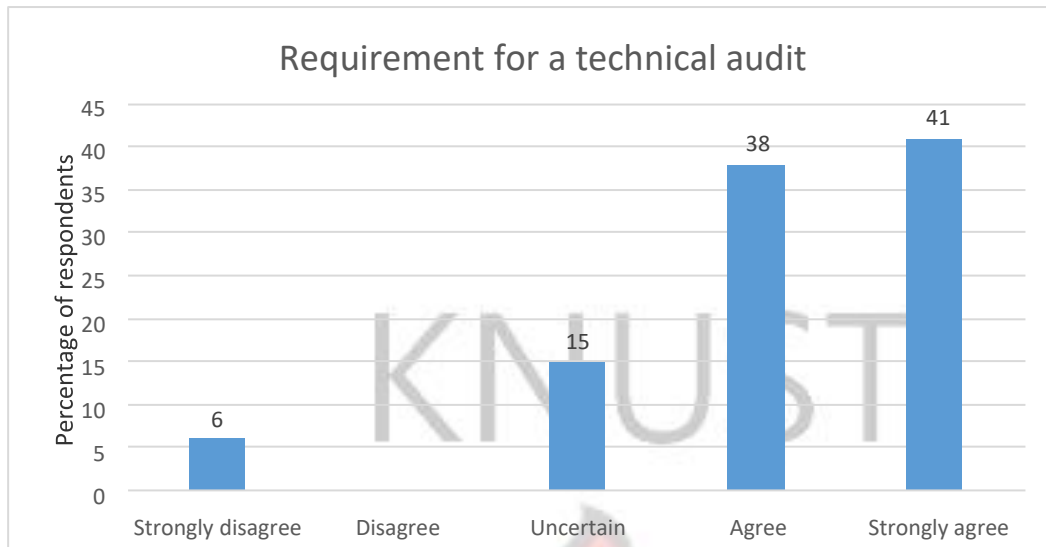
**Figure 4.13 Background of technical auditors**

#### **4.5 TECHNICAL AUDIT PROCEDURE**

The technical audit procedure outlines the policy that governs the conduct of the audit, the constitution and point of entry of an audit team, as well as the roles and the responsibilities of all parties involved.

##### **4.5.1 Mandatory requirement of technical audits**

This was assessed to ascertain whether technical audits should be made mandatory at least once during the life cycle of publicly funded construction projects. 79 percent of respondents agreed to strongly agree that technical auditing should be part of the conditions of contract for construction projects. 6 percent of the respondents however disagreed to making technical auditing a mandatory requirement in the conditions of contract. 15 percent of the respondents were uncertain as to whether to make technical auditing a requirement of the conditions of contract or otherwise.

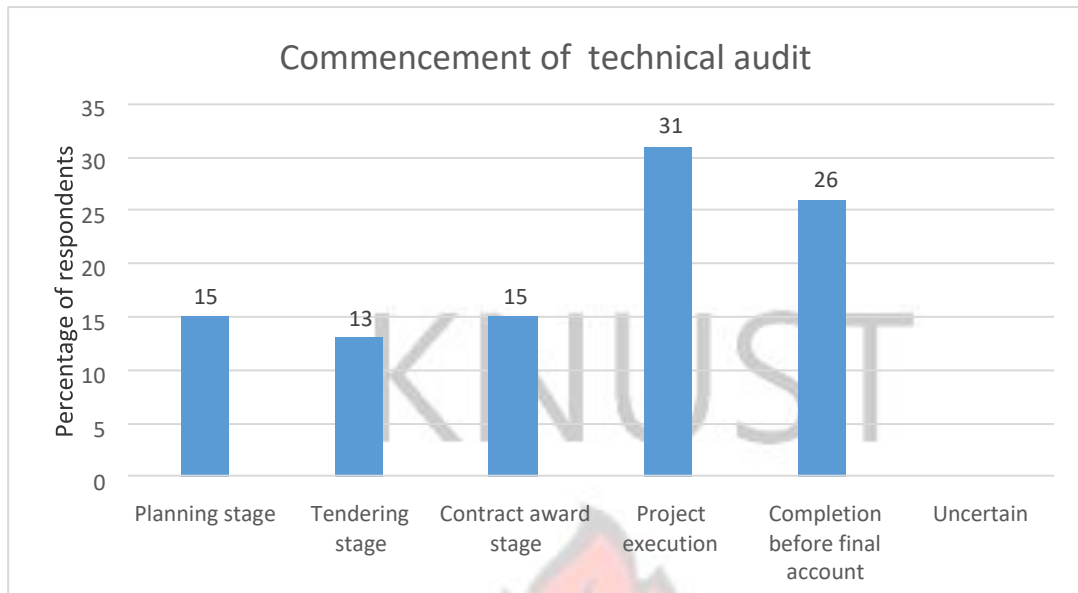


**Figure 4.14 Mandatory requirement for a technical audit**

#### **4.5.2 Commencement of technical audit**

According to Figure 4.15, 28 percent of those surveyed specified the audit should commence at the pre-contract stage (planning and tendering stage) while 72 percent of those surveyed stated that the audit should commence at the post -contract stage (contract award, project execution, completion before final account). The beginning of the audit at the pre-contract stage would review issues such as the economic viability of project, land acquisition and usage, risks associated with the project, design drawings and building team selection. This is done to assure clients that the best possible alternatives that fall in line with the attainment of project objectives are been pursued and implemented.

Technical audits at the post-contract stage measures actual works executed against industry standards and agreed project objectives. Project participants are notified of identified deviations from project objectives and solutions are recommended to ensure such deviations are not repeated for on-going and future projects.



**Figure 4.15 Audit commencement stages**

## **CHAPTER FIVE**

### **CONCLUSION**

#### **5.1 INTRODUCTION**

The chapter concludes this research on “the effects of technical auditing on construction project performance in district assemblies”. The chapter consists of the review of set objectives and discoveries of the research, recommendations and directions for future research.

#### **5.2 APPRAISAL OF OBJECTIVES**

The study set out to investigate the effect of technical auditing on construction project performance in District Assemblies in the Brong Ahafo region. To achieve the aim for the study, the following objectives were advanced:

Objective 1. To examine the effectiveness of financial audits on construction project performance.

Being a mandatory requirement for all publicly funded projects, financial audits were examined to ascertain its effectiveness on project performance. From the study and survey conducted, it was identified that financial audits have been effective in serving as a control mechanism in checking against over-payment for work done and the payment for works yet to be executed. Compliance with laid down accounting procedures and enhancing accountability were also identified as enhancing project performance. Accounting principles for record keeping, payment procedures for work done as well as seeking approvals for the use of reserved funds ensure project costs are kept within budget. This compliance with laid down procedures enhances accountability amongst project participants. Financial audits are also effective in enforcing compliance with tax regulations as 5 percent is deducted on all payments for work done as withholding tax.

Objective 2. To investigate the effectiveness of technical auditing on construction project performance.

One sure way of boosting clients' confidence and assuring them of value for money is to conduct technical audits on construction projects. The study found out that technical auditing was effective in enhancing project management processes as it identifies weaknesses in management processes and recommends solutions to ensure the attainment of project objectives. It was established that technical audits reinforce professionalism in the construction industry. The audit ascertains whether project participants have exhibited reasonable care and skill in the discharge of their duties. It was also identified that technical auditing could be used to check and enforce compliance with laid down industry standards and project objectives thereby enhancing project performance. With the lack of accountability for public resources on a high,



technical audits could be used to enhance accountability and credibility in the construction industry.

Objective 3. To investigate the capacity of staff to perform technical auditing functions.

It was identified during the survey that the educational background of staff of District Assemblies was adequate in carrying out technical auditing functions. Majority of the staff had knowledge of technical auditing through formal training or on-the-job training. What militates against their ability to perform technical audits on construction projects are the award of contracts by Central government without notice of such awards to staff, the lack of logistics such as vehicles to visit project sites, computers and accessories to aid in contract administration, and inadequate staffing of construction related departments. Uncertainty surrounds the capability of the Auditor General and the traditional audit firms to carry out technical audits on construction projects.

### **5.3 RECOMMENDATIONS**

In the light of the above outcomes, the ensuing recommendations are directed at enhancing project performance in District Assemblies.

- Incorporation of a clause on mandatory technical auditing in contract conditions. This is to be carried out at least once during the life cycle of a project by independent technical auditors.
- The establishment of a technical audit unit at the Auditor General's Office to be responsible for technical auditing of construction projects.
- The equipping of the Department of Works with logistics and personnel to carry out its mandate effectively.

## 5.4 DIRECTIONS FOR FUTURE RESEARCH

A future study into the capacity of the Office of the Auditor General to perform technical audits on construction projects will be ideal.

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## **APPENDIX**

## QUESTIONNAIRE

Kindly answer or tick [ ] the option(s) to each.

### SECTION A WORK EXPERIENCE

1) What is your profession?

Engineer [ ] Planner [ ] Architect [ ] Quantity Surveyor [ ] Auditor [ ]

Others, specify .....

2) How long have you practiced your profession?

Under 5 years [ ] 5 – 10 years [ ] 11 – 15 years [ ] 16 -20 years [ ] 20 – 25 years [ ]

26 -30 years [ ] Above 30 years [ ]

3) What is your highest level of education?

Diploma [ ] Bachelor's degree [ ] Master's degree [ ] Doctorate degree [ ]

Other, specify .....

4) How many projects have you been involved with in the past five years?

Under 5 [ ] 5 – 10 [ ] 11 – 15 [ ] 16 -20 [ ] 20 – 25 [ ] 26 -30 [ ]  
above 30 [ ]

5) Of the projects you have handled in the past five years what percentage was completed within/on schedule

0% [ ] Less than 50% [ ] More than 50% [ ] 100% [ ]

6) Of the projects you have handled in the past five years what percentage was completed within budget

0% [ ] Less than 50% [ ] More than 50% [ ] 100% [ ]

7) Of the projects you have handled in the past five years what percentage was completed according to specifications/quality standards.

0% [ ] Less than 50% [ ] More than 50% [ ] 100% [ ]

- 8) Of the projects you have handled in the past five years what percentage remains uncompleted beyond schedule

0% [ ]      Less than 50% [ ]      More than 50% [ ]      100% [ ]

## SECTION B AUDITING OF CONSTRUCTION PROJECTS

- 9) Do you have any knowledge of technical auditing

Yes [ ]      No [ ]

- 10) If yes, how did you acquire the knowledge in technical auditing?

Formal training [ ]      On the job training [ ]      Others, specify.....

- 11) Has any technical audit been carried out on the projects you have handled in the past five years

Yes [ ]      No [ ]

- 12) Which professional carried out the audit in 11 above

Engineer [ ]      Planner [ ]      Architect [ ]      Quantity Surveyor [ ]

Accounting auditor [ ]      Other, specify .....

- 13) To what extent do you agree with the following been benefits of technical auditing. Respond using the scale: 1= strongly disagree, 2= disagree, 3= uncertain, 4= agree, 5= strongly agree.

NO	BENEFITS OF TECHNICAL AUDITING	1	2	3	4	5
A	Assures clients of obtaining value for money					
B	Identifies weaknesses in project management processes and recommends solutions					
C	Enhances the credibility and accountability of the construction industry to taxpayers and clients					

D	Ensures reasonable care and skill have/are been/being employed by personnel in the discharge of laid down procedures and requirements					
E	Lowers the cost of finance by eliminating corruption					
F	Reinforces professionalism in the construction industry					
G	Enforces compliance with laid down procedures, requirements and standards					
H	Provides information for tax compliance					
I	Provides information for dispute resolution					
J	Audit report forms the basis for decision making and serves as a communication tool amongst project participants.					
K	Provides an independent assessment of the performance of project parties.					

How effective are financial audits in construction project performance. Respond using the scale: 1= strongly disagree, 2= disagree, 3= uncertain, 4= agree, 5= strongly agree.

NO	EFFECTIVENESS OF FINANCIAL AUDITING	1	2	3	4	5
A	Enforces tax compliance (i.e. withholding of the mandatory five percent (5%) tax on all payments for construction work done).					
B	Ensures that approvals are sought for the use of project sums thereby keeping project within budget.					
C	Enforces the application of laid down accounting principles in record keeping, payment for work done and the use of reserved funds.					



D	Serves as a check on over payment for work done					
E	Enhances the credibility and accountability of the construction industry to taxpayers and clients					
F	Lowers the cost of finance by eliminating corruption					

14) Does the Auditor General's Office/team have the capacity to carry out technical audits on construction projects

Strongly disagree [ ☐ ] Disagree [ ☐ ] Uncertain [ ☐ ] Agree [ ☐ ] Strongly agree [ ☐ ]

Do auditing firms in Ghana have the capacity to carry out technical audits on construction projects

Strongly disagree [ ☐ ] Disagree [ ☐ ] Uncertain [ ☐ ] Agree [ ☐ ] Strongly agree [ ☐ ]

15) Should the conditions of contract for construction projects make technical auditing a requirement during project execution

Strongly disagree [ ☐ ] Disagree [ ☐ ] Uncertain [ ☐ ] Agree [ ☐ ] Strongly agree [ ☐ ]

16) When should a technical audit be carried out on construction projects

At the planning stage [ ☐ ]

At the tendering stage [ ☐ ]

At the award of contract stage [ ☐ ]

During execution of project [ ☐ ]

At completion before final account [ ☐ ]

Uncertain [   ]

17) Who should pay for a technical audit

Client [   ]

Contractor [   ]

Both client and contractor [   ]

Uncertain [   ]

18) What training is most appropriate for a technical auditor

Construction related (engineering, surveying, architecture) [   ]

Financial auditing [   ]

Both construction related and financial auditing [   ]

Uncertain [   ]

19) Any other comments on the technical auditing of construction projects

.....

.....

.....

Thank you

