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FACTORS INFLUENCING THE FINAL COST OF CONSTRUCTION PROJECTS

IN GHANA

BY

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DEDICATION

This project work is first dedicated to the Almighty God for making it possible for us to go through this program successfully. Also to my parents, Rev. John Abera and Martha Akunnor and lovely wife Agnes A. Atampugre who have supported me throughout this programme.

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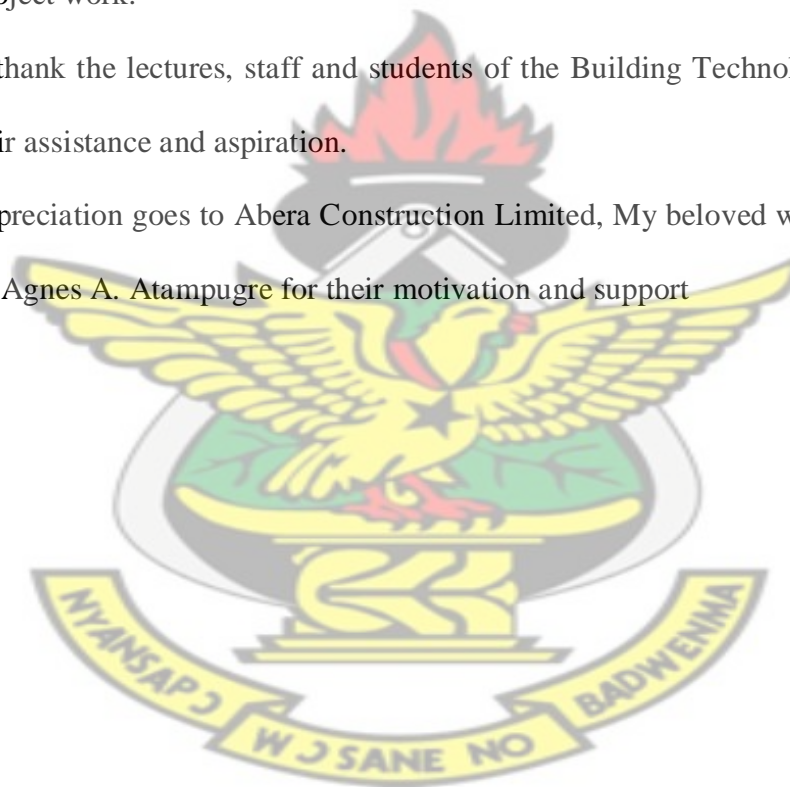
DECLARATION

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

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ABSTRACT

Over the past five decades, cost, time and quality have been taken as the basis for the measurement of the success of project management. This phenomenon is perhaps not surprising, since over the same period these criteria have usually been included in the description of project management. The cost performance of building construction projects is a key success criterion for clients. Projects require budgets which sets the pace and guarantees the client's financial commitment and provide the basis for cost control and measurement of cost performance of the project. The aim of this study was to investigate the factors that influence the final cost of a construction project. To achieve this aim the objectives set were; to identify the factors that affect the final cost of a project from the perspective of contractors; and to identify the factors that influence the accuracy of cost estimates in determining the final cost of a construction project. The study adopted the quantitative research strategy. Data was obtained using questionnaire from a convenient sample size of 50 from D1K1 to D4K4 contractors in the Central Region in Ghana. The data was analyzed using the Statistical Package for Social Scientists (SPSS) and Microsoft Excel softwares. It was discovered from the study that Unexpected ground Conditions, Design changes, Shortages of material and plant, Exchange rate and Inflation/ relative price changes as the major factors affecting the final cost of a construction project. Concerning the second objective, Material (prices/ availability/ supply/ quality/ imports), Experience and skill level of the estimator(s), Quality of information and flow requirements, Project team's experience in the construction type, and Time allowed to prepare the estimate were the factors affecting the accuracy of estimates.
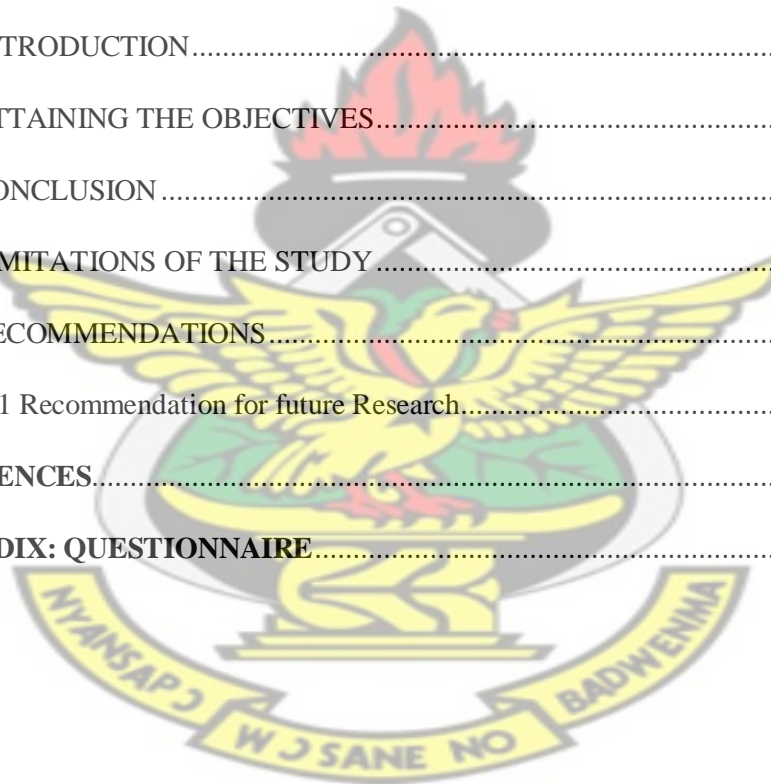
Keywords: Construction Industry, Final cost, Estimate accuracy.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The construction industry renders services which are needed for the production of durable buildings and works. The industry is unique especially when cognizance is given to the physical nature of the project; the structure together with the organization of the construction process, the demand; and the method of price determinations. Construction projects refer to structures, which are erected in accordance with the idea or design of the structures already stated either in sketches, drawings, and directives or in mathematical instructions to satisfy its purpose functionally, structurally and aesthetically exhibit a skill and conditions which are already variable. (Ugulu and Ikwuogu, 2011)

Construction projects has a lot of activities associated with it, each activity is again associated with a cost. In order to develop a strategy or plan for successful construction project the most cost influential factors should be determined and considered in making any decision. This research discusses the main issues leading to the final sum of construction of Building in Ghana (ibid).

In every country, the construction industry constitutes a large part of the economy. Studies show that construction contributes between 5 to 10 percent of Gross Domestic Product (GDP) in all countries, employs up to 10 percent of the working population, and is responsible for about half of the gross fixed capital formation (Ofori 2012). It is estimated that investments in housing alone account for 2 to 8 percent of GNP; between 10 and 30 percent of gross capital formation; between 20

and 50 percent of accumulated wealth; and between 10 and 40 per cent of household expenditure. Owing to its large size, the construction industry has the potential to contribute directly to the growth of the national economy (Ofori 2012)

Characteristically, construction projects are unique, complex and time consuming undertaking. As a matter of facts, no two projects are ever alike rather, each structure is tailored to suit its environment, arranged to perform its own particular functions and designed to reflect personal tasks and references (Munns and Bjeirmi, 1996). The actualization of a typical production of a construction industry commences with the client conceiving the nature or likely type of the product he want. These he articulates in the form of a brief or user requirement and make available to the design team. The designer translate these user's requirement into an initial preliminary design and preliminary cost for the client's approval. After the approval the design team then produces tender document with which after other tendering processes and procedures resulting to the award of contract for a contract sum (initial) to be completed at an agreed contract time. The contractor proceeds to execute and complete the project according to the contractual requirements.

1.2 PROBLEM STATEMENT

Cost is among the most important considerations during the project management life cycle and is most considered as one of the most critical parameters of a project and the defining ingredient for project success. Despite its established significance is it not unusual to see a construction project failing to achieve its objectives within the specified cost (Azhar *et al*, 2012). Maintaining the cost of construction within the estimated costs and schedules requires sound strategies, good practices, and careful judgment. Much to the displeasure of clients, contractors and consultants, however,

projects experience extensive delays and thereby exceed initial time and cost estimates (Aftab *et al*, 2014). There has been a constant pattern where projects are costing more than planned, delaying thereby exceeding the planned date, or even suffer the agony of contract determination before construction works begins or during implementation (Chabota, 2010). The delivery of projects within estimated cost can be achieved but that requires a good starting estimate, an awareness of factors that can cause cost escalation, and project management discipline (Shane *et al*, 2009). This study will therefore investigate the factors that underpins an accurate estimate in determining the cost of construction works and as well consider the issues that influence the cost of a project exceeding the estimated budget.

1.3 RESEARCH QUESTION

- What are the factors that affect the accuracy of estimates in determining the final cost of a project?
- What factors influences the final cost of a project?

1.4 AIM

The project work seeks to investigate the factors that influence the final cost of a construction project.

1.5 OBJECTIVES

- To identify the factors that affects the final cost of a project from the perspective of contractors.
- To identify the factors that influence the accuracy of cost estimates in determining the final cost of a construction project.

1.6 SCOPE

The scope of this research project would be limited to project management and quantity surveying firms in Ghana. Contextually, the research would be limited to identify the activities in construction projects that can lead to the final project sum.

1.7 JUSTIFICATION

Construction industry is a major element in the Ghanaian economy. Any improvement in the construction industry will probably lead a clear enhancement in the Ghanaian economy. An enhancement in the construction industry can be achieved by improving the construction project management functions. One of the most important construction management functions is estimating process. Construction projects has a lot of activities associated with it, each activity is again associated with a cost. In order to develop a strategy or plan for successful construction project the most cost influential factors should be determined and considered in making any decision. Against this background, this study seeks to identify the factors affecting the accuracy of estimates for a construction project.

1.8 METHODOLOGY

- The main instruments for data collection would be structured questionnaire made up of close-ended questions. The questionnaires would be designed to answer the objectives that have been outlined.

- Construction firms would be visited to solicit for information regarding the topic and personal interviews and discussions with professionals. The next step after data collection would be data analysis. This method includes compiling all the data collected.

- Literature search from related works by making uses of the university library books, construction journals and the internet.

- A quantitative approach to data analysis would be employed

1.9 ORGANIZATION OF STUDY/STRUCTURE

This presents the manner in which the study would be carried out. It shall comprise of five (5) chapters. The first chapter introduces the whole research work. It contains important steps to be followed during the research. This includes the background of the study, the problem statement, aims and objectives, research question, scope of the study, methodology used, and organization of study, resources and reference. The second chapter dealt with the existing literature on the study. This seeks to find out texts already written on the topic. It also seeks to find some causes and effects of the delay in payments. The third chapter describes the methodology used in carrying out the study and the determination of sample size. The fourth chapter consists of data analysis and presentation of the findings. Finally, the fifth chapter would present a summary of findings, recommendation and conclusion of the study.
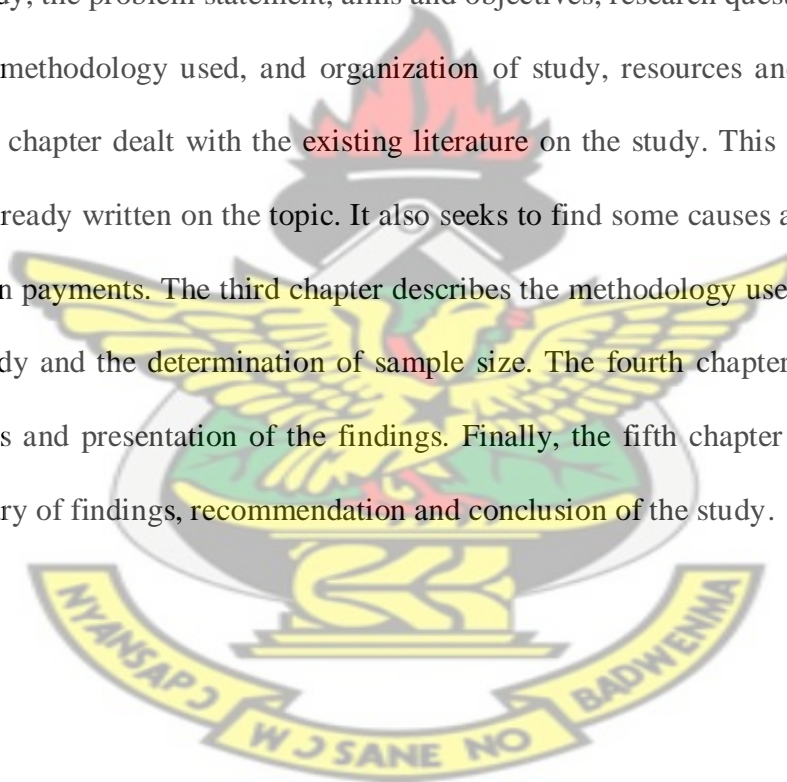
CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The construction industry renders services which are needed for the production of durable buildings and works the industry is unique especially when awareness is given to the physical nature of the project the structure together with the organization of the construction process, the demand and the method of price determinations. Construction projects refer to structures which are erected in accordance with the idea or design of the structures already stated either in drawings and directives or in mathematical instructions to satisfy its purpose functionally, structurally and aesthetically exhibit a skill and conditions which are already variable (Ugulu and Ikwuogu, 2010). In construction almost all clients are interested in obtaining fully functional facilities completed in time, cost, quality and scope. The ability of a builder to construct within the confines of the estimated time and budget to the right standards and scope is an excellent builder (Harris and McCaffer, 2001). Over the past five decades, cost, time and quality have been taken as the basis for the measurement of the success of project management. This phenomenon is not all that surprising since over the same period these criteria have usually been included in the description of project management (Atkinson 1999) as cited in (Chabota, 2010). The cost performance of building construction projects is a key success criterion for project funders. Projects require budgets which sets the pace and guarantees the client's financial commitment and provide the basis for cost control and measurement of cost performance of the project (Baccarini, 2004).

This chapter is dedicated to reviewing related literature of project cost determination. It will focus the on the process and methods used in determining the cost of a project. The accuracy of estimates in determining the final cost of a project will be interrogated and as well highlight the factors that impacts the final cost of a construction project.

2.2 CONSTRUCTION COST

Given the importance accorded to the cost of a project much effort is devoted by project managers in the computation of the final cost through estimation. According to Chen and Liew, (2003), the preparation of estimates represents one of the most important functions performed in any business enterprise. In the construction industry the quality of performance of this function is paramount to the success of the parties engaged in the overall management of capital expenditures for construction projects. The estimating process, in some form is used as soon as the idea for a project is conceived. Estimates are prepared and updated continually as the project scope and definition develops and in many cases, throughout construction of the project or facility. Consequently, Carr (1989) intimated that estimates of materials, time, and costs provide information to some construction decisions in a similar way that financial accounting information provides to others. Mohammed (2011) further stated that estimating is one of the most important parameters that contributes to make a construction project successful. Precise estimates improve good contracting as well as the process of calculating and analysing all the costs that will enter into a particular job to arrive at a set total. It is the responsibility of the estimator to ensure that these estimates which serve to ensure the project will have a successful financial outcome.

2.3 FINAL COST- THE IMPACTING FACTORS

The case of construction cost of a project is an important issue that priority is attached by the various parties engaged on the project that is the clients, design teams, contractors and quantity surveyors and others. The cost of constructing a building project is most importantly a primary worry for the most majority of construction clients. More importantly, the one question that a client will enquire at the beginning has to do with how much it is going to cost and subsequently techniques to be adopted in making the cost. Finding solution a major primary objective of quantity surveyors whose task it is to predict the likely cost of building work and to manage the evolving project design to ensure that the client's approved budget is not exceeded (Cunningham, 2013). In most circumstances the final costs of projects have exceeded the predetermined cost prepared during planning, preliminary engineering, final design, or at the start of construction (Shane *et al*, 2009). For instance Al-Momani, (1996) emphasised Ibrahim and Nabil, (2013) indicated that by the time a project is completed, the actual cost exceeds the original contract price by about 30%. Azhar *et al*, (2008) postulated that the final cost of construction sometimes exceeds the anticipated cost by 100% in developing countries. A study conducted by Chantel *et al*, (2012) into the case of cost overrun in 'Dutch Transportation Infrastructure Projects' revealed that average cost overrun is 10.6% for rail, 18.6% for roads and 21.7% for fixed links. The variations between early project cost estimates and the final cost of a project can be significant. Over the period spanning between the beginning of the project and the completion of construction various factors may impact the final project cost (Shane *et al*, 2009).

2.3.1 Fundamental Determinants of Project Cost

No projects will cost the same no matter how identical they are. There are several factors that influence the cost of a construction project. However the fundamental costs are determined by the actual cost of the land itself, materials, equipment and labour in the location where the project is undertaken. These basic costs will vary subject to a number of factors which are summarised in the diagram below (European Commission, 2005).

Figure: 2.1 Understanding and Monitoring the Cost-Determining Factors of Infrastructure projects

Location Specification Tax Liabilities

Site Original cost estimate Timescale

New Build or Refurbishment Inflation Form of procurement contract
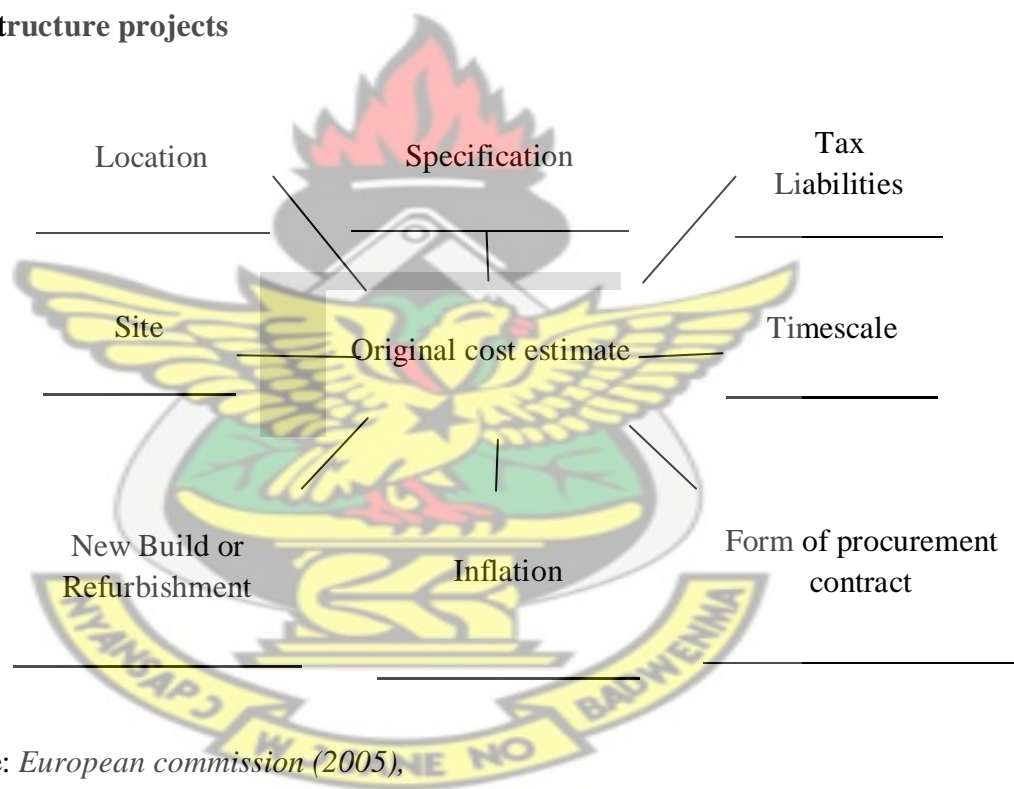
Source: *European commission (2005),*

2.3.2 Final cost Variation

Project cost is a significant criteria used by many for measurement of successful projects and it is of great concern to parties involved in the construction industry. Nevertheless studies show that it is rare for projects to be completed within anticipated budget (Azhar *et al*, 2012). There are several factors that accounts for the

differential between estimated cost and final cost of projects. Various researchers conducted in this sensitive area to identify the various factors that influence the cost of construction. Aftab *et al*, (2014) conducted a study into the factors affecting construction cost performance in project management projects with the focus of improving the cost performance of various construction projects. Among the several factors he identified, the most significant factors includes, fluctuation in prices of materials, cash flow and financial difficulties faced by contractors, shortage of site workers, lack of communication among parties, incorrect planning and scheduling by contractors, contractor's poor site management and supervision, delay in Material procurement, underestimate project duration resulting, schedule delay, unforeseen ground conditions, low speed of decisions making, inadequate contractor experience, change in the scope of the project, practice of assigning contract to lowest bidder, frequent design changes, and owner interference.

Gomez, (2012) conducted a case study on three projects for cost performance in the UK. After comparing the findings in the three projects, concluded that lack of proper training and experience of Project Manager, conflict between project parties, design changes, contract and specification interpretation, and lack of appropriate planning.

According to a user guide of the European Commission, (2005) on Understanding and Monitoring the Cost-Determining Factors of Infrastructure projects, the factors that causes variation on the original estimate include:

- Unexpected ground conditions

- Changes in the design

- Poor management of Project

- Land acquisition costs

- Inflation/ relative price changes

- Force majeure

- Shortages of material and plant

- Rate in exchange

- Inappropriate contractors

- Problems in funding

Aziz, (2012) discovered that factors such as: A) Lowest bidding procurement method (B) Additional work (C) Bureaucracy in tendering method (D) Wrong method of cost estimation (E) Funding problems were critical for causing cost variation while (A) Inaccurate cost estimation (B) Mode of financing and payment for completed work (C) Unexpected ground conditions (D) Inflation (E) Fluctuation in prices of raw materials are also responsible for cost variation.

In Nigeria, Elinwa and Buba (1993) cited in Tien-Choon *et al*, (2012) identified the most important cost factors as material shortage methods of financing and payment for completed works, poor contract management, material cost, fraudulent practices and kickbacks and the escalation of material prices.

In another study Hiral *et al*, (2013) revealed that the major factors influence cost includes escalation of the prices of materials and discontinuity of funds. The overall ranking analysis from that study shows that Technical Drawings, Government Policies, Increase in Expenses, Festivals, or Tests and Specifications are most critical factors that are responsible for construction cost overruns. Eshofonie, (2008) also indicated a similar cost factors such as cost of materials, incorrect planning, wrong method of estimation, contract management fluctuation of prices of materials, previous experience of contractor, absence of construction cost data, project financing, high cost of transportation.

2.4 ESTIMATION DEFINED

Estimating is a complex process which involves the collection of available and significant information relating to the scope of a project, expected resource consumption and future changes in resource costs. The process involves synthesis of this information through a mental process of visualization of the constructing process for the project. This visualization is mentally translated into an approximation of the final cost (Chen and Liew, 2003). Clark and Lorenzoni, (1997) emphasised Salman *et al* (2005) defined estimation as a methodology for forecasting and predicting cost and expenditures of a future project and to produce a budget. Enshassi *et al.* (2005), posited that cost estimation is a collection and analysis of many items that influence and contributes to the total cost of the project. Providing an estimate for a project at any stage requires effort in gathering information. It requires the conduction of reviews of the detailed plans, specifications, available site data, available resource data (labour, material and equipment) contract documents, resource cost information, pertinent government regulations and other requirements of the owner deemed applicable (Chen and Liew, 2003). The estimated cost means an estimate of the final total cost of performance of a construction project. This definition requires two important issues, namely the estimate is an approximate calculation; estimate contains uncertainties (Antohie, 2010). Cost estimation process are heavily influenced by the complexity of the project, scale and scope of construction, market conditions, method of construction, site constraints, client's financial position, build ability, the location of the project (Ahmad *et al*, 2012) and therefore the quality of the estimates depends on the qualifications and ability of the estimator (Chen and Liew, 2003). Chen *et al*, indicated that the estimator must exhibit the following competences and credentials:

a. Wide understanding of construction

b. The level of knowledge about methods and materials used for construction.

c. Knowledge of construction practices and contracts

d. Capability to understand construction documents

e. The sketching credentials of the estimator

f. Verbal and graphical communication capability

g. Robust experience in business and economics

h. Ability to envision work items

i. Comprehensive background in design and code requirements

2.4.1 Purpose of estimation

The main purpose of cost estimation is to produce a correct and dependable cost estimate of a construction project. To achieve this purpose the estimator have to look in deep to all factors that affect the project cost and make sure from the information source (Abdal-Hadi, 2010). According to Antohie, (2010), the main purpose of estimating costs is to provide a size reference for cost control, to verify that the resources expended during the execution of the project are kept within the costs assessed in feasibility phase of the project. Pushkar, (1999) stated that the process of estimation essentially serves three main functions in construction:

1. To know the probable cost of construction required in the initial stages of a building so as to determine the financial feasibility of the project.

2. Cost control programs requires estimates to control expenditure on the project. Cost management during the design stage requires consideration of various designs that help in decision making. In addition once construction

commences, the estimate provide basis for the contractor to identify shortfalls and take reactive measures so as to maintain the margin of profit.

3. Estimates helps during the tendering stage to ensure that the most responsive competitive tenderer is awarded the contract.

More over Abdal-Hadi, (2010) citing Marjuki (2006) stated the purpose of estimation as encompassing the following;

1. It forms the bases for assessment of capital cost for a specified nature of work.

2. Constitutes the basis for planning, budgeting and control by defining the scope of work and its associated estimated cost.

3. Provide much of the basic information (hours, resources, tasks, and durations) which is needed for preparing a schedule. It also states general resource requirements such as labor, material, and construction equipment.

4. Provides financial input and output required to prepare a cash flow analysis and curve.

5. It forms the basis for discussion, idea generation, team participation, clarity and buy-in, it ties together much of the relevant project information within a simple document

It is evident that cost estimation involves the forecasting of the future value of a project, forms the basis for decision making and consequently leads to the determination of the final cost.

2.4.2 Types of Estimation

Antohie (2010) stated that there are many ways of classifying the types of estimates for a construction project. Among these the most important ways of classification include:

a) Estimates that depend on the degree of definition of the project

b) Estimates that depends on their use

c) The method used to estimate.

Furthermore, Abdal-Hadi (2010) citing Marjuki (2006), classified the types of estimation based on:

1. The use to which the estimate will be put

2. The amount, type and quality of the information available to be used for preparing the estimate.

3. The level of precision or accuracy required in the estimate.

4. The calculation technique used to prepare the estimate

5. The time preferred to produce the estimate

6. The phase of project (appropriation, feasibility and construction) related to the estimate.

7. The target person for which the estimate is being prepared (client, contractor or insurance company)

Chen and Liew (2003) classified the various types of estimates into two broad categories namely;

➢ Conceptual (or approximate) estimate

➢ Detailed (Definitive) estimate

2.4.2.1 *Conceptual Estimate*

According to Chen and Liew (2003), when quick techniques are utilized employing minimal available information with the aim of providing the owner with approximate or rough values for the project's cost for purposes of determining the economic desirability of proceeding with design and construction, a conceptual estimate is prepared. Limited effort is utilized to prepare this type of estimate as such the level of accuracy of the estimate has a higher fluctuation (lower accuracy) relative to detailed estimation (Choon, 2008) cited in (Mohammed, 2011). At this stage, the estimate accuracy is between ±25% and ±50% due to the limited nature of the project's details (Mahamid, 2013).

2.4.2.2 *Detailed Estimate*

The detailed construction estimate is the product of a procedure whereby the cost of a projected construction project is forecast. The estimate is prepared by breaking down the items of work in a systematic and consistent basis, determining the cost of each item from experience, and summarizing the total (Butcher and Demmers, 2003). An estimate which is prepared after the scope definition of the project is essentially complete is referred to as a detailed estimate. As such for this estimate much effort is expended in gathering enough information and utilize the information to forecast the construction cost (Chen and Liew, 2003). The availability of information consisting working drawings, detailed specifications, and subcontractor and supplier price quotations makes detailed estimates the most accurate (Abdal-Hadi, 2010). Pushkar (1999), stated that these estimates are prepared through a careful calculation of the various quantities for the project called quantity takeoff using the design for the

project. The generated quantities are then multiplied by the selected or approved unit costs which results in the direct cost of the property.

2.5 THE ESTIMATION PROCESS

According to Awad *et al* (2007) every construction project benefits from following a thoughtful and deliberate process in developing project cost estimates. The estimation cost is necessary to be accomplished because it can be utilized as a base in controlling process during project construction execution (Rostiyanti *et al*, 2005). Throughout the project development process various different types of estimates are prepared for various purposes including planning and program management.

Estimating is the process of looking into the future and predicting project costs and resource requirements. Research indicates that one of the major reasons for the failure of construction contracting firms is inaccurate and unrealistic estimating practices. If 20 estimators or contractors were provided the same set of plans and specifications and told to prepare an estimate of cost and resources, it would be safe to assume there would not be more than two estimates prepared on the same basis or from the same units. Therefore, a consistent procedure or set of steps for preparing an estimate is needed to minimize errors and achieve dependable results (Haplin and Boliver, 2005). According to Awad *et al* (2007), the estimation process involves

1. Determination of the basis of the estimates

2. The base estimates preparation

3. The review of the base estimates

4. Set Contingency Risk determination plans

5. Determine the nature of Communication of the estimates

The steps involved in preparing a detailed estimate are shown graphically below (Haplin and Boliver, 2005)

Figure 2.2: Steps in the estimating process
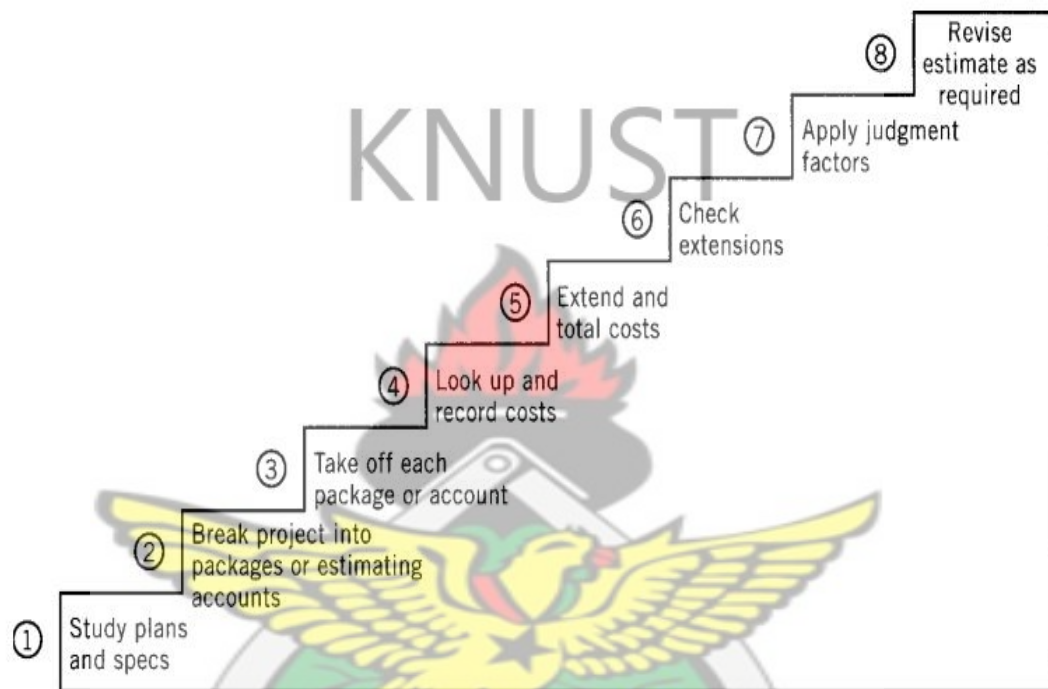
Souce: Haplin and Boliver, 2005

2.6 ACCURACY OF COST ESTIMATES

The construction industry in most economies forms a fundamental part of the economy's development, with high risks and low margins of profit when compared with other key industries. Accordingly, the price of a construction project forms one of the most important aspects of marketing in construction and therefore the subject of accuracy of cost estimate cannot be underestimated (Mochtar and Arditi, 2000). Accuracy is the degree to which a measurement or calculation differs to its actual value; thus estimate accuracy gives a clear indication of the rate the final determined

cost of a project may vary relative to the single point value used as the estimated cost for the project. It is thus justifiable that estimate accuracy should generally be regarded as a probabilistic appraisal of how far a project's final cost may differ from the single point value that is selected to represent the estimate (Dysert, 2006).

The accurate estimation of construction costs constitutes an important aspects of contracts. The contractor and consultants are expected to provide the owner with reliable cost information, and its ability to do so determines in large measure its continuing ability to attract owner-clients (Clough, 1986). An accurate and complete estimate establishes accountability with the cost engineer and enables management to place greater confidence in the cost estimate (UFC, 2010).

Therefore, the preparation of an accurate estimate, which is done before the physical realization of the work, requires detailed study of the bid document in the face of the environmental situation. This thus involves a careful and vigilant scrutiny of the outcome of the study in order to produce the most accurate estimate of the likely cost consistent with the time on hand, the accuracy and comprehensiveness of the information submitted (Abdal-Hadi, 2010).

The determinants of an accurate estimate includes the following (Oberlender and Trost, 2001); (1) who was involved in preparing the estimate; (2) how the estimate was prepared; (3) what was known about the project; and (4) other factors considered while preparing the estimate.

2.7 FACTORS AFFECTING THE ACCURACY OF ESTIMATES

The effects of inaccurate and/or incomplete estimates are enormous. Most obviously, it can be difficult or impossible to deliver projects that have been programmed and committed to if early estimates prove to be significantly low. Conversely, when early

estimates prove to be significantly high it can lead to under programming in the investment plan, and thus make it challenging to meet delivery targets. In the current economic climate of greater-than-ever strains on public funds, the pressure to accurately estimate the ultimate cost of a project is increasing (Ministry of Transportation and Infrastructure, 2013)

A large number of factors have effects on cost. Importance and explanation can be given to this, taking knowledge of the complex nature of the construction industry and its works, which fuse together the combine efforts the group of persons performing different tasks for the achievement of a common goal (the owner, the professionals, the contractors and suppliers). Proper integration of the combine efforts of these parties from the design table to the implementation or execution of projects will show significant effects on the overall project cost (Alumbugu *et al*, 2014).

Abdal-Hadi, (2010) considered about 64 factors that affects the accuracy of an estimate. Among these the most critical factors include the following:

1. Material (prices/ availability/ supply/ quality/ imports)

2. Closure and blockade

3. Project team's experience in the construction type

4. The experience and skill level of the consultant

5. Clear and detail drawings and specifications

6. Quality of information and flow requirements

7. Completeness of cost information

8. Accuracy and reliability of cost information

9. Currency exchange fluctuation

10. Clear contract conditions

Alumbugu *et al*, (2014) indicated from his study that the factors that influence the accuracy of a cost estimate encompasses Experience and skill level of the estimator(s), Project teams experience on the construction type, clear and detail drawings and specification, completeness of cost information, accuracy and reliability of cost information, availability of all fields of specialization in a project team, quality of information and flow requirement , clear scope definition for the client, financial capability of the client, and completeness of project documents.

Enshaasi *et al*, (2005) from their study into "Factors affecting accuracy of cost estimation of building contracts in the Gaza Strip" concluded on: location of the project, segmentation of Gaza Strip and limitation of movements between areas, political situation, financial status of the

owner, increase in unit cost of construction materials, experience of consultant engineer, clarity of project drawings, clarity of information before execution and tender currency as the main factors that affects the accuracy of a construction estimate for a project.

According to Oberlender and Trost, (2001), team experience and cost information time allowed to prepare the estimate, site requirements, and bidding and labour climate are the factors that impact the accuracy of an estimate.

Subsequently, Ashworth (1994) provided a set of factors that impacts the accuracy of estimates. They include but not limited to the following; design information availability, type and quantity of cost data, the type of project involved, project size, number of tenderers on competitive projects, stability of market conditions, personal factors, proficiency in estimating and sheer quantitative experience.

Dysert (2006) also contended that various factors affects the accuracy of cost estimate of project. Among the factors he indicated include; the extent of project

definition, the validity of cost estimating data, the state of innovation (technology) in the project (material pricing, labour hours, labour ware rates, etc.), the accuracy of assumptions made in preparing the estimate, the experience and competence of the estimator, the techniques employed in preparing the estimate, the use to which the estimate will be put, and efforts dedicated in preparing the estimate.

2.8 SUMMARY

This chapter reviewed related work to investigate the factors that have a major impact on a project's final cost. Several factors were revealed as indicated by various researchers in their studies. It is therefore prudent that this factors be tested in the study area to prove or otherwise the findings of the works reviewed and as well reveal the factors that are applicable in this study's area.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This research aims to identify the factors that affect the cost of construction projects and determine the factors affecting the accuracy of estimates. To achieve this reviews of the literature have been conducted and several factors have been identified. Throughout this chapter, the following subsections will further expand on the research methodology used to investigate and answer the research question:

3.2 RESEARCH APPROACH

According to Kothari (1985) and Dawson (2002) there are two basic approaches to research. These are

1. Quantitative
2. Qualitative

Quantitative research is concerned with investigating things which could be observed and measured in some way (Degu and Yigzaw, 2006). Quantitative research is on collecting and analyzing numerical data; it concentrates on measuring the scale, range, frequency of phenomena. This type of research, although harder to design initially, is usually highly detailed and structured and results can be easily collated and presented statistically (Neville, 2007). Quantitative research is based on the measurement of quantity or amount (Kothari, 1985).

Qualitative research is more subjective in nature than Quantitative research and involves examining and reflecting on the less tangible aspects of a research subject,

e.g. values, attitudes, perceptions (Neville, 2007). Qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behavior. Research in such a situation is a function of researcher's insights and impressions (Kothari, 1985). Neville, (2007) indicated that even though starting a qualitative research is easier relative to quantitative research, it can be often difficult to interpret and present the findings and that the findings can also be challenged more easily.

The quantitative approach has been selected as data collected will be analyzed with statistical procedures. Rajasekar *et al*, (2013) intimated that quantitative research often begins with the collection of data based on a theory or hypothesis or experiment followed by the application of descriptive or inferential statistical methods. This study will therefore make use of statistical methods to analyze the collected data which will form the bases of formulating recommendations.

3.3 POPULATION DEFINITION

The population from which a sample will be taken for the study includes D1K1 to D4K4 contractors classified by the Ministry of Water Resources Works and Housing (MWRWH). The main criteria for classification are related to company's previous experience, capital, value of executed projects, staffing and financial situation (Enshassi *et al*, 2007). The study set out to investigate the factors affecting the cost of construction. The decision to focus on these groups of contractors was born from the fact that all the foregoing selected group of contractors' deals with cost and it is therefore just adequate to solicit the opinion of these contractors on the subject matter.

3.4 SAMPLING TECHNIQUE

A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample (Kothari, 1985).

The purposive and snowball sampling techniques which are an example of non-probability sampling were used to collect the data. The purposive sampling technique was used to determine which class of contractors to use. This was due to the fact that the study wanted to obtain the views of persons who have specific expertise like quantity surveyors, project managers, Architects, consultants and contractors in the construction industry.

In addition, the advantage of doing this is that one is not on his/her own trying to defend his/her decisions but one have acknowledged professionals who back the findings. As a result the purposive sampling was used in selecting respondents, which resulted all contractors within D1K1 to D4K4 as classified by the Ministry of Water Resources Works and Housing (MWRWH) in the Central region for the study.

Snowball sampling may be defined as a technique for gathering research subjects through the identification of an initial subject who is used to provide the names of other actors (Atkinson and Flint, 2004). Snowball sampling was used because there was no information available on the contractors by the authorities. As a result of this the contractors who were initially consulted gave information and contacts of other contractors in that same category and were consulted accordingly.

3.5 SAMPLE SIZE

To obtain thorough knowledge on the extent to which a construction project's cost is affected, a convenient sample size of 50 contractors were selected for the study. The decision to use a convenient sample size was due to the fact there was no organized data on a list of contractors in the Region for the study. All effort to obtain this information from the authorities that matters proved futile hence the decision to conveniently use a sample size of 50.

3.6 DATA COLLECTION

The objectives of the research necessitated the design of a questionnaire to obtain data from the contractors. The questionnaires have been selected for data collection since the questionnaire is probably the most widely used data collection technique for conducting surveys (Abdal-Hadi, 2010). These questionnaires were self-administered to the various respondents.

3.7 QUESTIONNAIRE DESIGN

The questionnaire is considered as the heart of a research study (Kothari, 1985). It is therefore important for an accurate design of the questionnaire. If the questionnaire is not constructed well the research is bound to fail. The questionnaire consisted of close-ended and open-ended questions. It was categorized into three sections. The first section sought to obtain information about the background of the respondent. The second and third sections of the questionnaire aimed at satisfying the first and second objectives of the study. It contained a list of factors on a 5-ranking system. Respondents were required to rank these factors based on their relative importance.

3.8 DATA ANALYSIS

Lists of factors were organized into a questionnaire for respondents to rank. A 5 point ranking system using the Relative Importance Index (RII) was utilized for these factors. The relative importance was used to determine the contractors" perception of the relative importance of the factors in the questionnaire. According to Abdal-Hadi, (2010) the relative index technique has used widely by several researchers in construction research for measuring attitudes with respect to surveyed variables.

The RII five point scale, ranging from 1(not important) to 5 (very important) was adopted for each factor as follows;

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

W is the weight given to each factor by the respondent and ranges from 1 to 5

A is the highest weight-5

N= the total number of respondents.

The Statistical Package for Social Scientists (SPSS) and Microsoft Excel were used in analyzing.

4.1 INTRODUCTION

This chapter presents the results obtained and the analysis of the findings in the light of the objective of the study.

4.2 RESPONSE RATE

A total of 50 questionnaires were issued to the target respondents and a total of 46 representing 92% were received.

4.3 DEMOGRAPHIC VARIABLES

This section is mainly designed to gather information on the status of respondents with respect to their position, years of experience in the construction industry, value of projects undertaken, their level of satisfaction with the accuracy of estimates, the frequency of budget overrun and their opinion on some of the reasons why some firms does not have estimating departments in their establishment.

4.3.1 Respondents' position

The table about is a representation of the respondents' from whom opinion on the subject area was solicited. It shows that 43.5% of the questionnaires were filled by contractors, 2.2% by estimators, 6.5% by Architects, 23.9% by Project Managers, and 23.9% by Quantity Surveyor. The group of people was contacted since they are practitioners in the construction industry and have adequate knowledge on the issues being ascertained. This shows that the questionnaires were filled by

professionals in the construction industry thereby ensuring the credibility and reliability of the findings

Table 4.1: Respondents' Position

	Frequency	Percent	Valid Percent	Cumulative Percent
Contractor	20	43.5	43.5	43.5
Estimator	1	2.2	2.2	45.7
Architect	3	6.5	6.5	52.2
Project manager	11	23.9	23.9	76.1
Quantity surveyor	11	23.9	23.9	100.0
Total	46	100.0	100.0	

4.3.2 Years of experience

Table 4.2 indicate that 24.4% of the respondents have between 10 to 15 years of experience in the construction industry, 60% have between 5 to 10 years and 15.6% have worked in the industry for less than 5 years. This indicates that the respondents have enough insight in the subject area being researched and therefore proffer responses well enough to warrant adequate conclusion on the findings.

Table 4.2: Years of Experience

	Frequency	Valid Percent	Cumulative Percent
10 years to 15 years	11	24.4	24.4
5 years to 10 years	27	60.0	84.4
less than 5 years	7	15.6	100.0
Total	45	100.0	

4.3.3 Projects undertaken

It is important that the value of projects undertaken by the respondents be ascertained to verify the extent to which they appreciate the factors for which their opinion is being sought. As shown above 42.2% percent indicated that they executed projects worth between GHC1-5 million. The other 57.8% of the respondents also indicated that they executed of value less that GHC 1 million.

Table 4.3: Projects Undertaken

	Frequency	Percent	Valid Percent	Cumulative Percent
between GH 1-5 million	19	41.3	42.2	42.2
less than GH 1 million	26	56.5	57.8	100.0
Total	45	97.8	100.0	

4.3.4 Level of satisfaction with estimate accuracy

The level of satisfaction with accuracy of estimates prepared indicates that 6.5% are not satisfied. A surprising 39.1%of the respondents indicated their position on estimate accuracy as neutral. Meaning they could neither say they were satisfied nor otherwise. Another 52.2% of the respondents indicated their satisfaction with the level of accuracy of estimates as adequate. Only 2.2% of the respondents have indicated that they were very satisfied with the level of accuracy in the estimates they prepare as shown in Table 4.4 above. This information was sought from the respondents in order to gain an understanding of how they appreciate the factors affecting the accuracy of estimates.

Table 4.4: Level of satisfaction with estimate accuracy

	Frequency	Percent	Valid Percent	Cumulative Percent
Not Satisfied	3	6.5	6.5	6.5
Neutral	18	39.1	39.1	45.7
Satisfied	24	52.2	52.2	97.8
Very Satisfied	1	2.2	2.2	100.0
Total	46	100.0	100.0	

4.3.5 Budget overrun

An enquiry was made to discover the frequency at which the final project cost exceeded the initial budget of projects undertaken by respondents. An overwhelming 52.2% of the respondents indicated that budget overrun occurs often. Another 45.7% indicated that budget overrun occurs very often. Only 2.2% indicated that budget overrun does not occur often as shown in table 4.5. This confirms the assertion by several researchers that cost overrun occurs in projects frequently.

Table 4.5: Budget Overrun

	Frequency	Percent	Valid Percent	Cumulative Percent
Not Often	1	2.2	2.2	2.2
Often	24	52.2	52.2	54.3
Very Often	21	45.7	45.7	100.0
Total	46	100.0	100.0	

4.3.6 Non-Existence of Estimating Unit

A preliminary investigation conducted indicated that most construction companies in the area of the study (Cape coast) does not have estimating department. Therefore respondents were required to express their opinion on some reasons why construction companies do not deem it fit to have estimating departments in their establishment. Table 4.6 shows that 64.4% of the respondents are of the view that increase in the general overhead of the organization is the main reason why companies do not have estimating department. Another 13.3% were of the view that the volume of the work

they undertake is small, so there is no need for estimating unit. Finally 20% indicated that an estimating unit is not necessary.

Table 4.6: Reasons for Non-Existence of An Estimating Unit

	Frequency	Percent	Valid Percent	Cumulative Percent
Other Reasons	1	2.2	2.2	2.2
Increase The General Overhead Of The Organization	29	63.0	64.4	66.7
Volume Of The Work Is Small, So There Is No Need For Estimating Unit	6	13.0	13.3	80.0
Estimating Unit Is Not Necessary	10	21.8	20.0	100.0
Total	46	100.0		

4.4 FACTORS AFFECTING THE FINAL COST OF A CONSTRUCTION PROJECT

To determine the relative importance of the factors affecting the cost of construction projects the following formulae was used:

Relative Importance Index (RII) $= \dfrac{\sum W}{A \, X \, N}$

W is the weight given to each factor by the respondent and ranges from 1 to 5

A is the highest weight-5

N= the total number of respondents (46).

$$W = \sum[(f_1 \times n_1)+(f_2 \times n_2)+(f_3 \times n_3)+\ldots\ldots..+(fn \times nn)]$$

Where fn = score ranking   nn = corresponding number of responses

The following table presents the factors as rated and ranked

Table 4.7 RII on factors affecting the cost of projects as rated by respondents

NO	FACTORS AFFECTING THE COST OF PROJECTS	RANKING					WEIGHTING	RII	RANK
		5	4	3	2	1			
1	Unexpected weather conditions	14	22	5	5	0	183	0.796	12
2	Design changes	18	21	5	2	0	193	0.839	2
3	Poor project management	16	22	6	2	0	190	0.826	5
4	Land acquisition costs	12	20	9	5	0	177	0.770	17
5	Inflation/ relative price changes	16	23	4	3	0	190	0.826	5
6	Force majeure	16	16	6	8	0	178	0.774	18
7	Shortages of material and plant	19	19	6	2	0	193	0.839	2
8	Exchange rate	19	19	6	2	0	193	0.839	2
9	Inappropriate contractors	16	19	5	6	0	183	0.796	12
10	Funding problems	16	20	8	2	0	188	0.817	8
11	Unexpected ground conditions	23	14	6	3	0	195	0.848	1
12	Fluctuation in prices of raw materials	15	24	5	2	0	190	0.826	5
13	Fraudulent practices and kickbacks	17	19	7	3	0	188	0.817	8
14	Previous experience of contractor	13	22	7	4	0	182	0.791	14
15	High cost of transportation	14	19	9	4	0	181	0.787	16
16	Incorrect planning	16	16	10	4	0	182	0.791	14
17	Increase in Expenses	13	25	6	2	0	187	0.813	11
18	Government Policies	17	18	9	2	0	188	0.817	8
19	Specifications	13	18	8	7	0	175	0.761	20
20	Conflict between project parties	12	20	8	6	0	176	0.765	19

Table 4.8 Ranked RII on Factors affecting the final cost of construction projects

NO	FACTORS AFFECTING THE COST OF PROJECTS	RANKING					WEIGHTING	RII	RANK
		5	**4**	**3**	**2**	**1**			
1	Unexpected ground conditions	23	14	6	3	0	195	0.848	1
2	Design changes	18	21	5	2	0	193	0.839	2
3	Shortages of material and plant	19	19	6	2	0	193	0.839	2
4	Exchange rate	19	19	6	2	0	193	0.839	2
5	Inflation/ relative price changes	16	22	6	2	0	190	0.826	5
6	Fluctuation in prices of raw materials	16	23	4	3	0	190	0.826	5
7	Poor project management	15	24	5	2	0	190	0.826	5
8	Fraudulent practices and kickbacks	17	19	7	3	0	188	0.817	8
9	Government Policies	17	18	9	2	0	188	0.817	8
10	Funding problems	16	20	8	2	0	188	0.817	8
11	Increase in Expenses	13	25	6	2	0	187	0.813	11
12	Unexpected weather conditions	14	22	5	5	0	772	3.357	12
13	Inappropriate contractors	16	19	5	6	0	183	0.796	12
14	Previous experience of contractor	13	22	7	4	0	182	0.791	14
15	Incorrect planning	16	16	10	4	0	182	0.791	14
16	High cost of transportation	14	19	9	4	0	181	0.787	16
17	Land acquisition costs	12	20	9	5	0	177	0.770	17
18	Force majeure	16	16	6	8	0	178	0.774	18
19	Conflict between project parties	12	20	8	6	0	176	0.765	19
20	Specifications	13	18	8	7	0	175	0.761	20

The following are the most critical factors affecting the cost of construction projects;

1. Unexpected ground Conditions

2. Design changes

3. Shortages of material and plant

4. Exchange rate

5. Inflation/ relative price changes/ Fluctuation in prices of raw materials and poor project management

4.4.1 Comments/Discussion

Unexpected ground conditions was ranked by the respondents as the most important factor that affects the final cost of a construction project with an **RII value of 0.849**. This factor is not surprising as most construction projects experience such unexpected conditions. In the light of the expectations the bill of quantities of construction projects are deemed as provisional. It is true that preparation is required before a construction project commences but every detailed item of a construction project cannot be known or shown no matter how well the construction drawings and specifications are prepared. Some things can be learned only as construction is taking place. Changes in surface ground conditions can result in several problems including difficulty in actually moving machinery and supplies around the site, and in undertaking excavations and laying foundations. This can also increase costs and add to the construction time required.

Design changes were perceived to be the second most important factor that affects the final cost of a project. Changes can take several forms. It may be that the project sponsor wants additional elements to be included in the project or changes to existing ones. This is particularly irritating if the work to be changed has already been done. Usually, these design changes require additional time inputs from architects and engineers as well as the additional time and cost inputs from the contractor and for

additional materials. This factor was among the several factors Aftab *et al*, (2014) considered as dominant in affecting the final cost of a project.

Shortages of material and plant

During periods where the level of development activity is unusually high in a particular region, there may be shortages of some construction materials, construction plant (machines and equipment used during construction) and service plant (equipment used in the operation of the infrastructure project). If this was not anticipated in the original cost estimate, delays may occur and/or the prices of these elements increase. This factor obtained a RII of 0.839.

Exchange rate

Exchange rates are particularly affects the cost of construction if contracting services or other elements regarding the project are purchased from other countries. Ghana is particularly noted for importing several materials mostly of specialist nature. If the exchange rate goes beyond the anticipated value then the final cost of the project will be affected.

Inflation/ relative price changes

Inflation can act to increase the original estimates of construction costs. It is possible that this factor may have been included in the determination of the cost of the project, but if the rate of inflation increase beyond the anticipated level during the construction period, then the original cost estimate will be exceeded. Obviously any other factor that delays a project will expose the project to the risk of further inflationary cost increases. This was ranked the fifth most important factor affecting

the cost of projects with an RII of 0.826. This factor was among the dominating factors Aziz, (2012) discovered as factors that varies the final cost from the estimated cost.

4.5 FACTORS AFFECTING THE ACCURACY OF COST ESTIMATES

To determine the extent to which the various factors identified in the literature affects the accuracy of cost estimate prepared for projects, respondents were asked to rate the relative importance of the factors. The results are presented in the following tables:

Table 4.9 RII on factors affecting the accuracy of estimates as rated by respondents

NO	FACTORS AFFECTING ACCURACY OF ESTIMATES	RANKING					WEIGHTING	RII	RANKS
		5	4	3	2	1			
1	Material (prices/ availability/ supply/ quality/ imports)	45	1	0	0	0	229	0.996	1
2	Project team's experience in the construction type	17	29	0	0	0	201	0.874	4
3	Experience and skill level of the estimator(s)	25	16	5	0	0	204	0.887	2
4	Clear and detail drawings and specifications	14	28	4	0	0	194	0.843	7
5	Quality of information and flow requirements	28	12	4	2	0	204	0.887	2
6	Completeness of cost information	17	20	7	2	0	190	0.826	12
7	Accuracy and reliability of cost information	15	21	8	2	0	187	0.813	16
8	Currency exchange fluctuation	18	21	5	2	0	193	0.839	8
9	Clear contract conditions	14	21	7	4	0	183	0.796	20
10	Completeness of project documents	14	22	8	2	0	186	0.809	17
11	Time allowed to prepare the estimate	23	18	3	2	0	200	0.870	5
12	The state of innovation (technology) in the project (material pricing, labour hours, labour ware rates, etc.)	11	28	7	0	0	188	0.817	14
13	Accuracy of assumptions made in preparing the estimate	16	20	9	1	0	189	0.822	13
14	The use to which the estimate will be put	21	18	6	1	0	191	0.830	9
15	Efforts dedicated in preparing the estimate	19	15	9	3	0	188	0.817	14
16	Stability of market conditions	12	25	8	1	0	186	0.809	17
17	The type of project involved	18	18	9	1	0	191	0.830	9
18	Method of estimating used	16	20	6	3	1	186	0.809	17
19	Number of tenderers on competitive projects	23	16	5	2	0	198	0.861	6
20	Volume of consultant's workload during estimation	17	20	8	1	0	191	0.830	9
21	Project size	18	14	10	4	0	180	0.783	21
22	Multiple projects being advertised at the same time	9	23	13	1	0	178	0.774	22

Table 4.10 Ranked RII on factors affecting the accuracy of estimates

NO	FACTORS AFFECTING ACCURACY OF ESTIMATES	RANKING					WEIGHTING	RII	RANKS
		5	**4**	**3**	**2**	**1**			
1	Material (prices/ availability/ supply/ quality/ imports)	45	1	0	0	0	229	0.996	1
2	Experience and skill level of the estimator(s)	25	16	5	0	0	204	0.887	2
3	Quality of information and flow requirements	28	12	4	2	0	204	0.887	2
4	Project team's experience in the construction type	17	29	0	0	0	889	0.874	4
5	Time allowed to prepare the estimate	23	18	3	2	0	200	0.870	5
6	Number of tenderers on competitive projects	23	16	5	2	0	198	0.861	6
7	Clear and detail drawings and specifications	14	28	4	0	0	194	0.843	7
8	Currency exchange fluctuation	18	21	5	2	0	193	0.839	8
9	The use to which the estimate will be put	21	18	6	1	0	191	0.830	9
10	The type of project involved	18	18	9	1	0	191	0.830	9
11	Volume of consultant's workload during estimation	17	20	8	1	0	191	0.830	9
12	Completeness of cost information	17	20	7	2	0	190	0.826	12
13	Accuracy of assumptions made in preparing the estimate	16	20	9	1	0	189	0.822	13
14	The state of innovation (technology) in the project (material pricing, labour hours, labour ware rates, etc.)	11	28	7	0	0	188	0.817	14
15	Efforts dedicated in preparing the estimate	19	15	9	3	0	188	0.817	14
16	Accuracy and reliability of cost information	15	21	8	2	0	187	0.813	16
17	Completeness of project documents	14	22	8	2	0	186	0.809	17
18	Method of estimating used	16	20	6	3	1	186	0.809	17
19	Stability of market conditions	12	25	8	1	0	186	0.809	17
20	Clear contract conditions	14	21	7	4	0	183	0.796	20
21	Project size	18	14	10	4	0	180	0.783	21
22	Multiple projects being advertised at the same time	9	23	13	1	0	178	0.774	22

The results in table 4.10 indicate that **materials prices, availability and supply** have been ranked first with an RII of 0.996. Construction involves the uses of materials and contractors' inability to control prices, availability and supply of materials can

result in contractors raising the cost in preparing their estimates. To be on safer side contractors would prefer to raise either the cost or quantity of materials for a particular work activity in order to cater for uncertainties.

Experience and skill level of the estimator was ranked second as a key factor playing a role as far as estimate accuracy is concerned. Estimating is a process that requires experience and skill to provide an accurate estimate. The estimator will require experience in terms of how the various components of a project are constructed. A lack of knowledge in this regard has a major impact on the accuracy of the estimate prepared. This factor was ranked 2nd with a RII of 0.887.

The quality of information was ranked 3rd with an index of 0.887. This illustrates that the quality of information can be very crucial in estimating. The estimator needs to gather information for this function to be performed effectively and efficiently. This result confirms the findings of Abdal-Hadi, (2010) who ranked it in the 6th position with an index of 0.894. Some of the major information required for effective estimating includes basic information on client, project details, drawing, market conditions, environmental consideration and other conditions that will facilitate the estimation process (Abdal-Hadi, 2010).

The experience of the project team in the construction type was ranked 4th with an index of 0.874. If the project teams are well experienced in the construction of the proposed type of the project it will reflect in the amount of detail that will be provided in the design especially foe design and build contracts (Onukwube, 2008) cited in Abdal-Hadi, (2010). This result is also in conformation with the findings of Alumbugu, *et al* (2014), who indicated that project teams experience on the construction type is crucial in the accuracy of the estimates.

Time allowed to prepare the estimate was ranked 5th with an index of 0.870.This was not surprising as it is overly obvious that estimation goes through a process. The amount of detail required in an estimate is directly proportional to the time available in preparing it and the experience of the estimator (ranked 2nd). The process ranges from determining the basis of the estimate, preparation of base estimate, review of base estimate, and determining risk and contingency (Awad *et al*, 2007). It is also important to note that before an estimate is prepared detailed information about the project is obtained. It requires detailed study of the bid, document in the face of environmental situation and the amount of time required to achieve this process is as good as the estimate itself.

4.6 CHAPTER SUMMARY

This chapter was dedicated to presentation of the data gathered and discussion of the results. To obtain the objectives set for the study literature was conducted and questionnaire was developed and sent to respondents to express opinion. This chapter therefore presented the data gathered and concluded with a brief discussions on the most critical factors as ranked by the respondents.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

Construction projects have certain characteristics that determine the appropriate actions to accurately estimate their cost. A key factor for a successful project is the preparation of an accurate estimate, which can influence factors ranging from project feasibility to profitability (Enshassi *et al,* 2007). One of the most important construction management functions is estimating process. The success or failure of a project is dependent on the accuracy of estimates (Abdal-Hadi, 2010). To this extent much attention is given to every detail that entails in the preparation of an accurate. On this basis this study focused on how accurate estimates are prepared and extended by investigating how an estimate cost could be overrun by the end of a construction project. This chapter concludes the study and will make recommendations.

5.2 ATTAINING THE OBJECTIVES

This study aimed at identifying the factors that influence the final cost of a construction project.

To achieve the aim of the study the following objectives were formulated;

- To identify the factors that affects the final cost of a project from the perspective of contractors.

- To identify the factors that influences the accuracy of cost estimates in determining the final cost of a construction project.

OBJECTIVE # 1: To identify the factors that affects the final cost of a project from the perspective of contractors.

To achieve this objective the study proceeded to conduct literature to identify these factors as found by earlier researchers, (Eshofonie, (2008) Hiral *et al*, (2013) Tien-Choon *et al*, (2012) Aziz, (2012) European Commission, (2005) Gomez, (2012), Azhar *et al*, (2008) Aftab *et al*, (2014). Overall twenty factors were identified factors and organized into a questionnaire for respondents to rate their relative importance as they deem them. The respondents ranked the following as the main factors affecting the final cost of a construction project.

1. Unexpected ground Conditions

2. Design changes

3. Shortages of material and plant

4. Exchange rate

5. Inflation/ relative price changes

OBJECTIVE # 2: To identify the factors that influence the accuracy of cost estimates in determining the final cost of a construction project.

Subsequent to achieving this objective literature review was conducted and organized into a questionnaire for respondent rating(Dysert (2006), Ashworth (1994), Oberlender and Trost, (2001),, Enshaasi *et al*, (2005), Alumbugu *et al*, (2014), Abdal-Hadi, (2010), Alumbugu *et al*, (2014), Ministry of Transportation and Infrastructure, (2013). The following were the factors that respondents rated as critical in affecting the accuracy of a construction project:

1. Material (prices/ availability/ supply/ quality/ imports)

2. Experience and skill level of the estimator(s)

3. Quality of information and flow requirements

4. Project team's experience in the construction type

5. Time allowed to prepare the estimate

5.3 CONCLUSION

Construction and building projects are progressively reaching a point of complexity in terms of size and cost. In other industries the cost a product is based on known manufacturing cost whereas in construction most projects must be priced before they are constructed making the industry distinct with risky operations. One important factor which plays a role when the performance of a construction project is measured is cost. Indeed this factor is affected by various factors. The study found that Unexpected ground Conditions, Design changes, Shortages of material and plant, Exchange rate and Inflation/ relative price changes are the factors that causes the final cost of construction to overrun the initial budget. Subsequently the process of price determination thus estimation is also impacted by several factors. The study discovered that Material (prices/ availability/ supply/ quality/ imports), Experience and skill level of the estimator(s), Quality of information and flow requirements, Project team's experience in the construction type, and Time allowed to prepare the estimate as the factors affecting the accuracy of a construction project.

5.4 LIMITATIONS OF THE STUDY

1. Due to the lack of information on the target population from the authorities in the area of the study, the sample size was conveniently selected, therefore the sample used for the study cannot be considered to be representative enough.

The findings can therefore not be generalized even though the findings are useful.

2. The use of non-probability sampling techniques means that inferences cannot be made on statistical grounds.

5.5 RECOMMENDATIONS

The following recommendations are made based on the findings from the study.

- The study revealed that the final cost is mainly affected by unexpected ground conditions. This condition could probably be caused by the lack of the conduction of test on the condition of the ground prior to construction. Preliminary tests should therefore be intensified to explore the soil to at least gain firsthand information prior to construction.

- Should engage the services of experienced persons in the industry in preparing estimates for construction projects as it emerged that the quality/accuracy of estimate is affected by the experience level of the estimator. In other words the estimate is as good as the estimator.

- It is essential also that contracting companies of various classification provide on the job training for their estimators to gain the requisite on cost estimation.

- It is recommended for contractors to be attentive about construction materials and prices, so they are advised to make purchase of the amount of material for construction prior to the commencement of work. Time schedule for material delivery to the site and usage of materials should be prepared in order to avoid shortage of materials.

- Clients are recommended to allocate ample time to enhance the accuracy of estimates prepared by contractors. Contractors on the other hand should

expedite the decision to tender so as to preserve enough time for estimate preparation thereby easing the pressure on estimators.

- Enough information about a project should be gathered to enhance the quality of estimate. Clients should decide fully on their requirement for a particular project so that same can be incorporated in the design of the project.

5.5.1 Recommendation for future Research

The research conducted covered building contractors in classes D1 and D4 in the Central Region of Ghana. There is the need to be extended by taking samples from the other regions in Ghana.

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QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

<u>**SURVEY QUESTIONNAIRE**</u>

Research topic:

FACTORS INFLUENCING THE FINAL COST OF CONSTRUCTION PROJECTS IN GHANA.

INTRODUCTION

Cost is among the most important considerations during the project management life cycle and is most considered as one of the most critical parameters of a project and the defining ingredient for project success. Despite its established significance is it not unusual to see a construction project failing to achieve its objectives within the specified cost. This questionnaire is therefore aimed at soliciting your ideas with respect to cost in construction. This study is aimed at:

- To identify the factors that affects the final cost of a project from the perspective of contractors.

- To identify the factors that influences the accuracy of cost estimates in determining the final cost of a construction project.

I am by this writing promising you that this is strictly for academic purposes and that it will not be used in any way as a competitive edge against your company. Thank you in advance for your contribution to this research study.

SECTION A: RESPONDENT PROFILE

Please respond to the following either by writing in the blank space provided or ticking the appropriate box.

1. Which of the following describes your position?

    a. Quantity Surveyor [ ]   b) Project Manager [ ]   c) Architect [ ]

    d) Estimator [ ]   e) Contractor [ ]   f) others (specify)

    ……………………………..............

2. How many years of experience do you have in the construction industry?

    a) Less than 5years [ ]   b) 5 years to 10year [ ]   c) 10 years to15 years [ ]

    d) 16 years and above [ ]

3. What is the value of project that your company have undertaken in your last five contracts?

    a) Less than GHC 1 million

    b) Between GHC 1-5 million

    c) Above GHC 5 million

4. Are you satisfied with the level of accuracy of your estimate?

    a) Very satisfied   [ ]

    b) Satisfied   [ ]

    c) Neutral   [ ]

    d) Not satisfied   [ ]

    e) Very not satisfied   [ ]

5. How often have your final project cost exceeded the initial budget?

    a) Very often   [ ]

    b) Often   [ ]

    c) Not often   [ ]

    d) Never   [ ]

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6. In your opinion, what are the main reasons for non-existence of an estimating unit some construction companies?

    a) Estimating unit is not necessary [   ]

    b) Volume of the work is small, so there is no need for estimating unit [

    ]

    c) Increases the general overhead of the organization / firm   [   ]

    d) Other reasons, --

    -

SECTION B: FACTORS AFFECTING THE ACCURACY OF ACCURACY OF ESTIMATES IN DETERMINING PROJECT COST

From literature several factors were identified as the factors that influence the accuracy of an estimate. Please indicate the degree of importance of these factors affecting the accuracy of cost estimates. (Please tick the appropriate cell)

5- Very important 4-Important 3- Somewhat important 2- Little importance 1-Not important
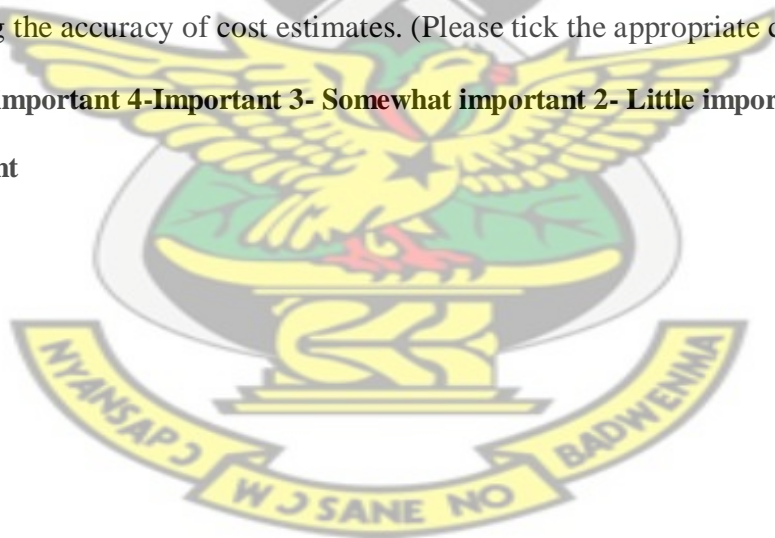
NO	FACTORS AFFFECTING ACCURACY OF ESTIMATE	DEGREE OF IMPORTANCE				
		5	4	3	2	1
1	Material (prices/ availability/ supply/ quality/ imports)					
2	Project team's experience in the construction type					
3	Experience and skill level of the estimator(s)					
4	Clear and detail drawings and specifications					
5	Quality of information and flow requirements					
6	Completeness of cost information					
7	Accuracy and reliability of cost information					
8	Currency exchange fluctuation					
9	Clear contract conditions					
10	Completeness of project documents					
11	Time allowed to prepare the estimate					
12	The state of innovation (technology) in the project (material pricing, labour hours, labour ware rates, etc.)					
13	Accuracy of assumptions made in preparing the estimate					
14	The use to which the estimate will be put					
15	Efforts dedicated in preparing the estimate					
16	Stability of market conditions					
17	The type of project involved					
18	Method of estimating used					
19	Number of tenderers on competitive projects					
20	Volume of consultant's workload during estimation					
21	Project size					
22	Multiple projects being advertised at the same time					

SECTION C: FACTORS AFFECTING THE FINAL COST OF A PROJECT

Below are numbers of factors affecting the final cost of a construction projects.

From your experience, please express your opinion on the importance of the following factors. (Please tick the appropriate box).

5- Very important 4-Important 3- Somewhat important 2- Little importance 1-Not important

NO	FACTORS AFFFECTING COST OF PROJECTS	DEGREE OF IMPORTANCE				
		5	4	3	2	1
1	Unexpected ground conditions					
2	Design changes					
3	Poor project management					
4	Land acquisition costs					
5	Inflation/ relative price changes					
6	Force majeure					
7	Shortages of material and plant					
8	Exchange rate					
9	Inappropriate contractors					
10	Funding problems					
11	Unexpected weather conditions					
12	Fluctuation in prices of raw materials					
13	Fraudulent practices and kickbacks					
14	Previous experience of contractor					
15	High cost of transportation					
16	Incorrect planning					
17	Increase in Expenses					
18	Government Policies					
19	Specifications					
20	Conflict between project parties					