

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF ARTS AND BUILT ENVIRONMENT

DEPARTMENT OF BUILDING TECHNOLOGY

KNUST

TOPIC

**BARRIERS TO DESIGN –STAGE COST PLANNING PRACTISES IN THE
CONSTRUCTION INDUSTRY OF GHANA**

BY

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**A THESIS SUBMITTED TO THE DEPARTMENT OF BUILDING TECHNOLOGY,
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UNIVERSITY OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF MSC IN CONSTRUCTION
MANAGEMENT**

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DECLARATION

I hereby declare that, except for references to other people's work, opinion and observations which have been duly acknowledged, this work is the result of my research. I hereby declare that, this work has not been presented for a degree elsewhere.

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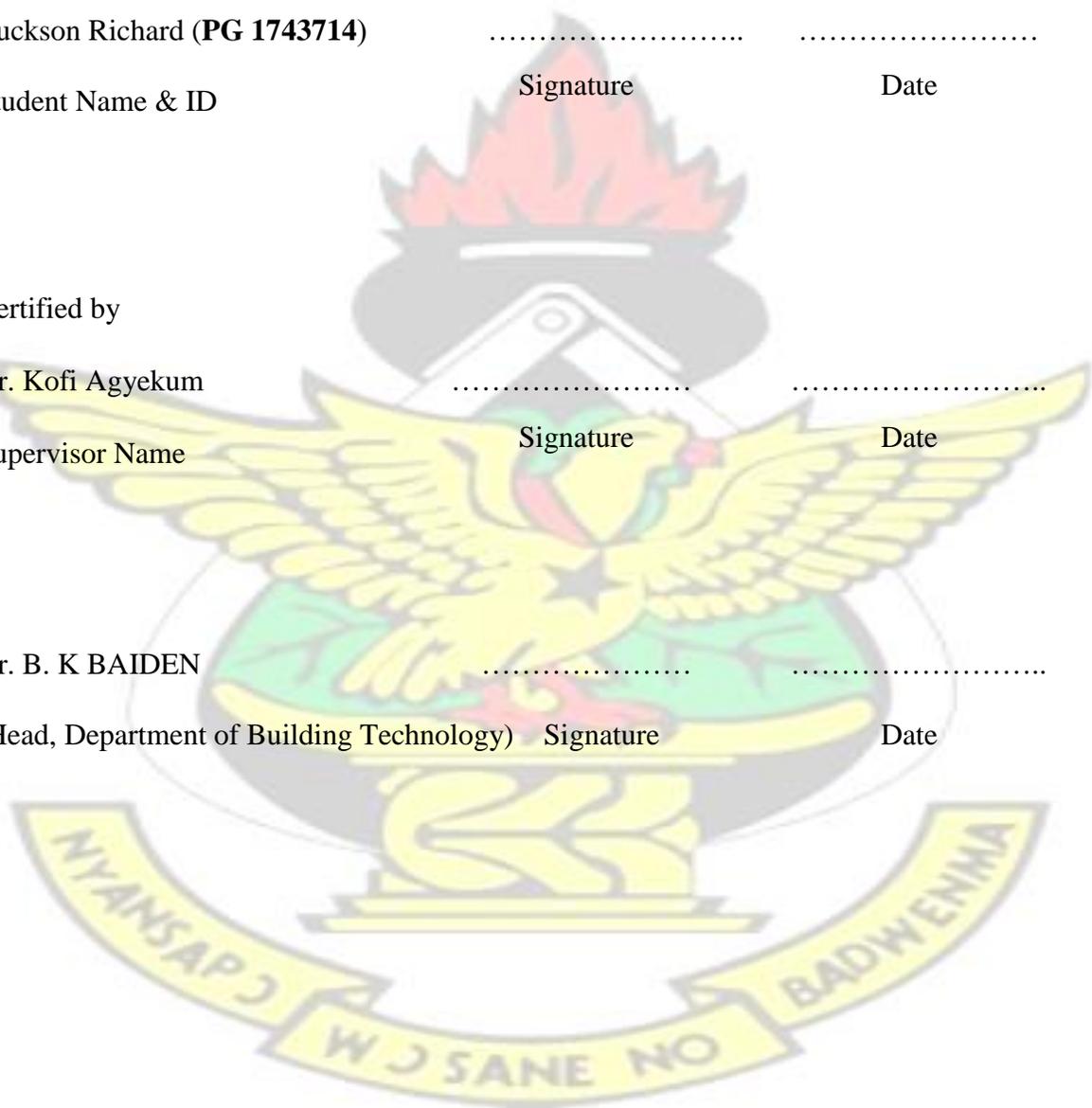
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Date



DEDICATION

This work is dedicated to God Almighty and for His support through this study.

I also dedicate it to my dearest wife Faustian, my children Keziah and Samuel Buckson.



ACKNOWLEDGEMENT

My sincere thanks go to Almighty God who kept me throughout the course and gave me success. I wish to express thanks to my supervisor, Dr. Kofi Agyekum for his contribution towards this project work. My dear wife, Faustian who has been a support and encouragement. My last thanks goes to Mr. E. Sackey Addo, a Senior Quantity Surveyor of Sacnip Ltd for his support and advice.

May the Almighty God Blessed you all.



ABSTRACT

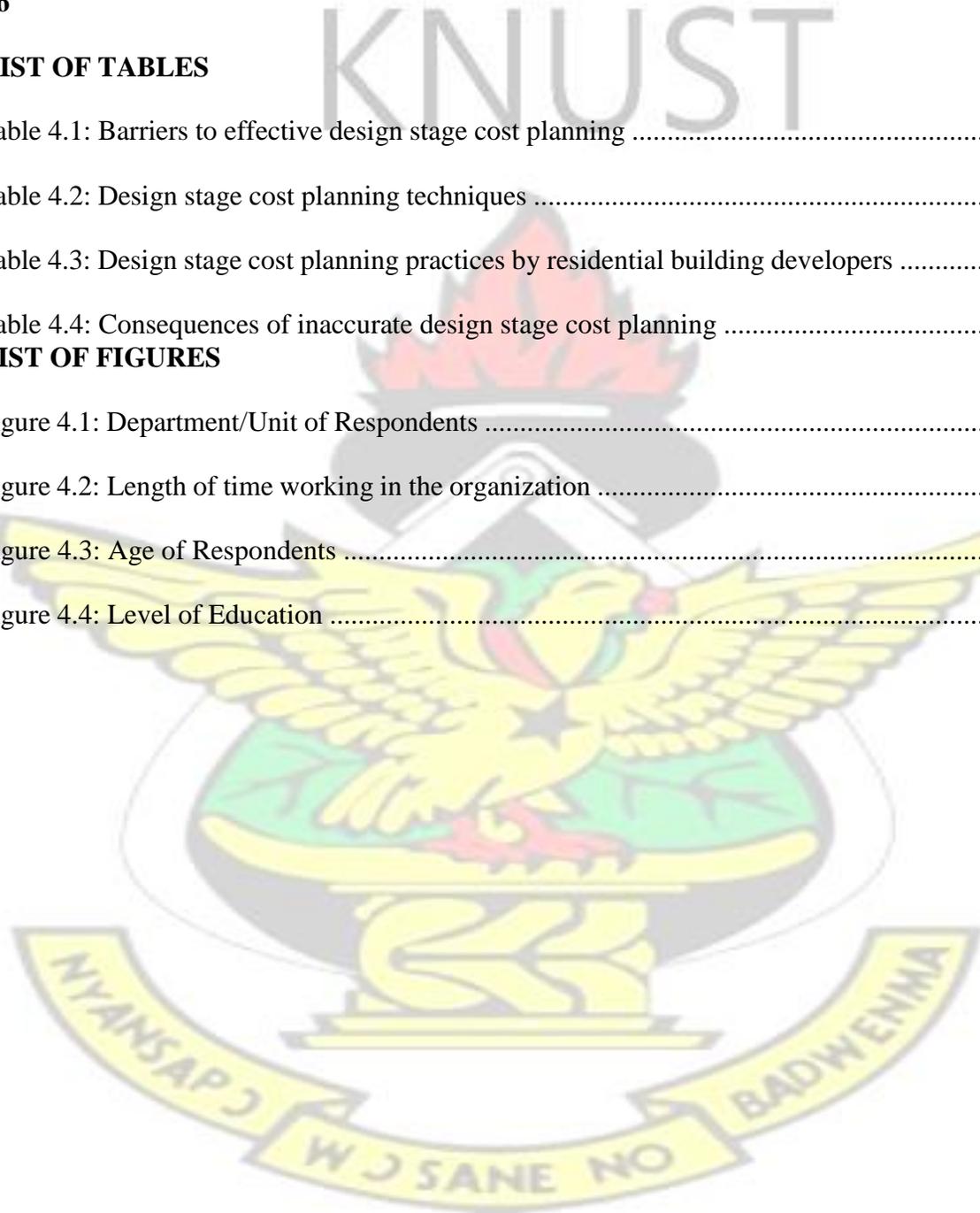
The purpose of the study was to identify the barriers to effective design stage cost planning for residential buildings, identify the methods adopted in estimating the design stage cost for residential buildings and ascertain the consequences of inaccurate design stage cost planning for residential building projects. Data was gathered over 127 respondents and was analysed using descriptive statistics. The study found that the common estimation techniques employed by the residential building developers are; cost review and update technique, expert opinion and trend analysis. The study also demonstrated that residential building developers are exposed to many factors that hinder the effectiveness of design stage cost planning. The factors identified included; complexity of contract structure, late contractor involvement in design, inadequate funding, poor project intelligence, poor use of technology, economic issues such as interest rate, inflation, depreciation of the cedi etc, inflexible design, procurement policies that discourage competitive negotiation, low skill staffs and conflict between project parties. The inability to find solution to these challenges results in delay in the completion of projects, increase in original cost and ineffective scope control. The study recommends that there must be an alternate course of action for likely changes in design stage cost. Also design stage cost planning ought to take into account a progression of cost holding classes fitting for the specific task plan. The aggregate estimation of the target costs should not surpass the general confirmed spending arrangement for the project.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The intention of every prospective client that is interested in building a residential house requires acquiring development work in the most successful way. At the end of the day the customer is attempting to accomplish the most elevated worth for cash. This goal can be achieved through an effective and efficient design stage cost planning procedure. The most important management process for the control of overrun cost, thereby getting the most benefit to the client within client agreed budget is to plan the design stage cost. It is especially pivotal as choices made amid the early phases of the project procedure have far more noteworthy financial outcomes than the generally restricted choices which are made later simultaneously

Design stage cost planning maybe defined as any system of bringing cost advice to bear upon the design process (Seeley, 1996). Saroop (2009) also defines design stage cost planning as controlling the cost of a project within a predetermined sum during the design stage, and normally envisages preparation of a cost plan and the carrying out of cost checks. According to Kwakye (1997) design stage cost planning is a generic term describing the various methods adopted to shape the design stage construction project's budget progression.

Accurate design stage cost planning optimizes great contracting and additionally the procedure of computing and breaking down every one of the expenses that will be caused at the configuration stage. General precision is constantly vital as figures outside of the scope of

evaluated costs can be considered futile and unsafe. Liu and Zhu (2007) report that the exactness level of design stage expense evaluations is a standout amongst the most pivotal pointers of viable estimation. On account of thinking little of the customer may get an unpalatable stun when the tenders are definitely altered upwards. On the off chance that the evaluation is an overestimation, then the estimator may lose the employment or lose the customer's certainty. Although design stage cost accuracy is the ideal situation, Seeley (1996) indicates that initial design stage cost planning is fraught with many inaccuracies. According to Saroop (2009) about 80% of projects worldwide are already over budget by the time construction commences on site, but ignorance of that fact allows the projects to go ahead. This necessitated an investigation into the barriers affecting design stage cost planning for residential houses development in Ghana.

1.2 Problem statement

A principal question that is normally asked by planned customers that are keen on a building a residential facilities is 'the cost of construction?' Although the main role of the amount that will be given by the designer is to give a sign of the likely cost of the building, it stays crisp in the psyche of the customer all through the period prompting the realization of his thought. The assessment will likewise give the premise to the customer's subsidizing courses of action, planning and control of the development costs. Be that as it may, history and day by day backgrounds present situations where outline stage expense arranging have brought about fiascoes, particularly as to building undertakings where cost and calendar invades are common. The consequence of this is the myriad of uncompleted residential buildings all over the country. There is a general accord by building researchers that the level of exactness accomplished in design expense assessment is lower than alluring (Clough, 1986; Ling and

Boo, 2001). This suggests that there are some barriers to effective design –stage cost planning in the construction industry which is making accurate prediction of cost a daunting task. This study therefore attempts to investigate these barriers and find ways of addressing the issues.

1.3 Aim of the study

The study seeks to identify the barriers to effective design stage cost planning for residential building, identify the methods adopted in estimating the design stage cost for residential buildings and ascertain the consequences of inaccurate design stage cost planning for residential building projects

1.4 Objectives of the study

The specific objectives of the study are;

1. To identify barriers to effective design stage cost planning for residential buildings
2. To identify the methods adopted in estimating the design stage cost for residential buildings
3. To ascertain the consequences of inaccurate design stage cost planning for residential building projects

1.5 Research question

The accompanying exploration inquiries were asked by the study;

1. What are the barriers to effective design stage cost planning for residential buildings?
2. What methods are used in estimating the design stage cost for residential buildings?
3. What are the consequences of inaccurate design stage cost planning of residential building projects?

1.6 Scope/ Delimitation of the study

The respondents chosen to take part in the study was confined to firms in the Greater Accra Region because of time and budgetary requirement.

Likewise the study was directed just on residential structures. The decision of residential structures is on the grounds that they are the commonest and the most requested type of development because of their vital significance to the monetary and economic wellbeing of individuals.

Finally the research variables considered were restricted to Architectural and Quantity Surveying. In this way, detail ramifications of auxiliary, mechanical and electrical designing administrations were not considered in this study.

1.7 Significance of the study

The study is noteworthy in the following ways;

1. The discoveries of the study will enhance the exactness level of design stage cost assessments. This research study will establish the scope and methodology of cost estimation function benefit for a wide range of construction businesses. The study will avail designers with the requisite requirements for giving more impartial cost guidance to their clientele throughout the initial phase of the project.
2. The study will help planners in comprehending the cost ramifications of design variables, so they can settle on more precise design choices amid the early periods of a residential building task, particularly in the determination of the most temperate design from a few choices.

3. Furthermore, the study will add to the current scholarship on design stage cost planning for residential buildings as the outcome of the study could be depended upon by academicians and other industry players as a wellspring of reference material for further studies.

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1.8 Organization of the study

The study is structured as follows:

Chapter one (1) is the introduction and it covers background of the study, problem statement, objectives of the study, research question, scope of the study, the significance of the study, and the organization of the study.

Chapter two (2) is the literature review and it discusses both theoretical and empirical literature related to the study. Thus the chapter discusses the existing literature on design stage cost planning in the construction industry.

Chapter three (3) covers the research methodology that was used to conduct the study. The chapter outlined the research design, population, population, sample size and sampling procedure, data collection instrument, data analysis, reliability, validity, ethical consideration etc.

Chapter four (4) presents the data collected and its analysis. It further discuss the data in relation to the literature review. The discussion indicates whether the finding is in agreement with earlier studies or not and if not what are the reasons underlying the divergence of findings.

Chapter five (5) is the concluding chapter and it captures and unfolds a summary of the findings and makes recommendations as well as concluding thoughts.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The drive behind this review is to provide an overview of the literature focusing on design stage cost planning and its challenges. It delivers theoretical as well as empirical literature relevant to the research study. The theoretical literature deliberates on; the activity theory. The empirical literature covers; cost planning, design stage cost estimate, principles guiding design stage cost estimation and design stage cost estimation techniques

2.2 Theoretical Framework

The foundation theory underpinning the study is the activity theory. Activity theory projects that activities of human beings are affected by economic, social and cultural factors from internal and external sources. The aim for selecting activity theory is that it aims at highlighting potential issues that affect the success or otherwise of a task or project such as design stage cost planning.

2.2.1 Activity theory

The activity theory is a cross investigative hypothesis for contemplating man as a performer in a socio- social, chronicled context. It is taking into account the thought of the double procedure of man and ancient rarities forming and being molded by societal and corporeal setting (Cole, 1996). This hypothesis is ancient rarity intervened and object-oriented activity (Vigotski, 1997). The connection between human operators and objects of environment is mediated by social means, tools and symbols. Activity theory may offer a conceptual

framework to portray the structure, advancement and setting of task such as the design stage cost planning. As opposed to subjective science, which concentrates on the examination of the individual as a different substance, the unit of examination of activity hypothesis is human (work) action. This activity can be portrayed as an action composed at an item that moves the action. The article orientedness states that people live in a reality which is focus in an extensive sense; the thing which constitute this reality have not quite recently the properties which are considered as item as showed by characteristic sciences however social and socially portrayed properties too. The hypothesis of activity places the underscore on the significance considering the setting, just as it is expected that the activity is essentially arranged in communal and corporeal setting. As per Nardi (1996), activity theory do not see cognizance as an arrangement of incorporeal subjective doings, and do not restrict it in mind; however, they see awareness as situated in regular exercise. In this way, human cooperations are considered as social, progressively composed, taking into account mediums. The theory of activity concentrates on the foundation of communications: the procedure of internalizing the apparatuses. The procedure comprises in an aggregate allocation of the instruments, and the compelling utilization. The key components in internalisation process inside of a group are: (i) specialists' discernment; (ii) social communications; (iii) nature of exercises. This procedure of internalisation is connected to the design stage cost planning which is a key principle upon which the study is underpinned.

Vygotski (1997) figured how first thoughts regarding intervention of awareness by appropriating Marxist thoughts regarding how intervene the work activity, the research expanded those thoughts to incorporate the use of psychological instruments facilitate thought. The activity is at that point made out of a subject, and an item, interceded by an apparatus. The participant could be a man or a team occupied with the activity. The subject holds an item

which gives it a specific bearing. The intervention could happen by the utilization of a wide range of sorts of apparatuses.

The activity theory accentuates on social elements and on co-operations in the middle of operators and their surroundings clarifies why the rule of device intercession plays a central part inside of the approach. As a matter of first importance, equipment defines the way human beings interface with the world. What's more, concurring to the rule of internalization /externalisation, forming outer exercises eventually brings about moulding inner one in forming inner ones. Second, instruments for the most part mirror the experience of individuals who have attempted to take care of comparable issues at a prior time what's more, imagined/altered instruments to make it more productive. This encounter is collected in the auxiliary fitting ties of instruments (shape, material) and also concerning the learning in the usage of equipment. Tools are made and changed amid the improvement of the activity itself and convey with them a specific society and chronicled remainders from that development. In this way, the utilization of tools is a method for the aggregation and transmission of social learning. It impacts the nature, not just of outside conduct, additionally on eventual rational working of people (Bannon, 1997). Human activity is interceded by objects-inner and external. These apparatuses may be cues, dialects or machineries. These are made by individuals on impact control, above conduct. Obsolescent have a related society and history and perpetual quality that exist crosswise over time and space.

2.3 Cost planning

Per Seeley (1996) cost planning is a deliberate use of expense criteria to have the capacity to keep up, regardless, a sensible and budgetary association between expense, quality and appearance, likewise, in the second place, such broad control of proposed consumption as

circumstances may exhibit. Therefore, it conceives the readiness of an expenditure planning and the completing of expense forms. Mark (1978) additionally describes cost planning as a framework for checking cost at the configuration juncture such that (a) tender will not surpass preparatory assessment, furthermore, (b) the expenses are developed so as to give the customer best value for his money. In view of the above explanation, cost planning can be said to be essentially a term which will be utilized to depict any framework of bringing cost advice on the design stage. Cost planning can be characterized as an arrangement of coordinating expense based insight into the process of designing.

To extend the worth, cost planning should be in perspective of a movement of expense holding classification legitimate for a particular task plan. Every cost holding category must be allotted an objective cost. The total estimation of the objective cost ought not to surpass the general endorsed spending plan for the task (AAMCoG, 2008). When a design cost plan is set up, the cost holding classifications ought to be persistently evaluated to guarantee that the uprightness of the project spending plan keeps on remaining constant.

Cost planning determines the financial feasibility of the building (Asiedu & Gu, 1998). This is conducted by setting the lifecycle cost plans and cost controls to deal with the design and construction of the project.

Fruitful cost planning is comprised of enhanced decisions in methodology and execution. There's ultimate approach that fits all situations. It's an instance of making the best and most proper decisions to fit the circumstance.

In the construction sector cost planning is utilized as a method for controlling the assessed cost amid the configuration and development periods of the project. That implies that cost planning is living artefacts much the same as undertaking project management plans. They must be overseen all through the lifecycle of the project. In any case, it is an understood

assurance that regardless of the amount of consideration and effort will be place into the preparation of outline stage cost planning; aberrations will be typically detected between the actual cost planning and the last tender cost. The explanation behind this is risk which will be inherent in plan and construction. Whereas it is perceived that the risk elements exist, the customary method for managing them is to make a rate of remittance in type of contingency fund. Effective cost planning will help to guarantee that, once a reasonable assessment is concurred between the gatherings, everything that takes after is as per it, from the contractors tender to the last project cost (Asiedu & Gu, 1998).

2.4 Design stage cost estimate

Forecasting cost at the design stage estimate the aggregate expense of the identified scope of work for the project (Beringer & Weber, 1996). Design stage cost estimates should reflect a general precision characteristic of the level of data accessible when the evaluation was conducted. Project cost estimates will be construct in light of distinguishing, evaluating also, assessing the rate of every resource (e.g. individuals, machines, materials, administrations, property) needed to complete all activities (e.g. engineering, construction, and so forth) comprising suitable stipends for related dangers and vulnerability (possibility), utilizing costs winning at the time the evaluation is readied. To precisely approximate the expenses for the project, an estimator must have the capacity to rationally develop the estimating so as to undertake the expenses utilizing costs winning at the time the appraisal is readied. The essential reason for design stage cost estimate is to give a premise for creating , altering , or assessing a task spending plan. It is vital segment of the construction case, because it is the premier archive to legitimize the capital allotment. The significance of exactness and culmination in cost evaluating for residential buildings can't be exaggerated

Poor estimates result from numerous components, especially appraisals planned in fragmented manner, the inability to reflect prices at the current rate at the time the assessment is being conducted (either downplaying or exaggerating them), and an absence of sufficient risk appraisal may affect the correctness of the estimate (Blanchard & Fabrycky, 1990)

Most clearly, it can be troublesome or difficult to convey projects that have been customized furthermore, dedicated to if early estimate end up being fundamentally low. Then again, when early appraisals end up being essentially overrated, it may prompt cutting down in the funding plan, thereby making it daunting to achieve the set targets. Presently, in the financial atmosphere of limited funding, the weight placed on precisely estimating a definitive project cost is swelling.

Cost estimate thus is a basic component against which the accomplishment of a private building is measured. An exact and complete cost estimate goes a long way toward supporting the productive consummation of the project inside of its attested spending arrangement. Adopting a consistent approach and methodology in the design stage cost estimate process facilitates the efficiency, exactness, validity, and reliability of cost estimates (Blanchard & Fabrycky, 1990). It additionally improves the capacity to alter and think about assessments at different periods of the project life cycle. Notwithstanding when the estimator utilizes a reliable and intricate system, watchful consideration is obliged to guarantee exact expense projection. It is obligatory for the estimator to research, contrast and utilize its expert keenness with set up a suitable cost estimate.

2.5 Principles guiding design stage cost estimation

According to Boussabaine, and Kirkham, (2004) the following should guide design stage cost estimation of residential projects;

1. Quality

Residential project cost estimate ought to be done by people with expertise in assessing residential building constructions utilizing industry perceived, repeatable, and defensible practices (Bremer, 2009).

Those who estimate cost ought to be:

- Working out a conclusion to the evaluation and the presumptions done when formulating the design stage cost
- adopting proper quality control into the evaluating procedure
- deliberating and evaluating risk and instabilities of the project
- offering the assessment in an understanding manner
- The estimator should be capable to safeguard the estimate what's more, the premise for the choices and assumptions

2. Integrity

Project cost estimate ought to be planned utilizing a high standard of proficient and moral honesty. Taken a toll estimation ought not be arranged by any person who may be, or may be seen to be, in irreconcilable situation. Adding to the assessment through a transparent process, and introducing it in a manner that is caught on.

3. Interdisciplinary Experts

The design stage cost estimation ought to be in a perfect world, created in discussion with talented, interdisciplinary specialists, and not in disengagement (Boussabaine & Kirkham, 2004). Working with such mastery is particularly basic when the endeavour degree is least described. Where possible project cost assessments should be organized using a gathering methodology, using dominance from suitable faculty for the real project perspective (e.g. engineers for design parameters; property cost master and so on. Interdisciplinary specialists ought to moreover study the task scope, goals besides, to guarantee that the undertaking is surely known. Where sober minded, a field review should be coordinated with the gathering of specialists, before the readiness of the examination. Meeting with outside organizations may additionally be required, particularly for work that is interesting or not typical anomalous.

4. Current information

Project cost estimate should be in perspective of the best, most finish information open on the undertaking as at the time the evaluation is being directed (Boussabaine & Kirkham, 2004). An unmistakable and brief degree clarification perceiving especially what is consolidated, and what, if anything, is excluded in the expansion of work for the endeavour is possibly the most discriminating component for setting up the expense estimate (Boussabaine & Kirkham, 2004). Project cost appraisals should constantly reflect the entire degree of the work. Most of the parts critical to complete the undertaking must be considered, nearby an expense segment for each which respects the quality and precision of the data open, the geographic area of the building, the eccentricities of the work, and the expenses existing at the time the examination is

directed. The vulnerabilities and dangers joined with the work must be meticulously considered to set up suitable possibility.

5. Contingency

Design stage cost estimate should dependably incorporate possibility to cover certain instabilities and risk. Contingency is all things considered appreciated to be a measure of money added to an evaluation to take care of certain expense which are not known decisively at the time the appraisal is begun, on the other hand, which will probably happen in the midst of the life of the project. It is proposed only for the augmentation as described in the assessment, it is not wanted to cover extension changes. In a perfect world the entirety should be resolved through a danger examination of the things of work inside of the project utilizing the master judgment of both the estimator and the undertaking staffs, instead of just adding a pre-decided standard to the base expense (Boussabaine & Kirkham, 2004).

Contingency ought to be surveyed and included in each assessment and each money related arrangement. It is a plainly clear cost to the undertaking. It is not "padding" and it should sensibly be depended upon to be eaten up as the undertaking creates. Building up the measure of possibility is a piece of the assessing technique. It progresses with the level of task revolvment. Amid the early periods of a task when the thought needs sufficient definition, possibility could be by and large high, by then as the undertaking advances and the configuration is further characterized, the possibility ought to minimize with every repeating expense gauge. The crucial aide is that the measure of possibility changes once in a while, getting to be lower, as the project mindfulness and condition of undertaking improvement expands (Boussabaine & Kirkham, 2004).

Watchful thought ought to be given in choosing the aggregate of probability. An expense gauge which does not contain enough plausibility may bring about a task proceeding without agreeable spending arrangement, as needs be jeopardizing the accomplishment of the project (Breemer, 2009). Also as key, estimators must get ready for setting a great deal of plausibility in an expense gauge. An assessment that contains an excessive amount of possibility will be exaggerated; such gauges can unfavourably influence project choices (Breemer, 2009).

Contingency will be frequently the most dubious component of developing creating the cost estimate. Project financiers and project owners frequently challenge the estimator on the exact contingency that must be put on the project. While project supervisors are regularly attentive of completely uncovering the contingency in request to maintain a strategic distance from project overwhelps. It will be critical for project owners to commonly move in the direction of full, open and declaration of contingency.

6. Review of estimates

Project cost estimates appraisals ought to experience intermittent reviews by adroit, outsider operators to favour the expense gauge. This is particularly basic for greater tasks where the evaluations are uncommonly perplexing and as often as possible subject to basic examination. Every evaluation is taking into account the individual assessment, perspectives, and understanding of a specific estimator. An autonomous body looking the evaluation will manage the cost of project administrators and choice creators a chance to catch an alternate point of view (a second conclusion), and give certifications per the nature of assessment.

These reviews are in addition fundamental to ensure that any movements to the conditions and shrouded suppositions for the first evaluation are fittingly reflected in following appraisals.

For less baffling exercises, this review could be driven by autonomous work force experienced

in undertaking development and conveyance or maybe different individuals from the task outline firm who were not included in the first gauge. For greater, more mind boggling projects, such reviews may be finished by contracted independent qualified untouchable estimators.

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2.6 Design stage cost estimation techniques

The common technique used for estimating design stage cost include: Bottom-up technique, Specific Analogy technique, parametric technique, Cost Review and Update technique, Trend Analysis technique and Expert Opinion technique (Christensen, Sparks, & Kostuk, 2005).

1. Bottom-up technique

Bottom-up technique is generally finished with work decree and set of drawings known as working drawings or particulars to "take of". It is a count of costs which is done considering work breakdown structure (WBS) (Christensen et al., 2005). From the expense mulled over, direct work, equipment and overhead costs are resolved and added to the material cost. Development project can be pre-chosen and expected. The appraisal is arranged by isolating the work in an effective and predictable reason (Christensen et al., 2005). The foundation for a compelling assessment relies on strong conspicuous evidence (flight) of the expense of the distinctive materials included in the undertaking.

The advantages of bottom up technique are that;

- (i) It gives a detailed estimate, the cost of each item can be determined
- (ii) Cost can be controlled and it can be used for job schedule.

The disadvantages of bottom up technique are that:

- i. It is time consuming because of the numerous items involved and it involves the use of wide documentation.

2. Specific Analogy technique

This strategy relies on known expense of a item utilized in the past however, later development as a premise for determining the expense of comparable item in another development (Christensen *et al.*, 2005). An evaluation of expenses in light of recorded information of a comparative item. It is a calculated assessment giving rough idea of cost.

Conformities are normally made to the known expenses to make up for differences in relative complexities of design.

The relationship system contrasts another or proposed framework and one comparable to (i.e., comparative) framework, that was ordinarily gained in the later past, for which there is precise expense and technical information (Cole & Sterner, 2000). There must be a sensible association between the proposed and "evident" system. The estimator comes out with a subjective evaluation of the complexities between the new arrangement of interest and the credible system. The relationship strategy should regularly be per framed ahead of schedule in the expense assessing procedure, for example, the pre - Breakthrough A and Milestone A phases of a project. This is ahead of schedule in the life of a potential securing project when there may be a set number of chronicled information focuses and the cost estimator may be managing innovation encountering fast technical change.

Advantages

- (i) Estimating by analogy may be the best technique for estimating the cost of state-of-the-art systems
- (ii) The analogy strategy has a tendency to be moderately dependable, quick and reasonable method for evaluating expenses
- (iii) It is a faster method of estimating than bottom-up.

Disadvantages

- (i) A key drawback of the analogy system is the subjectivity inalienable in evaluating the expense of the specialized and different contrasts between the authentic thing and the new thing.
- (ii) (ii) The estimates tend to be less accurate

3. Parametric technique

This requires chronicled information in view of comparative structures. Information is gotten from the chronicled data or is created from building a model situation. Authentic examination is performed on the data to find associations between expense drivers and other system parameters, for instance, blueprint or execution parameters (Cole & Sterner, 2000). The examination produce cost comparisons or expense assessing associations that can be used autonomously or accumulated into extra complex models. This procedure is significant exactly when the information available is not especially positive. Outline is unit taken a toll (length for trenches, square meters for tiling or cubic meters for space).

Advantages

- (i) It spares substantial time that would be squandered in itemized assessment
- (ii) Information acquired can be tried.
- (iii) This strategy can compensate for missing information where satisfactory information on task is definitely not accessible.

Disadvantages

- (i) Not as reliable as definite appraisal.
- (ii) The assessments determined are not as exact as bottom- up appraisals. (iii)
Can't be utilized at the last estimate

4. Cost Review and Update technique

An evaluation is developed by looking at past appraisals of the same inward plans, scope culmination, assumptions and evaluating system utilized and redesigning them with changes because of contrast in time (Cole & Sterner, 2000). Interest rate, inflation rate, and exchange rate also, other monetary components that might affect costs over the long haul are considered.

Advantages

- (i) It is speedier than bottom- up strategy.
- (ii) This strategy is useful for planning evaluation.

Disadvantages

- (i) Precision of assessment relies on the exactness of the past evaluation.

- (ii) This system is mistakenly expecting that just financial variables can influence costs.

Political elements, social components like language hindrance what's more, social contrast, technological factor, legal factor, environmental factors and safety factors can also affect costs.

5. Trend Analysis technique

This method adopts the use of Contractor Efficiency Index (CEI). A Contractor Efficiency Index is gotten by looking at initially anticipated contract costs against genuine expense on work performed to date (Christensen et al., 2005). The record is utilized to conform the expense appraisal of work not yet finished. It is an estimate of expense in light of the pattern in the development part. In development pattern investigation is a numerical strategy that uses authentic results to anticipate future result. This is accomplished by following fluctuations in expense and timetable execution. Pattern examination can be done graphically or through regression.

Advantages

- (i) May be utilized for rough order of magnitude (ROM) estimate
- (ii) Alluring where pattern is unsurprising.
- (iii) Quick technique for assessing.

Disadvantages

- (i) It is definitely not a solid evaluation especially for last estimate.

- (ii) Patterns are not effectively anticipated.

6. Expert Opinion technique

This system is generally used when other strategies are definitely not accessible (Christensen *et al.*, 2005). Diverse experts like contractors, tillers, rooftop experts and so forth are reached over and again until a cost estimate is reached. Sentiments of experts are looked for on the project to get a reasonable appraisal. Expert assessment as a method of estimation is subject to litigation and arbitration concerning construction works (Christensen *et al.*, 2005).

Advantages

- (i) Gives estimate that can't be gotten by different methods.
- (ii) Spares time and expense.

Disadvantages

- (i) Precision of appraisal can't be tried.
- (ii) It is just in light of individual judgment of experts

2.7 Barriers to effective design stage cost planning practices

Events of poor design stage cost planning in construction projects are because of different elements. Kaming *et al.* (2007) work shows that main considerations thwarting the adequacy of configuration stage expense arranging are materials cost expanded by swelling, off base amount take-off, work expense expanded because of environment confinement, absence of experience on project area, absence of experience of undertaking sort, eccentric climate conditions, and absence of experience of local regulation. Chang (2012) study reports of two

purposes behind incapable configuration stage expense arranging; proprietor solicitation of changes in extension and extra works. While in Koushki et al. (2005) study on private tasks, the principle patrons' variables are foreman related issues, material-related issues, and proprietors' monetary requirements. Enshassi et al. (2009) contemplated development projects indicating that primary variables are augmentation of materials costs, delay being developed, supply of rough materials and rigging by foremen, instabilities in the cost of building materials, unsettlement of close-by cash, wander materials forcing plan of action by a couple of suppliers, resources constraint (funds and related partners, not arranged), nonattendance of cost organizing/seeing in the midst of pre-and post-contract periods, moves up to standard drawings in the midst of the advancement stage, design changes, and off course sum take-off. Nawaz et al. (2013) directed an overview among construction experts, builders, engineers, outline creators, suppliers, and subcontractors in Pakistan and distinguished 10 principle variables which repress powerful plan stage expense arranging: defilement and pay off, political intrigues, poor site administration, delay in site activation, unbending mentality by advisors, additional work without approbations, successive changes amid execution, gold plating, wellbeing and wellbeing, and restricted access to occupation locales. Park and Papadopoulou (2012) reported that most critical reasons for compelling design stage cost arranging in framework projects experienced in Asia are contract recompensed to the least bidder, insufficient site examinations, unanticipated site conditions, lacking predevelopment study, and mistaken evaluations.

2.8 Consequences of inaccurate design stage cost planning

Two main consequences are encountered with regard to inaccurate design stage cost planning: cost overrun and schedule delays (Boussabaine & Kirkham, 2004). Cost overrun is the

measure of cash exhausted on a task at the finish of the occupation that surpasses the beginning undertaking expense gauge. Cost overrun can be just characterized as the distinction between the last, finished expense of a project and its beginning expense gauge (Boussabaine, & Kirkham, 2004).

Overruns by and large happen when there are imperfect introductory outlines and/or changes in the extent of the undertaking as it advances. Imperfect introductory outline just means lacking or off base arranging and skewed conceptualization. The after effect of a project that has gone over spending plan may be a deficiency of stores and/or conceivable cancelation or deferral of one or numerous different undertakings. In the event that this proceeds for duration of time, cost overrun could influence various undertakings, bringing about budgetary pandemonium and the decay of base. More issues would likely emerge, for example, where cash will originate from for future task improvements and the degree to which can acquired capital be minimized and required activities finished immediately. Schedule delay is the time stretched out from the first anticipated consummation date to the genuine date of finishing. Schedule delay can come about because of various variables and can happen whenever amid undertaking development. Some of these issues are design based, running from broken plans to ROW complexities. Schedule delays are time requirements that reliably cause increments in expense, either through punishment statements, squandered time and exertion, or both.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

This chapter is keen to the depiction of the methodologies used in collecting data and the presentation of the data. This includes the research design, population, and sampling and sampling procedure, instruments, data collection and data analysis procedure. The main object of this study is seek to establish barriers to design – stage cost planning practices in the construction industry of Ghana.

3.1 STUDY AREA

The study was based on registered Architectural Firms and Quantity Surveyor Firms in Accra. These are construction professionals who start the building process. Again most clients seek the services of these professionals in their building project. In certain instances the architect is made to develop the client request then the services of the cost consultant are sought.

3.2 RESEARCH DESIGN

To do a powerful appraisal or assessment of a study, one needs to receive proper examination plan. As per Powell and Connaway (2004), examination configuration alludes to the methodologies encompassing the utilization of various routines for directing an exploration study as needed by distinctive endeavors to accomplish a high level of dependability and legitimacy. An examination outline is hence general arrangement for getting responses to the exploration inquiries being concentrated on (Polit & Beck, 2008). It is the philosophical supporting to the exploration approach. Exploration outline depicts how a study is directed to boost control over variables that could meddle with the wanted result of a study (Burns & Grove, 2005). Case of examination outlines incorporates contextual investigations, reviews, expressive, causal, exploratory and so forth. With respect to this study, a cross-sectional study

outline was utilized. This system was picked as information was gathered on a study populace at a specific point in time.

Moreover, the study utilized a quantitative exploration outline. The point is to make right expectations, as Worrall (2000) explains, one reason that quantitative examination appreciates across the board uplifted admiration in the control "lies in the prescient preferences this strategy for request has. Greater part of studies directed in the zone have used quantitative methodology on the grounds that quantitative information have been suggested for its objectiveness (Bowling, 2005).

3.3 POPULATION

The populace is the complete totality of all subjects (Polit and Beck, 2008). Bryman et al (2003) depict a study populace as the entire gathering that the exploration concentrates on. Therefore, population is a group of people from which individuals are chosen for the study purpose. The Greater Accra Region has 142 and 32 registered Architectural and Quantity Surveying firms respectively and this number forms the targeted population of the study.

3.4 SAMPLE AND SAMPLING PROCEDURE

Seidu (2007) posit that to study a whole population in order to arrive at generalizations would be impracticable. Therefore, it becomes more convenient to study a portion of the population in order to make inferences and generalize to cover the entire population.

In determining the sample size, Yamane's formula was used. The sample size is based on the projected population size of (n=174), using the formula; $n = \frac{N}{1+N(e)^2}$ n – The sample size N- The population size e- The margin of acceptable error is estimated at 0.05

$$\begin{aligned}
 \text{Total sample size (n)} &= [174 / (1 + 174 (0.05)^2)] = [174 / (1 + 174 \times .0025)] \\
 &= [174 / 1 + 0.355] \\
 &= [174 / 1.355] \\
 &= 127.41 \\
 &= 127
 \end{aligned}$$

Based on the above, the appropriate sample size selected for the study was 127

The simple random method was utilized as a part of selecting the respondents for the study. The decision of utilization of simple random sampling system is to guarantee that every one of the respondents have equivalent possibility of being chosen as a feature of the members for the study.

3.5 DATA COLLECTION INSTRUMENTS

The study made use of both primary and secondary data. Primary data refers to data collected properly and exclusively for the study. It has the advantage of relevance. Primary data was solicited by utilizing a self-developed questionnaire.

The questionnaire was presented in a very neat and attractive form since it is generally believed that the beauty of it enhances its acceptance and corporation by respondents though conscious of the fact that, people generally recent completing questions. In designing the questionnaires, care was taken to relate questions to the research topic. The questionnaire was mainly close ended and open ended questions, some of which required a simple tick while others allowed respondents to make personal comments and state their opinion.

Questionnaire completion was voluntary from the professional and also, they were highly motivated to contribute their quota to establishing the barriers to the cost planning practices.

The questionnaire provided appropriate responses to the research questions which had close ended and open ended questions. This enabled the researchers to generate a number of different responses.

Secondary data was collected from existing books, the internet, and other bulletins so as to acquire past information or knowledge in the field.

3.6 DATA COLLECTION PROCEDURE

The questionnaires were administered to a sampled size of registered Architects and Quantity Surveying firms within Accra. All these firms responded within five days. The completed questionnaires were numbered serially, edited and tabulation of data was done, also quantitative methods were used in analyzing field data. It involved; tabulation, description and interpretation of the field data.

3.7 DATA PROCESSING AND ANALYSIS

Considering the objective of the study and the nature of the research population the questionnaires secured as guidelines for the researcher in the data presentation and analysis of the study. Information acquired from the questionnaires was analysed. The data were analyzed using the Statistical Package for Social Science research software (SPSS version 18). The data collected was sorted, coded and analyzed using descriptive statistics (i.e percentages, bar chart, pie chart, etc).

KNUST

CHAPTER FOUR

PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

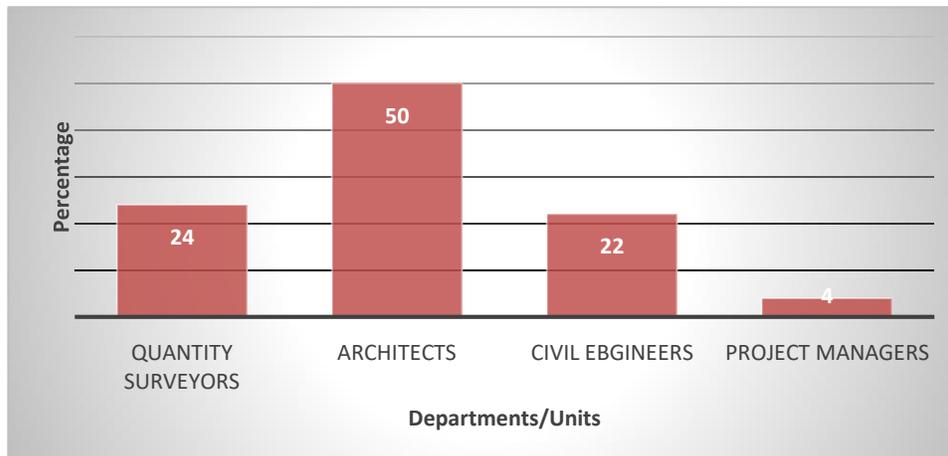
4.1 INTRODUCTION

This chapter analyses and discusses the data gathered in line with the objectives of the study. The analysis begins with examining the demographic characteristics of the respondents, afterward, barriers to design stage cost planning practices, followed by design stage cost planning techniques, followed by design stage cost planning practices and lastly the consequences of inaccurate design stage cost planning.

4.2 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

4.2.1 Department/Unit of Respondents

Determining the sort of respondents that shared in a study, helps in figuring out if they were learned witnesses in the study region henceforth this information was looked for and Figure 4.1 presents the information.



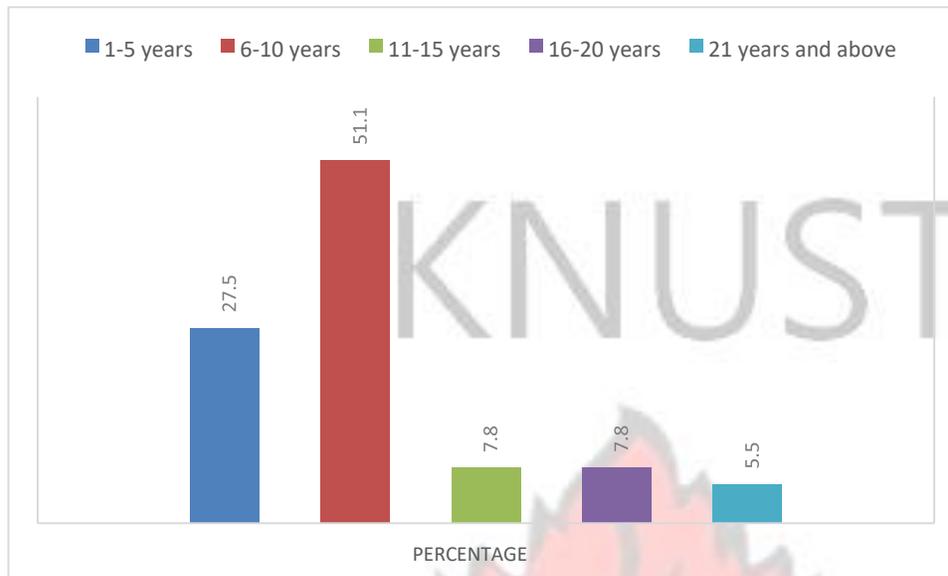
Source: Data Survey (2015)

Figure 4.1: Department/Unit of Respondents

As shown in Figure 4.1, half (50%) of the respondents were architects, 24% were quantity surveyors, 22% were civil engineers and 4% were project managers within the firms. The category of respondents indicate that all the respondents were involved in one way or the other in design stage cost planning. This suggests that varied response from the respondents was ascertained for the analysis of the study.

4.2.2 Length of time working in the organization

To what extent a man has been working in an industry can impact his/her mindfulness on matters in the business subsequently the study asked from the respondents to what extent they have been working in the business and the information is displayed beneath.



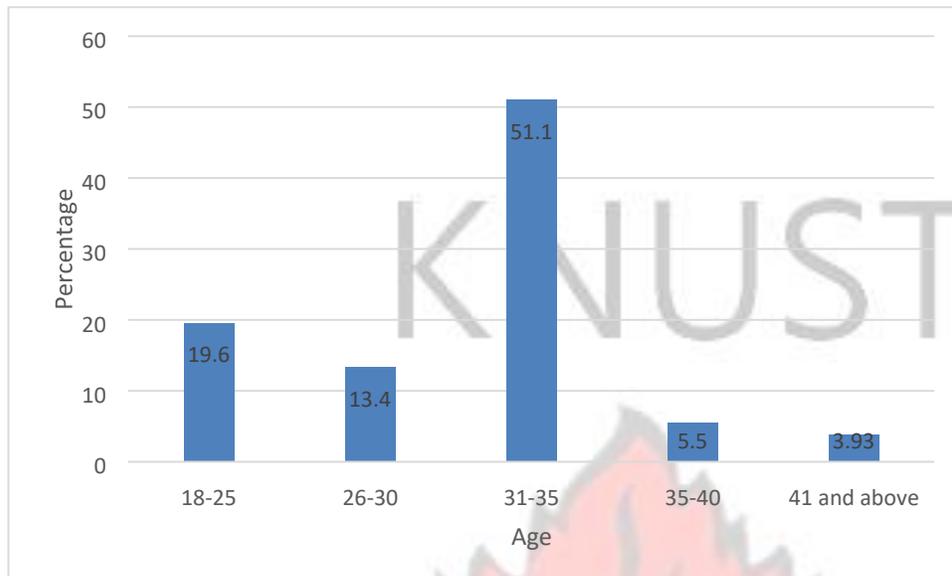
Source: Data Survey (2015)

Figure 4.2: Length of time working in the organization

From Figure 4.2, majority (51.1%) had worked in the construction industry between 6-10 years, 27.5% between 1-5 years, 7.8% between 11-15 years, 7.8% also between 16-20 years and 5.5% for more than 21 years. From the above data, all the respondents have been working in the industry for a long time and thus could be said are aware of what goes into design cost planning practices and its barriers.

4.2.3 Age of Respondents

The age of a man can impact his comprehension of an issue consequently the study looked for the age conveyance of the respondents and has displayed the information underneath.



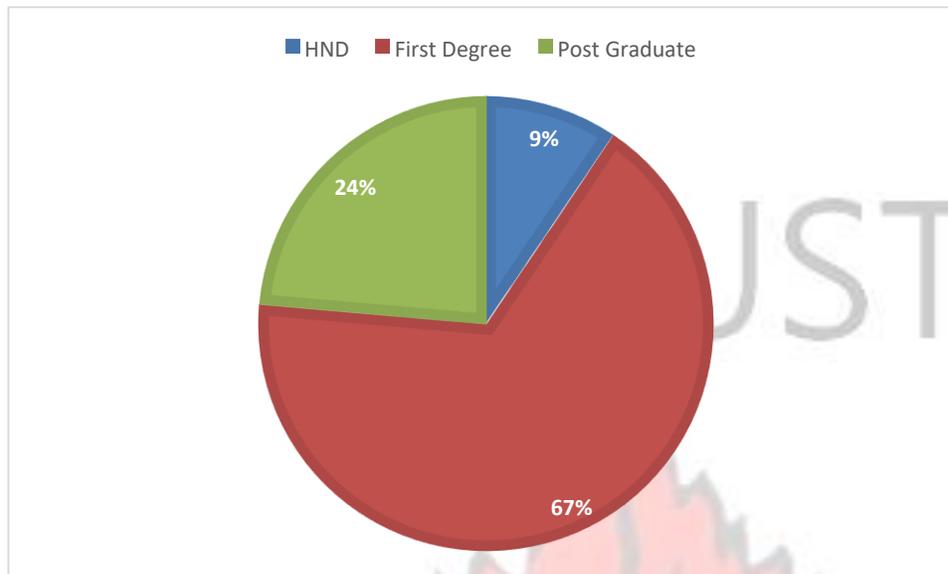
Source: Data Survey (2015)

Figure 4.3: Age of Respondents

Figure 4.4, clearly indicates that majority (51.1%) of the respondents were in the age range of 31-35 years, then after 19.6% were found to be the age group 26-30 years and 18-25 years. About 5.5% were also in the age group of 36-40 years and 3.93% were in the age bracket of 41 years and above. The age distribution of the respondents suggests that the respondents are all adults and thus are capable of understanding what goes into design stage cost planning of the construction firms.

4.2.4 Level of Education

Education is imperative to how a man sees an issue henceforth the study looked for from the respondents their instructive level and the information is introduced in the Figure beneath.



Source: Data Survey (2015)

Figure 4.4: Level of Education

Majority of the respondents (66.9%) have first degree, 23% have post graduate degree and 9.4% have HND. The finding imply that every one of the respondents have gotten formal education, and along these lines it could be deduced that they possess critical thinking prowess to evaluate the study.

4.3 Barriers to effective design stage cost planning

Although the expectation is that construction firms will conduct effective design stage cost planning, there are some barriers that hinder the attainment of this objective. These barriers were investigated and the data is presented in the Table below.

Table 4.1: Barriers to effective design stage cost planning

Statement	1	2	3	4	5
Complexity of contract structure is one of the reasons why design stage cost planning is poorly conducted	11.8%	21.2%	3.93%	55.1%	7.8%

Late contractor involvement in design is one of the reasons why design stage cost planning is inaccurately done	7.8%	26.7%	-	51.9%	13.3%
Inadequate funding affects how design stage cost planning is conducted	5.5%	5.5%	2.3%	69.2%	17.3%
Poor project intelligence affects the effectiveness of design stage cost planning	7.0%	14.1%	11.8%	51.1%	15.7%
Poor use of technology affects the effectiveness of design stage cost planning	5.5%	7.8%	6.2%	62.9%	17.3%
Economic issues such as interest rate, inflation etc affects design stage cost planning	4.7%	4.7%	3.9%	64.5%	22%
Inflexible design	6.2%	14.9%	-	55.9%	22.8%
Procurement policies that discourage competitive negotiation	11.0%	15.7%	10.2%	52.7%	10.2%
Low skilled manpower	7.8%	28.3%	5.5%	50.3%	7.8%
Risk and uncertainty connected to projects	4.7%	7.0%	1.5%	70.8%	15.7%
Inaccurate evaluation of projects	6.2%	9.4%	5.5%	56.6%	22%
Project fraud and corruption	7.8%	10.2%	3.1%	54.3%	24.4%
Conflict between project parties	7.0%	14.1%	7.8%	53.5%	17.3%

1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Source: Data Survey (2015)

From Table 4.1, 55.% of the respondents agreed whereas 7.8% strongly agreed that complexity of contract structure is one of the reasons why design stage cost planning is poorly conducted. These respondents reported that some project owners come out with complex designs which make the cost estimating very difficult. They often are not sure about the design they want which leads to the designing of complicated structures. This finding is in agreement with similar findings by Chang (2012). The author found that indecision on the part of project owners is the major barrier to effective design stage cost planning. Not all of the respondents agreed that complexity of design is a barrier to design stage cost planning. About 11.8% and 21.2% strongly disagreed and disagreed respectively. These respondents reported that regardless of the complex nature of the design presented by the project owner, there is no excuse on the part of estimators to get the design stage estimate wrong. These respondents

questioned the competency of the estimators rather than putting the blame on the complex nature of the design. This confirms Karming et al (2007) that the main barriers hindering the adequacy of design stage cost estimate are material cost overestimated, off base amount take off, work expense expended because of environment conferment, absence of experience on project area, absence of experience of undertaking sort, eccentric climate conditions, the absence of experienced local regulations.

Further 51.9% agreed and 13.3% agreed and strongly agreed that late contractor involvement in design is one of the reasons why design stage cost planning is inaccurately done. The respondents reported that contractors are often left out at the design stage. Therefore their input is not factored depriving thereof their expectation which could have been tapped to get a more accurate estimate. However, 7.8% and 26.7% strongly disagreed and disagreed respectively that late contractor involvement in design is one of the reasons why design stage cost planning is inaccurately done. These respondents indicated that they involve contractors at the start of the design of the building therefore do not see this as barrier to design stage cost planning.

In addition inadequate funding was reported as a barrier to design stage cost planning; and this was agreed by 69.2%, whereas 17.3% strongly agreed. These respondents equally responded that residential building contractors feel reluctant to invest money into best practices in the industry. They do not invest in training of their staffs therefore there is lack of innovation in the way cost estimation is conducted. But 5.5% strongly disagreed and another 5.5% disagreed that inadequate funding affects how design stage cost planning is conducted. For these respondents they were of the view that funding is adequate for an effective design stage cost estimate as per Enshassi et al's. (2009) contemplation that development projects

indicating that primary variables are augmentation of materials costs, delay being developed, supply of rough materials and rigging by foremen, instabilities in the cost of building materials, unsettlement of close-by cash, wander materials forcing plan of action by a couple of suppliers, resources constraint(funds and related partners, not arranged), nonattendance of cost organizing/seeing in the midst of pre-and post-contract periods, moves up to standard drawings in the midst of the advancement stage, design changes, and off course sum take-off. Also 51.1% and 15.7% agreed and strongly agreed that poor project intelligence affects the effectiveness of design stage cost planning. The respondents reported that because of the lack of investment in skill training of employees in the construction industry, many of them lack the intelligence to conduct proper design stage cost planning. The result is that inaccurate cost estimation is conducted. However, 7% and 14.1% strongly disagreed and disagreed respectively that poor project intelligence affects the effectiveness of design stage cost planning. According to the respondents, staffs are competent on their jobs and thus effective cost estimation is conducted.

Again it was found that poor use of technology affects the effectiveness of design stage cost planning. The poor use of technology was agreed to by 62.9% while 17.3% strongly agreed. Many of the construction firms continue to use manual approach at the design stage cost planning. They do not make use of modern technology to assist in this regard and therefore there is uncertainty about the accuracy of the estimate. But 5.5% and 7.8% strongly disagreed and disagreed respectively that poor use of technology affects the effectiveness of design stage cost planning. These respondents maintained that without technology one can still have an accurate design stage cost estimate hence refuted the assertion that poor use of technology affects the effectiveness of design stage cost planning.

Furthermore 64.5% agreed and 22% strongly agreed that economic issues such as interest rate, inflation etc affects design stage cost planning. The respondents mentioned that construction firms usually get estimation wrong because of economic issues such as inflation. Because most of the materials used in the construction industry are imported, a little deprecation of the cedi increases the original cost estimate of the project. Koushki et al. (2005) reports that the principal barrier to effective design stage cost planning are materialrelated issue, and proprietors' monetary requirements. Enshassi et al. (2009) reports that primary variables hindering effective design stage cost planning are augmentation of materials costs, delay in development, supply of raw materials and gear by foremen, vacillations in the expense of building materials absence of expense arranging/observing amid pre-and post-contract stages.

But 4.7% disagreed and a further 4.7% strongly disagreed that economic issue such as interest rate, inflation etc. affects design stage cost planning.

In addition, 55.9% agreed and 22.8% strongly agreed that inflexible design is a barrier to effective design stage cost planning. These respondents reported that some designs cannot be varied when the need be therefore affecting its cost estimate. But 6.2% and 14.9% disagreed and strongly disagreed respectively that inflexible designs becomes a barrier to design stage cost estimate.

Moreover 52.7% and 10.2% agreed and strongly agreed respectively that procurement policies that discourage competitive negotiation affects design stage cost planning. These respondents mentioned that procurement policies can a times discourage competitive bidding. Due to the lack of competitive bidding no competitive cost estimate is received from other constructors. Therefore project owners take the cost estimates as it's presented to them with their inherent flaws. Park and Papadopoulou (2012) reported that most critical reasons for compelling design

stage cost planning are contract recompensed to the least bidder, insufficient site examinations, unanticipated site conditions, lacking predevelopment study, and mistaken evaluations. But 11% strongly disagreed and 15.7% disagreed that procurement policies that discourage competitive negotiation is not a barrier to design stage cost planning.

About 50.3% agreed and 7.8% strongly agreed that low skill staffs are a barrier to effective design stage cost planning. These respondents reported that some staffs of construction firms lack the skill and ability to conduct an effective design stage cost planning. The resultant effect is the poor design stage cost planning practices adopted by them. But 7.8% and 28.3% strongly disagreed and disagreed respectively that there is low skill staffs in the construction industry. These respondents reported that workers in the construction industry are very much qualified to conduct an effective design stage cost planning.

Furthermore 53.5% agreed and 17.3% strongly agreed that conflict between project parties serves as a barrier to an effective design stage cost planning. Parties may disagree on the scope of the project and this may result in conflicting figures for the design stage cost. But 7% and 14.1% strongly disagreed and disagreed respectively that conflict between project parties serves as barrier to effective design stage cost planning. According to the respondents although there may be conflicting issues between project parties, that does not in any way affect the conduction of an effective design stage cost planning. Chang (2012) study reports of two purposes behind incapable configuration stage expense arranging; proprietor solicitation of changes in extension and extra works.

4.4 DESIGN STAGE COST PLANNING TECHNIQUES

There are various design stage cost planning techniques available to residential developers to choose from. Therefore the study investigated the common technique adopted by the residential developers and has presented the data below.

Table 4.2.2: Design stage cost planning techniques

Statement	1	2	3	4	5
Your organization uses bottom –up technique	15.7%	50.3%	12.5%	14.1%	7.0%
Your organization uses specific analogue technique	23.6%	55.5%	3.9%	8.6%	8.6%
Your organization uses parametric technique	26.7%	51.9%	5.5%	7.8%	7.8%
Your organization uses cost review and update technique	7.8%	10.2%	3.1%	56.6%	22.0%
Your organization uses trend analysis technique	4.7%	11.8%	4.7%	52.7%	25.9%
Your organization uses expert opinion technique	5.5%	9.4%	6.2%	57.4%	21.2%

1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Source: Data Survey (2015)

From the Table above, it can be seen that the bottom –up technique approach is not popular with the respondents. This is because majority (50.3%) disagreed while 15.7% strongly disagreed that they use the bottom –up technique. The reason given largely for it not being frequently used was that the respondents indicated that the technique is time consuming because of the numerous items involved and it also involves the use of different documentation. This assertion of the use of the bottom up technique is shared by Christensen et al., (2005). They went further to state that the bottom up technique is only appropriate in case there is a solid recognizable proof (departure) of the cost of the different materials involved in the project. However, 14.1% of the respondents agreed and 7% strongly agreed to

the use of the bottom up technique. These respondents reported that they prefer the bottom up technique because: it gives a detailed estimate and that the cost of each item can be determined, cost can be controlled and also can be used for job schedule. Also it can be seen that specific analogue technique is another technique which is not commonly used the respondents. This is because majority (55.5%) disagreed and 23.6% strongly disagreed to the use of specific analogue technique. Reasons given for the infrequent use of the method are; there is subjectivity inherent in quantifying the expense of the specialized and difference contrasts between the verifiable thing and the new item and also the estimates tend to be less accurate. . In the view of Cole and Sterner (2000) for specific analogue technique to be effective, there must be a sensible connection between the proposed and "verifiable" framework. About 8.6% agreed and a further 8.6% strongly agreed to the use of specific analogue technique. These respondents indicated that they prefer specific analogue technique because; estimating by analogy is the best technique for estimating the cost of state-of-the-art systems and also the analogy method is more likely to be quite reliable, fast and economical technique of assessing costs. This approach relies on an evaluation of expenses in light of recorded information of a comparative item. It is a calculated assessment giving rough idea of cost.

Further 51.9% disagreed and 26.7% strongly disagreed to the use of parametric technique. In the view of the respondents, this approach is not as reliable as definite appraisal; the assessments determined are not as exact and lastly cannot be utilized at the last estimate. But 7.8% agreed and another 7.8% strongly agreed to the use of parametric technique. In using this technique respondents rely on historical data based on similar buildings. Information is gotten from the verifiable data or is created from building a model situation. Authentic examination is performed on the data to find associations between expense drivers and other

structure parameters. The examination produce cost equations or cost evaluating connections that can be utilized independently or gathered into additional complex models. The benefits given by the respondents that use this technique include; the use of less time in itemized assessment, information acquired can be tried and this technique compensate for missing information where satisfactory information on task is definitely not accessible.

Furthermore the data suggest that cost review technique is a common technique used by the respondents. This is because majority (56.6%) agreed and 22% strongly agreed to the use of cost review technique. With this approach, the respondents reported that an evaluation is developed by looking at past appraisals of the same inward plans, scope culmination, assumptions and evaluating system utilized and redesigning them with changes because of contrast in time. Interest rate, inflation rate, and exchange rate also, other monetary components that might affect costs over the long haul are considered. The benefits for the use of this approach as reported by the respondents include; faster technique as compared to the others and very useful for planning evaluation. However, 7.8% strongly disagreed and 10.2% disagreed that they use cost review and update technique. These respondents alluded to these reasons for the lack of use of this technique; precision of assessment relies on the exactness of the past evaluation and that system is mistakenly expecting that just financial variables can influence costs.

In addition, majority (52.7%) agreed and 25.9% strongly agreed to the use of trend analysis technique. According to Christensen et al., (2005), trend analysis is a common technique due to it is tried and tested reliability. With this approach respondents adopt the use of Contractor Efficiency Index (CEI). A Contractor Efficiency Index is gotten by contrasting initially anticipated contract costs against real cost on work performed to date. The file is utilized to alter the cost evaluation of work not yet finished. The pattern investigation procedure utilizes

chronicled results to anticipate future result. This is accomplished by following changes in expense and calendar execution. The popularity of this technique include; it can be utilized for rough order of magnitude (ROM) estimate, alluring where pattern is unsurprising and lastly it is a quick technique for assessing. But 4.7% strongly disagreed and 11.8% disagreed to the use of trend analysis. These respondents reported that they don't use trend analysis because it is not a solid evaluation especially for last estimate and also patterns are not effectively anticipated.

Lastly 57.4% agreed and 21.2% strongly agreed that they use expert opinion. Different expert opinion from the likes of contractors, tillers, rooftop experts etc. are consulted over and over again until a cost estimate is attained. Sentiments of experts are looked for on the project to get a reasonable appraisal. The benefits of the use of this technique according to the respondents are; it gives estimate that can't be gotten by different methods and it spares time and cost. But 5.5% strongly disagreed and 9.4% disagreed to the use of expert technique. These views is in line with Christensen, Sparks, & Kostuk, (2005) that the common technique used for estimating design stage cost include: Bottom-up technique, Specific Analogy technique, parametric technique, Cost Review and Update technique, Trend Analysis technique and Expert Opinion technique.

These respondents reported that the precision of appraisal can't be tried and also it is just in light of individual judgment of experts which cannot be objective.

4.5 DESIGN STAGE COST PLANNING PRACTICES BY RESIDENTIAL BUILDING DEVELOPERS

The act of design stage cost evaluating is a very specialized and expert control. It includes keeping certain standard practices. Estimators must practice sound proficient judgment at all

times when setting up the design stage expense estimate. As per Seeley (1996), who reported that cost planning is a deliberate use of expense criteria to have the capacity to keep up, regardless, a sensible and budgetary association between expense, quality and appearance, likewise, in the second place, such broad control of proposed consumption as circumstances may exhibit. The study investigated about design stage cost planning practices and has presented the data below.

Table 4.3: Design stage cost planning practices by residential building developers

Statement	1	2	3	4	5
The estimator consider the project scope, the level of effort and resources needed to complete the task ahead	10.2%	11%	7.8%	50.3%	20.4%
The estimator considers alternate methods of construction for the projects.	5.5%	14.1%	9.4%	58.2%	12.5%
The estimator review all sections of the drawings and division specifications	8.6%	8.6%	3.9%	55.9%	22.8%
The estimator develops a good system of estimating forms and procedures that exactly meet the requirements of the project, and that is understood and accessible by all team members.	13.3%	18.1%	5.5%	50.3%	12.5%
The estimator documents all portions of the estimate in a logical, consistent, and legible manner.	7.8%	14.9%	6.2%	54.3%	16.5%

The estimator shows estimating procedures that allow conversion of the estimate to field cost systems so management can monitor and control field activities.	3.9%	17.3%	-	55.9%	22.8%
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1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Source: Data Survey (2015)

From the Table above, half (50.3%) agreed while 20.4% strongly agreed that estimators consider the project scope, the level of effort and resources needed to complete the task ahead. It came to the fore that estimators firstly consider the project degree and the level of exertion and assets expected to finish the undertaking ahead; the firm's monetary ability, staff, and plant ability to finish the task. Estimators consider the time allocated for the development of the undertaking in a joint effort with the proprietor's calendar needs, inspect the general and uncommon states of the agreement and focus the impact these prerequisites have on aberrant expenses. Also majority (55.9%) agreed and 22.8% strongly agreed that estimators survey all areas of the drawings and division particulars, level of design discipline coordination, sufficiency of subtle elements, and undertaking constructability.

In addition, majority (58.2%) agreed and 12.5% strongly agreed that estimators deliberate different techniques of construction for the projects. This is done to ascertain the best method that should be used to construct the project. The method chosen is influenced by the cost involved. Methods that its costs are low are usually adopted by the companies. These option strategies incorporate diverse development technique, substitution materials, and so forth.

Further 50.3% agreed and 12.5% strongly agreed that estimators build up a decent system of evaluating structures and strategies that precisely meet the prerequisites of the undertaking, and that is comprehended and available by all colleagues. The framework gives the capacity to characterize material, work hour and gear hour amounts needed for the project. Material, work, and gear unit expenses are then connected to the amounts as created in the amount review. The organizations apply the same sums for overhead and benefit, acceleration, and possibility in the last outlines.

Again 54.3% agreed and 16.5% strongly agreed that estimators archive all parts of the evaluation in a legitimate, steady, and readable way. Documentation in most of the construction firms was found to be clear and logical. Clear and logical documentation was found in change order preparation, settlements of claims, and review of past estimates as preparation for new estimates on similar projects.

In conclusion 55.9% concurred and 22.8% emphatically concurred that estimators show evaluating methodology that permit transformation of the assessment to handle cost frameworks so administration can screen and control field exercises. These techniques incorporate routines for reporting field costs for issue ranges. The development firms make reports every day or week by week as opposed to eventually in time after the project are finished. Field expense reporting, which is generally reliable with evaluating techniques, empowers estimators to apply the information picked up from these verifiable expenses to future gauges, and help train field work force in labour hour and expense reporting that give the level of precision needed as in line with Mark (1978) who described cost planning as a framework for checking cost at the configuration juncture such that (a) tender will not surpass preparatory assessment, furthermore, (b) the expenses are developed so as to give the

customer best value for his money. In view of the above explanation, cost planning can be said to be essentially a term which will be utilized to depict any framework of bringing cost advice on the design stage.

4.6 CONSEQUENCES OF INACCURATE DESIGN STAGE COST PLANNING

Inaccurate design stage cost planning can have serious repercussion for the project. Hence the study inquired about some of the repercussion on residential projects and has presented the data in the table below.

Table 4.4: Consequences of inaccurate design stage cost planning

Statement	1	2	3	4	5
Inaccurate design stage cost planning can affect project timelines	3.9%	4.7%	4.7%	32.2%	54.3%
Inaccurate design stage cost planning can lead to additional project cost	-	5.5%	-	31.4%	62.9%
Poor design stage cost planning may lead to ineffective scope control	2.3%	9.2%	4.7%	56.6%	29.9%

1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Source: Data Survey (2015)

From the table above, majority (54.3%) strongly agreed whiles 32.2% agreed that inaccurate design stage cost planning can affect project timelines. Because design stage cost planning was inaccurately done timelines are not able to be met. This is because additional funds will have to be provided which may have not been budgeted for by the owner. The request for

additional funding to complete the project could drag the timeline to complete the project. But 3.9% strongly disagreed and 4.7% disagreed that inaccurate design stage cost planning can affect project timelines. These respondents reported that even when there are inaccuracies in design stage cost planning it can be corrected and may not affect project timelines. Two main consequences are encountered with regard to inaccurate design stage cost planning: cost overrun and schedule delays (Boussabaine & Kirkham, 2004).

Also majority (62.9%) strongly agreed and 31.4% agreed that inaccurate design stage cost planning can lead to additional project cost. This is because items that were not originally budgeted for may show up and would increase the project cost. Raising additional funding may not be easy and may affect the completion of the project. The findings support the view of Boussabaine and Kirkham (2004) who reported that two main consequences are encountered with regard to inaccurate design stage cost planning: cost overrun and schedule delays. Overruns in the construction largely happen due to imperfect introductory designs and/or changes in the extent of the undertaking as it advances.

Lastly, majority (56.6%) agreed and 29.9% strongly agreed that poor design stage cost planning may lead to ineffective scope control. Poorly design stage cost planning may lead to the contractor not knowing the scope of the project. The scope may be narrow or wider than what has been presented. Therefore upon start of the project, the contractor will encounter variation in the project scope. That is the project scope on paper may be different from the reality leading to project delays.

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CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS 5.1

INTRODUCTION

This chapter concentrates on the summary, major findings, conclusions drawn from the results and recommendations based on the findings.

5.2 SUMMARY OF FINDINGS

The study investigated into the barriers affecting design stage cost planning for residential buildings development in Ghana. Overall, 127 respondents were used for the study, using questionnaires. The data gathered from them was analysed using descriptive statistics.

Findings indicates that;

- There are barriers to effective design stage cost planning. The barriers established by the research include: Complexity of contract structure to effective design stage cost planning; Late contractor involvement in design; Inadequate funding; poor project intelligence; Poor use of technology; Economic issues such as interest rate, inflation, depreciation of the cedi etc; Inflexible design; Procurement policies that discourage competitive negotiation. Procurement policies at times discourage competitive bidding; Low skill staffs and Conflict between project parties.

- Estimators adopt various techniques in their work. Such techniques include: Cost review technique is a common technique adopted by most firms. Trend analysis technique is another technique that estimators prefer. The use of expert opinion is another design stage cost estimate technique that most estimators prefer.
- The study found that inaccurate design stage cost planning affect project timelines. Inaccurate design stage cost planning also lead to additional project cost. Poor design stage cost planning also lead to ineffective scope control.

5.3 CONCLUSION

The study concludes that Quantity Surveyors do not rely on only one design stage cost planning technique but they employ different techniques. However, it came to the fore that the most commonly used technique are cost review and update technique, expert opinion and trend analysis. The study also demonstrated that Quantity Surveyors are exposed to many factors that hinder the effectiveness of design stage cost planning. Among some of the factors identified include; complexity of contract structure, late contractor involvement in design, inadequate funding, poor project intelligence, poor use of technology, economic issues such as interest rate, inflation, depreciation of the cedi etc., inflexible design, procurement policies that discourage competitive negotiation, low skill staffs and conflict between project parties. The inability to find solution to these challenges results in delay in the completion of projects, increase in original cost and ineffective scope control. It is therefore imperative that construction firms find a way to minimize or control the impact that the barriers are having on design stage cost planning.

5.4 RECOMMENDATIONS

The study makes the following recommendations;

1. Cost planning ought to be taking into account a progression of cost holding classifications fitting for the specific project design. Every cost holding class ought to be dispensed an esteem (an objective cost) that speaks to a sensible extent of the financial backing furthermore speaks to esteem for cash.
2. To carry out proper cost planning it is crucial that master expense counsellors are named to do this work – either from inside of the customer body or outside. These counsels ought to be selected at the most punctual conceivable stage (ideally in the meantime as the appointment of the design team) and their obligations ought to be plainly doled out.
3. There ought to be no significant change in extension to a project once the client necessities, capacity, particular and physical yield which shape the premise of an undertaking project are set up in the Definitive Project Brief. Any significant changes to project must be endorsed by the Supervision term and the Quantity Surveyor prior to the project continuing.
4. The Project Coordinator ought to overhaul the 'Other Costs' at whatever point new verifiable data is made accessible, especially from the past stage where things may have been further refined or affirmed.
5. There has to be a contingency plan for probable changes in design stage cost. Costs need contingency administration in the connection of contingency fund. Extra funds have to be set aside for any probable changes in cost.

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APPENDIX I

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

The questionnaire for this research is meant for academic purpose, and aims at investigating barriers to design stage cost planning in residential building projects. You are assured of the strict confidentiality of all information given in relation to this study. Thank you.

PART ONE (Demographics)

1. Job Title (a) Quantity Surveyor (b) Architect (c) Civil engineer (d) Project manager
2. How long have you been working in your profession?
(a) 1-5 Years (b) 6- 10 Years (c) 11-15 Years (d) 16-20 Years (e) 21 Years and Above

Gender

- (a) Male (b) Female

4. Age

(a) 18-25 Years (b) 26- 30 Years (c) 31-35 Years (d) 36-40 Years (e) 41 Years and Above

5. Highest educational level attained

(a) S.S.C.E (b) H.N.D (c) First Degree (d) Post Graduate

(e) Other (specify).....

PART TWO (Barriers to effective design stage cost planning)

Indicate the extent to which you agree or disagree with the following statements in respect of how these issues affect design stage cost planning. Tick the appropriate response where 1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Statement	1	2	3	4	5
6. Complexity of contract structure is one of the reasons why design stage cost planning is poorly conducted					
7. Late contractor involvement in design is one of the reasons why design stage cost planning is inaccurately done					
8. Inadequate funding affects how design stage cost planning is conducted					
9. Poor project intelligence affects the effectiveness of design stage cost planning					
10. Poor use of technology affects the effectiveness of design stage cost planning					
11. Economic issues such as interest rate, inflation etc affects design stage cost planning					
12. Inflexible design					
13. Procurement policies that discourage competitive negotiation					
14. Unnecessary high and all encompassing design criteria that restrict design quality option					

15. Low skilled manpower					
16. Risk and uncertainty connected to projects					
17. Inaccurate evaluation of projects					
18. Project fraud and corruption					
19. Conflict between project parties					

20. Any design stage cost planning barrier you wish to add?

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PART THREE (Design stage cost estimating technique) Indicate your agreement or disagreement with the use of the following design stage estimating technique. Tick the appropriate response where 1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Statement	1	2	3	4	5
21. Your organization uses bottom –up technique					
22. Your organization uses specific analogue technique					
23. Your organization uses parametric technique					
24. Your organization uses cost review and update technique					
25. Your organization uses trend analysis technique					
26. Your organization uses expert opinion technique					

PART FOUR

(Design stage cost planning practices)

Indicate the extent to which you agree or disagree with the following statements. Tick the appropriate response where 1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree

Statement	1	2	3	4	5
27. The estimator consider the project scope, the level of effort and resources needed to complete the task ahead					
28. The estimator considers alternate methods of construction for the projects.					
29. The estimator review all sections of the drawings and division specifications to ascertain an accurate perspective of					
30. The estimator develops a good system of estimating forms and procedures that exactly meet the requirements of the project, and that is understood and accessible by all team members.					
31. The estimator documents all portions of the estimate in a logical, consistent, and legible manner.					
32. The estimator shows estimating procedures that allow conversion of the estimate to field cost systems so management can monitor and control field activities.					
33. Level of design discipline coordination, adequacy of details, and project constructability.					

34. Any other design stage cost estimate practice that you wish to add?

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PART FIVE (Consequences of inaccurate design stage cost planning) Indicate the extent to which you agree or disagree with the following statements. Tick the appropriate response where 1= strongly disagree 2= disagree 3=not sure 4=agree 5= strongly agree.

Statement	1	2	3	4	5
36. Inaccurate design stage cost planning can affect project timelines					
37. Inaccurate design stage cost planning can lead to additional project cost					
38. Residential project may not provide support for the project					
39. Poor design stage cost planning may lead to ineffective scope control					

40. Any other consequence you wish to add?

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41. Any other general comment you wish to add?

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End of questions

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Thank You.

