

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

EVALUATION OF THE COST CONTROL PRACTICES USED BY
CONSTRUCTION FIRMS IN GHANA

By

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requirement for the degree of

MASTER OF SCIENCE

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DECLARATION

I hereby declare that this submission is my own work towards the MSc. Construction Management 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 or any other university, except where due acknowledgement has been made in the text.

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ABSTRACT

Large sums of money have been lost in most public and non-public sectors in the construction industry due to unsuccessful projects in relation to time and cost. Cost overrun is intense in the developing and Sub-Saharan countries and this depicts that Project Cost Control (PCC) is major challenge to some members handling a project and contractors as well. Therefore, this study aimed at determining the cost control practices used by construction firms in Ghana. In order to achieve the aim of the study, three (3) objectives were established which were to identify the cost control practices used in the Ghanaian construction industry, to identify the challenges associated with the cost control practices in the Ghanaian construction industry and to identify the strategies to improve the effectiveness of the cost control practices in the Ghanaian construction industry. With these objectives, an extensive literature review was conducted from which variables on sub-contractor's risks and communication were identified. The variables were subsequently used in the development of a structured questionnaire. The questionnaire was distributed and fifty-nine (59) was retrieved and used for the analysis of the study. The analysis was done using the mean score ranking and content analysis. With the objective one, it was realized that, the most often used cost control practice is cashflow/S-curve. Material cost variance was ranked second, followed by earned value and overhead variance. With the second objective, it was realized that, lack of knowledge on the use of available tools and technology occurs most in the Ghanaian construction industry as indicated by the respondents. Usage of old methods and concepts was ranked second followed by striving in observing various sources of regular cost data and over emphasizing of results while ignoring the process of project cost control. With the third objective, the respondents indicated that, construction firms should be consistent about their approaches of controlling cost. Furthermore, the respondents indicated that, clients and their advisors should closely monitor construction firms to ensure they are applying any form of cost control system on their project. They also indicated that, construction firms must properly-establish standards and protocols in monitoring the sources of cost data that arises during the course of project execution. Lastly, construction firms must also endeavor to educate their work personnel on the use of some cost control systems and its applicability on site so as to ensure its ease in adoption. Based on the findings of the study, it was recommended that, construction firms should be consistent about their approaches of controlling cost. If managers become consistent on the cost control processes to adopt, it becomes easier in transferring the knowledge to others. Also, clients and their advisors should closely monitor construction firms to ensure they are applying any form of cost control system on their project. This can serve as a motivation for construction firms to adopt such practices. This study was limited to D1K1 and D2K2 construction firms in the Accra metropolis. This study was also limited to cost control practices that are used at the construction phase of a project.

Keywords: Cost Control, Construction Firm, Evaluation, Ghana, Project.

TABLE OF CONTENT

DECLARATION.....	II
ABSTRACT.....	III
LIST OF TABLES	VII
LIST OF FIGURES	VIII
ACKNOWLEDGEMENT	IX
DEDICATION.....	X
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 BACKGROUND OF STUDY	1
1.2 PROBLEM STATEMENT	3
1.3 AIM.....	4
1.4 OBJECTIVES	4
1.5 RESEARCH QUESTIONS	4
1.6 METHODOLOGY	5
1.7 SIGNIFICANCE/JUSTIFICATION	5
1.8 SCOPE OF WORK AND LIMITATIONS	6
1.9 STRUCTURE OF THE STUDY	6
CHAPTER TWO	8
LITERATURE REVIEW	8
2.1 INTRODUCTION	8
2.2 OVERVIEW OF THE GHANAIAN CONSTRUCTION INDUSTRY.....	8
2.3 THE CONCEPT OF COST CONTROL	9
2.4 COST CONTROL PRACTICES	12
2.4.1 <i>Cash flow/ S-curve</i>	13
2.4.2 <i>Variances</i>	14
2.4.3 <i>Earned Value</i>	16
2.5 CHALLENGES ASSOCIATED WITH COST CONTROL.....	17
2.5.1 USAGE OF OLD METHODS AND CONCEPTS.....	17
2.5.2 <i>Lack of knowledge on the use of available tools and technology</i>	18
2.5.3 <i>Overlooking of the process involved in project cost control</i>	18

2.5.4 Lacking cost control processes and systems suitable to the organization.....	19
2.5.5 Abandonment of complicated strategies	19
2.5.6 Lack of consistency in cost control by managers	19
2.5.7 Poor attitude towards ICT usage.....	20
2.5.8 Difficulty in monitoring different sources of day-to-day cost data	20
CHAPTER THREE	21
RESEARCH METHODOLOGY	21
3.1 INTRODUCTION	21
3.2 RESEARCH DESIGN	21
3.2.1 Descriptive and explanatory research design.....	21
3.3 RESEARCH APPROACH.....	22
3.3.1 Deductive and inductive research approach.....	22
3.4 RESEARCH METHOD	23
3.4.1 Qualitative, quantitative and mixed research method.....	23
3.5 SOURCE OF DATA.....	24
3.6 POPULATION, SAMPLE SIZE AND SAMPLING TECHNIQUE	25
3.7 QUESTIONNAIRE DEVELOPMENT AND ADMINISTRATION.....	26
3.8 ANALYTICAL TOOLS	26
CHAPTER FOUR.....	27
DATA ANALYSIS AND DISCUSSION	27
4.1 INTRODUCTION	27
4.2 BACKGROUND OF THE RESPONDENTS	27
4.3 MEAN SCORE RANKING AND CONTENT ANALYSIS.....	29
4.3.1 Objective one: Cost control practices.....	29
4.3.2 Objective two: Challenges associated with cost control	31
4.3.3 Objective three: Strategies to improve the use of cost control	33
4.4 SUMMARY OF CHAPTER	34
CHAPTER FIVE.....	35
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	35

5.1 INTRODUCTION	35
5.2 SUMMARY OF FINDINGS	35
5.3 LIMITATIONS AND FURTHER STUIES	36
5.4 CONCLUSION	36
5.5 RECOMMENDATIONS	37
REFERENCES766.....	38
APPENDIX.....	47

LIST OF TABLES

TABLE 4.1: BACKGROUND OF THE RESPONDENTS	28
TABLE 4.2: COST CONTROL PRACTICES	31
TABLE 4.3: CHALLENGES ASSOCIATED WITH COST CONTROL	33

LIST OF FIGURES

FIGURE 1.1: STRUCTURE OF THE REPORT.....	7
FIGURE 2.1: CAPABILITY TO INFLUENCE COST OF CONSTRUCTION PROJECTS.....	11
FIGURE 2.2: CASH FLOW/S-CURVE.....	13

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DEDICATION

This Thesis is dedicated to Almighty God for guidance and protection. And also, to my family and friends for their support and inspiration to make this dream a reality.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

One of the hardest jobs encountered by most contractors in management of cost of current projects is the practice of controlling construction project cost. For every construction organization in every nation to thrive, controlling of project cost is a prerequisite. According to Bahaudin et al., (2012); Adjei et al., (2017), for unneeded wastages of resources during the construction of projects to be mitigated or completely taken off, the practice of cost control should not be overlooked by the organizations.

The procedure whereby cost of a project, schedule and technical performance goals of a project are being determined by supervising, assessing and comparing of planned results with actual results of a project is known as cost control as affirmed by Cleland and Ireland (2002). One of the necessary and effective way of achieving or staying within the targeted cost as prepared and endorsed at the inception stage of the project is engaging cost control at the post contract stage of the construction project (Adjei et al. 2017; Adjei et al. 2015). According to Bahaudin et al. (2012), the budgeted cost at the inception stage of the project becomes the baseline for the cost control for the contractor or whoever is responsible for the controlling of the cost of the project. It is very relevant to have an insight in the various principles in cost control so as to help the project manager or the cost engineer to make ready their PCC as well help in the timely delivery of future projects by the development of cost forecasting techniques as attested by Skitmore and Marston, (2005).

Controlling of cost concepts are projected to act as indicators or provide prompt caution system, notifications of viable finances complications at set intervals for helpful measures to be determined to remedy the value variances. The assignment volume

surveyor or the price engineer desires to practice the value manage techniques to boost a sequence of selections for the other mission contributors to reflect on consideration on and pick out one of the nice alternatives that match within the authorized finances restrict (Adjei et al., 2017).

Controlling cost for construction projects starts early during the project life cycle from the conception stage through to the construction stage and beyond. According to Roslan (2012), logically, the time at which major cost savings can be achieved is during the pre-construction stage. This is the stage where the project is still at its infant stage and no major cost expenditures has been committed. During the actual construction, changes are likely to delay the project and lead to inevitable cost increases. Although the greatest ability to influence cost is early in a project life cycle, Halpin and Woodhead (1998), highlighted that one of the phases that potentially have the greatest ability to increase the planned budgeted cost is the construction phase, which consequently substantiate the importance of cost control. Current cost monitoring and control methods are exceptionally intended to pick out cost deviations and take corrective measures to eliminate the occurrence of cost overruns

From the discussion above, it can be realized that, the construction industry must rely on effective cost control as construction companies operates on a tight budget and small profit margin due to fiercer competition. There are huge financial risks in the construction industry and without any adequate cost control, the risks can escalate. Therefore, this study is being conducted to determine the cost control practices used by construction firms in Ghana.

1.2 PROBLEM STATEMENT

The success factors like cost and time are not being met by a lot of projects for so long a time (Adjei et al., 2018). An appreciable amount of money is lost in the construction industry by both the public and non-public sectors due to project failure in cost and time. Project cost control remain a big challenge to contractors and team members of projects in the developing and Sub Saharan countries. This is evident in the severity of cost overruns of projects. Controlling of cost of projects requires the application of techniques relating to cost control by professionals in the construction industry and these techniques involves theoretical knowledge obviously as affirmed by Premalal (2016). Due to the great impact cost control has on the construction industry, mechanism for the effective control of cost should not be overlooked. However, relevant construction bodies and other stakeholders have not still made sufficient rules and regulations or include closure in the conditions of contract to overcome this problem.

Studies towards the practices of controlling of cost in the construction industry is very minimal comparatively. The challenges pertaining to controlling of cost of project were brought into light by researches like Sanni and Hashim (2013) and Ademola (2012) but in very limited literature review. This study aims at looking into cost control practices of project used in the Ghanaian construction industry. In this study, the assessment of current practices as well as the challenges and strategies encountered during the control of cost practices in the construction industry is being looked into. This study will aid members of construction project or cost engineers of construction organizations to improve on measures that can reduce cost overrun and help in enjoying all the benefits associated with control of cost.

1.3 AIM

The aim of this study is to determine the cost control practices used by construction firms in Ghana.

1.4 OBJECTIVES

The objectives of this study are;

1. To assess the cost control practices used in the Ghanaian construction industry;
2. To assess the challenges associated with the cost control practices in the Ghanaian construction industry; and
3. To evaluate the strategies to improve the effectiveness of the cost control practices in the Ghanaian construction industry.

1.5 RESEARCH QUESTIONS

This study seeks to answer the following questions;

1. What are the cost control practices used in the Ghanaian construction industry?
2. What are the challenges associated with the cost control practices in the Ghanaian construction industry?
3. What are the strategies to improve the effectiveness of the cost control practices in the Ghanaian construction industry?

1.6 METHODOLOGY

The study adopted a purely quantitative research method. This study was conducted through the review of relevant literature and analyzing the researches gotten. This aided in the development of a questionnaire to be answered by professionals in the construction industry (Contractors and Civil engineers). Their responses were coded in SPSS and subsequently analyzed using mean score ranking technique. This research adopted the positivist philosophical position. The positivist ideology suggests that, reality can be measured hence focus on reliable and valid tools to obtain it (Crotty, 1998). Also, the research design was explanatory as the study sought to assess the cost control practices used by construction firms in Ghana. Furthermore, this research made use of only primary data as a source of information for the study. Primary data are collected by the researcher as such data may not be available. Therefore, the collection of primary data implies that, new data are added to existing store of social knowledge that are made available for use to the general research community.

1.7 SIGNIFICANCE/JUSTIFICATION

In spite of the important role cost control plays in the construction industry, no published study explored the methods being utilized by contractors in Ghana. The vast number of registered contractors in Ghana and the limited number of projects available means that competitive bidding has started to play an important role in projects awarding, and a sound cost control system to ensure maximum profitability once projects are successfully awarded. The outcome of the present study will benefit managers in the corporate world, business practitioners, engineers and academicians by enhancing their awareness of the materiality of cost control in an organization, and providing some insights into the

prerequisites of a successful cost control procedure and the dynamics of such cost control practices and processes.

1.8 SCOPE OF WORK AND LIMITATIONS

This study was focused on only contractor's cost control during the construction stage. The type of cost control adopted was dependent on the size of the projects, the size of the construction company and also the types of contracts. Methods used by clients and consultants in relation to controlling of cost in projects in the pre-construction and post construction stage are not inclusive in this study. It also excluded cost control procedures related to the accounting and financial management of the construction company. This study was limited to only civil engineering and building contractors. According to Halpin and Woodhead (1998), the propensity of budget of a project to overrun is mostly vibrant at the construction phase of the project where the contractor is massively involved. Furthermore, this study was limited to D1K1 and D2K2 firms in Accra metropolis.

1.9 STRUCTURE OF THE STUDY

The structure of this report was shown in figure 1.1. The chapter one (1) constitutes the general introduction to the study. The introduction of the study touches on the background of the research, the problem statement, research aim, research objectives, the scope, significance of the study and the methodology. The chapter two (2) consists a comprehensive review of literature pertaining to the study. The chapter three (3) provides an elaborate discussion on the methods, approaches and strategies employed for this study. It also discusses the type, method and processes of collating and analyzing the data. The chapter four (4) provided a report on the analysis of the data collected from the respondents. It establishes the procedures adopted for the analysis and a discussion of the

results of the analysis. The chapter five (5) summarized and gave a conclusion to the study. This is inclusive of includes a discussion on how the objectives were achieved, the findings and recommendations made.

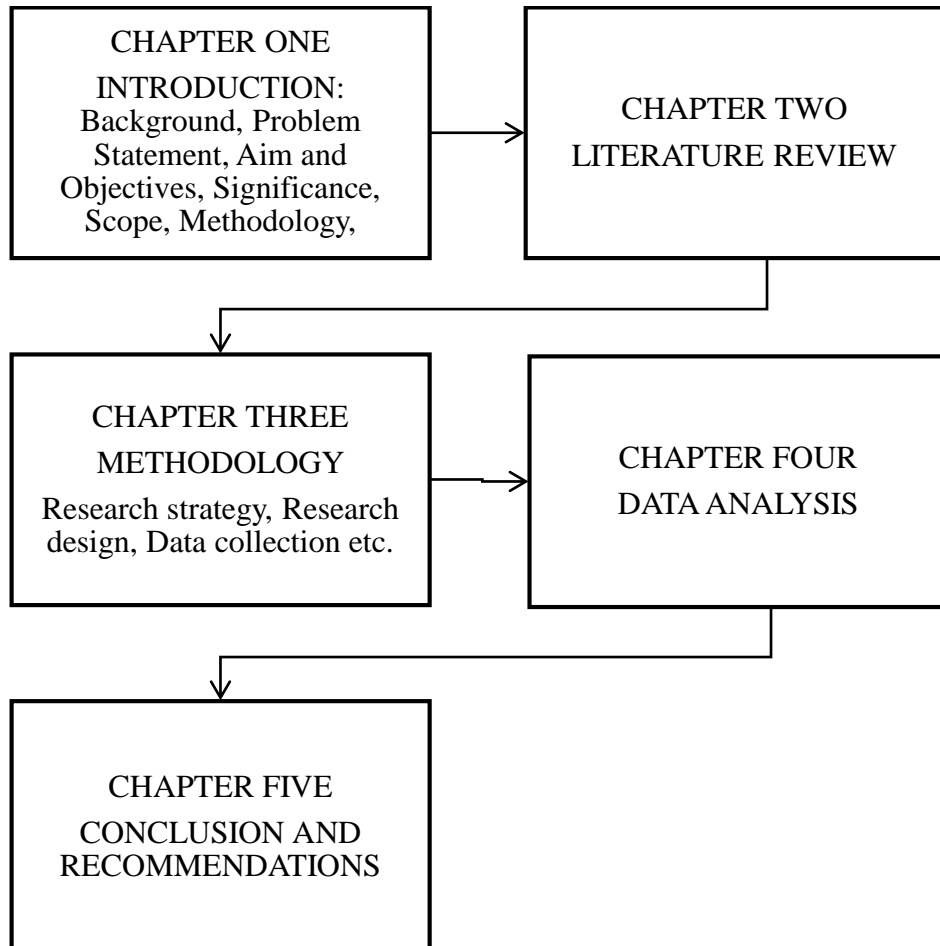


Figure 1.1: Structure of the report

Source: Author's construct, (2018).

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews literature on the study area. The aim of this learn about is to determine the controlling of cost practices used by construction companies in Ghana. The first step in achieving this aim is reviewing comprehensive literature in order to set the foundation for the development of a questionnaire to collect data. The review begins with a review on the overview of the construction industry in Ghana accompanied by a discussion on the thought of cost control followed by a discussion on the available practices in relation to controlling cost in the construction industry. This is subsequently accompanied by a review of the challenges associated with cost control in the construction industry.

2.2 OVERVIEW OF THE GHANAIAN CONSTRUCTION INDUSTRY

The construction industry plays a vital role in every country and Ghana is no exception. In Ghana, it contributes approximately 8.2% to the gross domestic product (GDP) (Owusu-Manu and Badu, 2011). There is an enormous subculture of underperformance as majority of the foremost undertaking in Ghana are awarded to very few giant companies which are mostly overseas Ghanaian construction firms. In his research, he identified problems like the inability to secure adequate working capital, inadequate project management skills and poor workmanship as significantly affecting the progress of the Ghanaian construction industry. Badu and Owusu-Manu (2012) explained that, construction firms in Ghana find it difficult in accessing financing for projects, therefore, they normally opt for debt financing which usually is accompanied by high interest rates.

Furthermore, delays in payment is a significant problem facing the Ghanaian construction industry. Adams (2008), postulated that, the delays in contractors' payment for done work are very frequent and types a major purpose in the delays in the completion of projects in Ghana. It is therefore now not surprising that, construction project in Ghana recorded an average price overrun of 60% to 180% (Kpamma and Adjei-Kumi, 2010). Also, there is a lack of commitment closer to the fitness and safety of construction workers in Ghana, who work in typically dangerous environments (Ankomah et al., 2010). According to Ofori-Kuragu (2013), the problems that impacts the overall performance of Ghanaian contractors includes terrible get right of entry to credit, delays in payment, cumbersome charge process, bias in contract awards amongst others.

These problems facing the Ghanaian construction industry affects the performance of the industry especially in terms of project cost performance. However, the construction industry in Ghana can draw beneficial training from the experiences of other international locations (Ofori et al., 2012). Benchmarking against countries with better developed industry constructions will grant instruction on the way ahead in the struggle to acquire industry-wide organizational and project enhancements in the Ghanaian development sector.

2.3 THE CONCEPT OF COST CONTROL

A construction project is essentially regarded as profitable when it is done on time, inside budget and in accordance with the specifications to fulfill the client. Even though these criteria are fundamental to the success of a construction project, Chua et al. (1997) indicated that, cost performance is the most significant success criterion in the construction industry. This is because, it affords now not solely the firm's profitability

but also the productiveness of businesses at any point all through the construction process. Bad performance in cost of construction projects has been a predominant concern for contractors and clients and other stakeholders in the construction industry. Cost overruns affects numerous projects in construction due to the increasing nature of complexities and advancements. Therefore, Wang (1994), indicated that, as the procedure of construction is becoming extra complex, a greater state-of-the-art method is wanted to deal with the intricacies of the process in construction. It is therefore very necessary to device strategies to manage cost of a construction project to avoid cost overruns.

There are three (3) elements of cost management. These are cost estimating, cost budgeting and cost controlling (Owens et al., 2007). Cost estimating can be described as the development of estimates and measurements of the cost needed for a resource to complete the project tasks and activities. Cost budgeting can be described as collecting the cost estimates, combining them to improve typical cost and baseline. Cost controlling is the system of managing and controlling elements that trade or affect the finances of the project This study focusses on cost control. According to the Institute of Construction and Development (ICTAD), there are several documents which should maintain records for controlling cost by comparing with the planned cost. Some of these documents are; the unit cost sheet, weekly statement of direct labor cost, weekly statement of machinery hire cost, monthly cost summary, contractor's monthly cost control table among others.

Controlling of cost for projects of construction commences right at the inception stage of the life cycle of the project. Appropriately, cost control starts at the conception stage via to the construction stage and beyond. Logically, the time at which predominant cost savings can be accomplished is at some point of the conception/ pre-construction stage, when the challenge is still at its toddler stage (Jumaludin, 2012). It ought to be cited that,

at some stage in the true construction phase, any changes are likely to prolong the challenge and lead to inevitable cost increases (Halpin and Woodhead, 2000). Thus, the construction phase has high potential to increase the planned budgeted cost as shown in Figure 2.1. Therefore, there is a clear evidence on the need for effective cost control practice at the construction stage of a project.

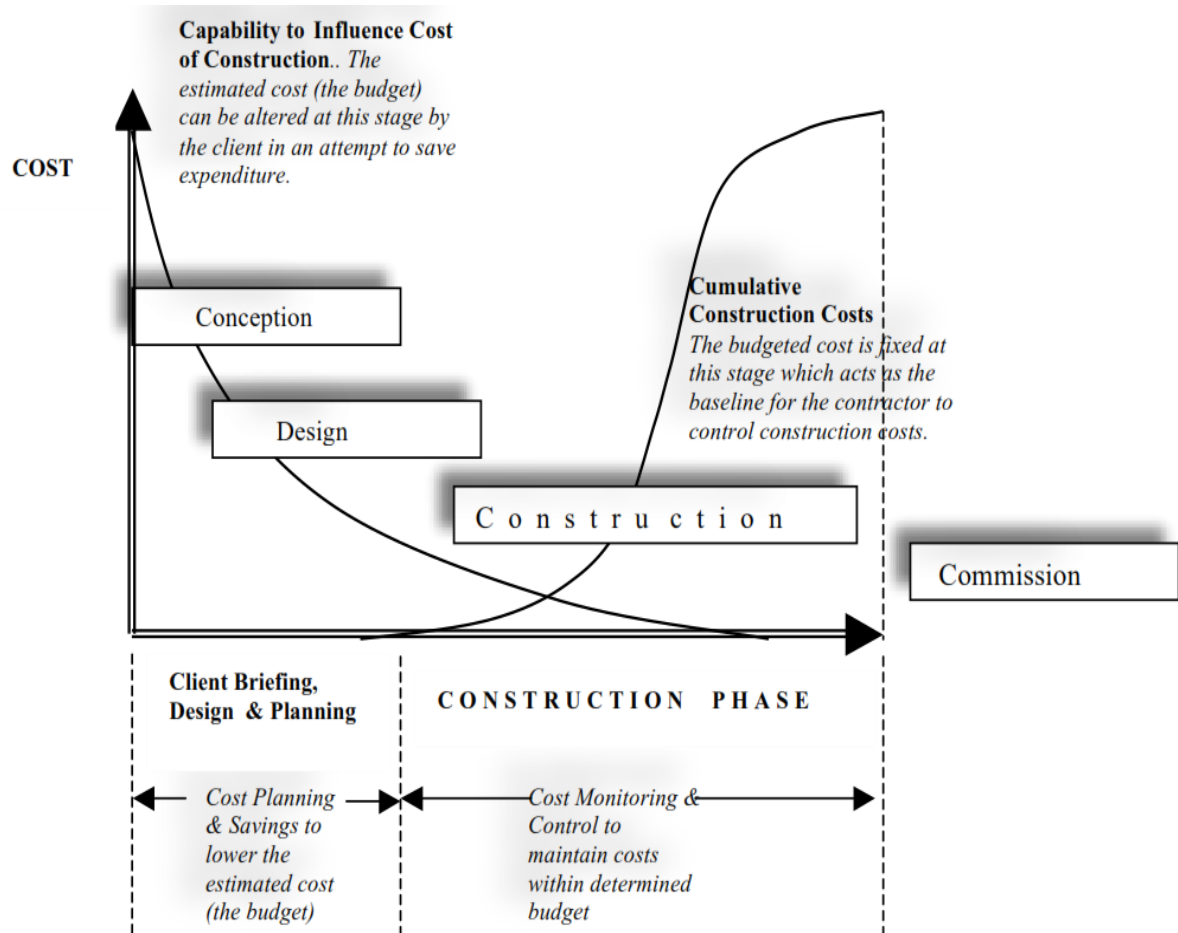


Figure 2.1: Capability to influence cost of construction projects

Source: Venkataraman and Pinto, (2008).

Current project cost monitoring and control methods are basically supposed to become aware of value deviations from the project sketch and take corrective measures. Thus, corrective measures are taken when the cost overrun has already occurred. Nikander and Eloranta (2001), indicated that, the normal strategies of controlling of cost such as style

evaluation are primarily based on what has already been done. This procedure is unacceptable and undesirable for an effective cost control system. The control process should not be dormant, but always be active and functioning especially during the construction stage. The basis of cost control is monitoring and reporting at regular intervals, hence cost control requires not just a record of costs incurred to date but also the likely eventual cost commitments.

Literature have shown that, the presently available cost control concept that is adopted by most project control systems is based on the thermostat analogy (Harris and McCaffer, 1992; Halpin, 1985) which is basically based on occurrences that have already materialized. Efforts by various researchers like Kim (2002), Hastak and Halpin (2000) and others all attempted at the improvements in cost and project control, but are still confined to concept of management by exception (corrective actions). There are however several mentions in literature of a more effective preventative methodology for project control as mentioned by, Medley (1997), Nikander and Eloranta (2001) and Kerzner (2009).

2.4 COST CONTROL PRACTICES

Project cost control is regarded as a very significant management responsibility. When construction work starts, the project cost management system retrieves cost of labor, equipment-hours and production quantities from the job site as the work progress (Clough, 1986). There are numerous cost control techniques used in the construction industry.

Abbasi and Al-Mharmah (2000), Hutchings and Christofferson (2000), Yang, et al., (1997), White and Fortune (2002), and Kazi (2002) have examined various management

tools and techniques. These tools and techniques are: Cash flow/S-curve, Variances, and Earned Value.

2.4.1 Cash flow/ S-curve

Cash flow can be described as the transfer of money into or out of the company (Harris and McCaffer, 1995). The cash flow aids the contractor in determining the economic feasibility of the construction project. The inflow represents the payments to the contractor while the outflows represents payments made or expenditure incurred (Ahuja, et al., 1994). According to Harris and McCaffer (1995), cash flow aids in making provisions for difficult times before they arrive. The cash flow chart is mostly used as a means of control by plotting the actual expenditure curve against the budget curve as shown in Figure 2.2 (Pilcher, 1992).

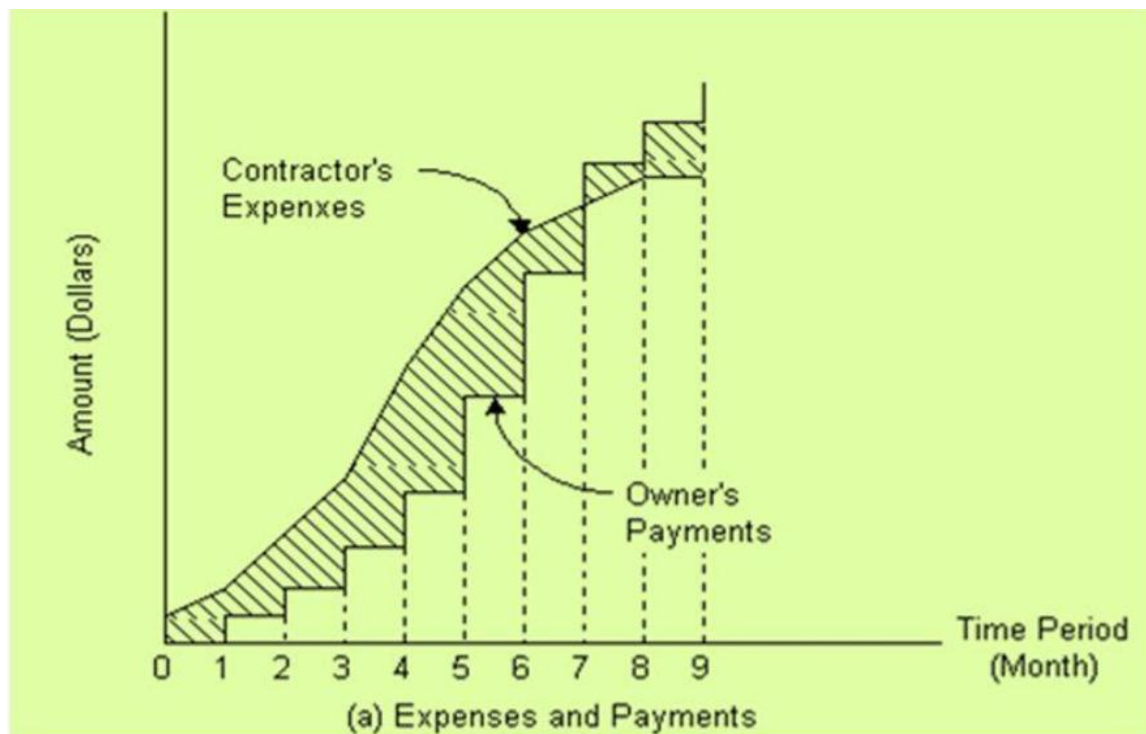


Figure 2.2: Cash flow/S-curve

Source: Pilcher, (1992).

According to Ritz (1994), the shape of the curve follows the project life-cycle bell curves. Any deviation from the anticipated S-curve should prompt a review with the contractor to determine the cause of the variation and whether any problems may cause cost and schedule slippage (Bramble et al., 1990).

Furthermore, the owner may want to monitor the amount of contract change orders and how they relate to the S-curve. Owners should monitor the number of change orders and its cost implications to ensure that the job is brought in on budget (Bramble *et. al.*, 1990).

The timing of cash flow is important to the client. An expenditure cash flow that has a link with the contractor's activities in relation to the program of works must be prepared by the clients' consultants. According to Ashworth (1994), the prediction of future contracts' flow of expenditure can be done by the help of the standard S-curve. Cash flows that occur at different points in time have different values and cannot be compared directly with one another.

2.4.2 Variances

Variance involves comparing actual project results to planned results. Cost and schedule variances are the most frequently analyzed. However, variances from plan in the areas of scope and quality are of equal significance (PMI, 1996). Variances may occur when the price actually paid for a resource is greater or less than that estimated in the standard. Secondly, the quantity of resource actually used is either greater or less than the estimated standard (Pilcher, 1992). To the extent that significant variances are observed, adjustment to the plans is made by repeating the appropriate project planning process. The inadequacy of the variance analysis makes it relevant for other methods to be added to the variance analysis as affirmed by Harrison (1992). Supplementary the

analysis with other methods is necessary because the analysis is sometimes misinforming and futile.

The common variances used in the controlling of projects are as follows;

- Schedule start/finish versus actual start/finish.
- Schedule time for an activity versus actual time.
- Budgeted cost versus actual cost.
- Measured value versus actual value.
- Budgeted man-hours versus actual man-hours.
- Budgeted unit cost versus actual unit cost.
- Budgeted percentage completes versus actual percentage complete (Harrison, 1992).

Variance of cost of material, variance of cost of labor, variance of sales and variance of overhead are the four types of variances,

The disparity between the standard cost of material and material's actual cost is known as material cost variance. Cost of material variance can be analyzed in terms of material price variance, material usage variance, material mix variance and material yield variance. The difference between the specified price standard and the actual price paid is described as price variance in relation to material. Moreover, variance in relation to material usage is the difference between the planned standard quantity and the actual quantity of material used. Material yield variance is defined as a portion of material as a result of variation in the material mix structure or composition. Lastly, it can be defined as the distinction among the preferred yields planned and the genuine yield achieved.

The difference concerning direct wages that are standard and the actual wages salaried for an exercise is known as labor cost variance. The variance in labor cost can be analyzed using the wage rate variance or the labor efficiency. The wage price variance

escalates as a result of the distinction among the widespread and authentic wages rate. The distinction between the actual hours of labor exhausted and the curtailed preferred labor hours is referred to as labor effectivity.

The difference that exist between the proper sales cost and the trendy value of income distinct is described as sales variance and this is in 4 types. These are the combine, volume, quantity and price variances. Furthermore, the difference that exist among specified general contribution and the authentic contribution of the sales mix is also known as mix variance while the distinction between sales mix that is standard and actual sales mix is also known as quantity variance. In addition, variance in volume is the distinction among anticipated extent of sales and the true quantity of sales. Price variance is the distinction between the genuine rate received and the well-known rate specified.

Overhead variance is the distinction among the general fee of overhead immersed in the output attained and the proper overhead cost. There are forms of overhead variance. These are the overhead expenditure and the overhead effectivity variances. The overhead expenditure variance is as a result of the distinction between the well-known allowance for the output performed and the proper expenditure incurred. The overhead effectivity variance is due to the distinction between the fashionable effectivity and the genuine effectivity attained.

2.4.3 Earned Value

Earned value is a measure of progress. According to Wilkens (1999), earned value provides a uniform unit of measure for reporting progress. It combines cost and time table on a structured and personalized fundamental whereby the work is broken down into Work Breakdown Structure (WBS), cost accounts and work packages. The earned value of the work completed is then based on the budgeted value of the completed work

segments (Harrison, 1992). Oberlender (1993), indicated that, earned value is used to define overall percentage complete for the whole project. Earned value can be calculated using the following equation.

Earned value = (percent complete) x (budget for the account). Performance against schedule is a comparison of what was planned against what was done. Thus, a comparison of budgeted against earned.

2.5 CHALLENGES ASSOCIATED WITH COST CONTROL

Cost control of construction projects during their execution is one of the challenges encountered by most construction firms. The usage of methods and concept that are old, inconsistency in cost administration by way of managers, editions in contract and lack of economic commitment in initiatives ,deficiency of expertise on the usage of reachable tools and technology, , bad attitude toward the utilization of Information Communication Technology (ICT), lack of undertaking in the control of project cost procedures and systems appropriate to the firm, neglecting of problematic policies, , problem in critically observing special sources of everyday cost data, over highlighting on effects whilst overlooking the manner of project cost control are the examples of challenges being faced by construction firms. These variables are discussed below.

2.5.1 Usage of old methods and concepts

Some construction firms still use historical project cost tactics which broadly depend on manual, paper-based information, intuition and experience gained from previous work as attested by Benjaoran (2009). When it comes to the level of knowledge of owners of the construction firms, Song (2014) attested that most proprietors have little degree or no knowledge on how cost is being managed and this impedes the practice of controlling of

cost. In the usage of old method or practices in relation to management of cost in projects, the challenge is that these old practices cannot be applied to solve current situation in the real world. Therefore, Song (2014) indicated that, the usage of out of date techniques and ideas without continuously upgrading them impedes on cost control practices.

2.5.2 Lack of knowledge on the use of available tools and technology

For a construction firm to be considered as competitive, one of the vital tool is knowledge (Martin 2010; Ademola, 2012). Knowledge about controlling of cost in the industry is deemed as technical or managerial and the absent of it have negative effect on the cost control of the project (Ademola, 2012). Construction professional are challenged to have an insight in the cumbersome and sophisticated procedures involved in controlling of cost of projects by the usage of the right tools (Ademola, 2012).

2.5.3 Overlooking of the process involved in project cost control

Managers in construction are particular in issues relating to control of cost and constantly stress on its significance to effective construction management. However, construction managers are only concerned about the cost variance and overlook the source of changes in the cost and how the process involved in the management of the changes in cost is being handled. Song (2014) attested that most construction managers overlook the methods involved in controlling of cost during the construction phases. The process involved in controlling of cost of projects should be active all the time and operational as well and not with series of records of cost only but the propensity of subsequent committees involved in cost control of the project as affirmed by Bahaudin et al., (2012). Furthermore, the commitment into management of cost methods by most contractors is

very poor as it is considered as a waste of money to the firm although it could save the organization huge sums of money with the practice of cost control.

2.5.4 Lacking cost control processes and systems suitable to the organization

It is very necessary for cost managers to develop a cost control template for every construction project. However, most managers are not prepared to do that because it takes much time in formulating a cost control template. Furthermore, only aspects of construction projects likely to experience cost variance is attended to. A helpful way is by the establishment of a template with structured procedures for managers in the corporate world at all levels. Cost control should be looked into repeatedly and not once. This connotes that cost management for delivery of construction projects especially controlling of cost should be simplified (Adjei et al., 2015).

2.5.5 Abandonment of complicated strategies

According to Ademola (2012) most managers of site, quantity surveyors or cost engineers face challenges in combining knowledge and experience gained from works been done. The organized schemes where one practices mathematics with computerized base is a difficulty for some experts in the daily activities in dealing with cost (Ademola, 2012). Therefore, they abandon the use of such strategies

2.5.6 Lack of consistency in cost control by managers

Managers are inconsistent in the practice of project cost control during the execution of construction projects. Construction managers only perform cost control practices when it becomes a necessity. Adjei et al., (2015) affirms that there is inconsistencies in the engagement of cost control techniques by construction managers in the delivery of

projects as well shortages in processes involved with cost control and systems. Many construction firms only undertake project cost control process only when there exist cost problems. This is a major challenge in the performance of cost control.

2.5.7 Poor attitude towards ICT usage

Generally, the usage of ICT tools and knowledge is prevalent in the construction industry. Egbu and Botterill, (2002) attest that though ICT is very prevalent and beneficial to the construction industry but most construction organization are reluctant in the usage of it. This reluctance is evident in the consistent usage of cost control practices as professionals are comfortable with the usage of the outdated cost control methods and tools in the management of cost which hinders the usage of cost control techniques (Samuelson, 2002; Achar et al., 2005).

2.5.8 Difficulty in monitoring different sources of day-to-day cost data

The value of work earned must be observed as the construction work continue to allow the identification of the status of cost of the project at every point. Collection of high quantum of data from various sources may be part of the supervisory process. If a firm and highly acceptable procedure is not used to enhance the advancement and warrant the completeness of data for the practicing of cost control, it can be a huge barrier to its successful implementation (Sanni and Hashim 2013).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the methodological approach adopted for the study. This involves a discussion on the research design, research approach, research method, source of data, study population, sample size and sampling technique, questionnaire development and administration and analytical tools used for the study.

3.2 RESEARCH DESIGN

This is a plan created, that depicts how research questions are to be answered or how a research hypothesis is being tested (Spencer-Oatey, 1993). The descriptive and explanatory research designs are the two basic types in relation to research design. The descriptive research design was adopted for this study. They are discussed below.

3.2.1 Descriptive and explanatory research design

The precise and systematic description of the characteristics and facts about a given population is described as descriptive research design as affirmed by De-Vaus (2001). Questions like “What is going on?” is being answered using the descriptive research design. It can also be described as the provision of an accurate account of the features of a particular individual, situation or group as a way of discovering new meanings (Kerlinger, 1986).

According to De-Vaus (2001), the explanatory research design involves the advancement of fundamental explanations which hinges on the fact that, one concept is affected by various other concepts. Explanatory research can also be referred to as causal research

as it is conducted in order to identify the extent and nature of cause-and-effect relationships (Zikmund et al., 2012).

3.3 RESEARCH APPROACH

According to Gabriel (2013), inductive and deductive research approaches are the two basic forms of research approach. The research approach used for this study was the deductive approach. Their descriptions are discussed below.

3.3.1 Deductive and inductive research approach

The deductive research approach is basically adopted when the researcher aims at testing a theory. Testing a theory usually begins with research questions or a hypothesis (Gabriel, 2013). A deductive research approach is used for testing hypothesis in order to verify a theory. According to Burney (2008), a deductive research approach is a migration from a general to a specific as it involves the movement from broader generalization and theories to specific observations.

This is the direct opposite of inductive research as it involves the movement from specific observations to broader generalizations and theories (Burney, 2008). Thus, the inductive research approach generally involves the generation of new theory established from data. Gabriel (2013) indicated that, an inductive research approach basically involves research questions which narrow the scope of the study. The inductive research approach is basically involved in exploring new phenomena. General inductive research is associated with qualitative research but there are no rules to that effect.

3.4 RESEARCH METHOD

The research methods have been categorized into three (3) form. These are qualitative, quantitative and mixed research method (Carrie, 2007). The type of data required to respond to the research question will determine the type of research method to adopt. Research data can be numerical, textural or both numerical and textural. Carrie (2007), asserted that, researchers typically select the quantitative method to respond to the research questions that requires numerical data while qualitative research method respond to research questions that requires textural data. The mixed method is used when both numerical and textural data are required to respond to the research question. The quantitative research method was deemed more suitable for this study therefore adopted. They are discussed below.

3.4.1 Qualitative, quantitative and mixed research method

Carrie (2007), indicated that, qualitative research involves discovery (Carrie, 2007). Creswell (2003), asserted that, qualitative research method normally occurs in the natural environment which allows the researcher to undertake a detailed investigation from the viewpoint of the participants. In qualitative research method, the data collected are normally described and interpreted. Qualitative research method can also be described as an effective model of researching that enables the researcher to develop a level of detail by being highly involved in the actual experiences (Creswell, 2003). A major feature of qualitative research is that, there is no established assumptions from which the researcher can start (Leedy and Ormod, 2001). It is used to explain phenomena significant to social behaviors in new and emerging theories.

Quantitative research is very specific in its surveying and experimentation as it builds upon existing theories (Leedy and Ormod, 2001). Also, Creswell (2003), stipulated that,

quantitative research adopts the assumption of an empiricist paradigm as the research itself is independent of the researcher. Therefore, quantitative data are objective and used to measure reality. Furthermore, Leedy and Ormrod, (2001), postulated that, quantitative research method is designed to respond to questions associated with relationship between variables and make predictions. Thus, quantitative research method aids in establishing and validating relationships and to develop generalizations that contribute to theory. In quantitative research, a problem is first identified, followed by formation of hypothesis, collection of data and analysis of data. The outcome of quantitative research can be predictive, explanatory and/or confirming.

The mixed research method combines method of collecting and analyzing data from the quantitative and qualitative method in a single study (Creswell, 2003; Tashakkori and Teddlie, 2003). The mixed method is regarded as an extension rather than a replacement for the quantitative and qualitative research approaches as they will continue to be useful in the research world (Johnson and Onwuegbuzie, 2004).

3.5 SOURCE OF DATA

The types of data are primary and secondary data. Data collected for a specific problem in research is described as primary data by Hox and Boeije (2005), described primary data as the data collected for a specific research problem. Primary data are collated by the researcher as such data may not be available. Therefore, the collection of primary data implies that, new data are added to existing store of social knowledge that are made available for use to the general research community. Hox and Boeije, (2005) indicated that, when collected data (primary data) are reused by other researchers, it is then called secondary data. Contemporary and ancient features comparative research or replication of an original research, teaching and learning, research design and methodological

advancement may be described with the secondary data. Only primary data was utilized for this study.

3.6 POPULATION, SAMPLE SIZE AND SAMPLING TECHNIQUE

The population can be described as the universe from which a sample is chosen. The population for this study is D1K1 and D2K2 construction firms in the Accra metropolis. There are one hundred and fifty-four (154), D1K1 and D2K2 construction firms in the Accra metropolis according to data collected in 2015 from the Ministry of Water Resources, Works and Housing. Using the Yamane formula shown below, the sample size for this study is seventy-one (71).

$$n = \frac{N}{1 + N(e)^2}$$

where;

n is the sample size

N is the population size

e is the level of precision or the confidence level.

$$\text{Therefore, } n = \frac{154}{1 + 154(0.10)^2} = 60.63 \approx 61.$$

Add an extra 10 to cater for non-responsiveness.

$$\text{Therefore, } 61 + 10 = 71$$

Therefore, the sample size is 71.

A sampling technique can be described as the process in selecting a unit or an entity from a sample frame or population. For this study, the simple random sampling technique was utilized for the study. According to Bryman (2004), the simple random sampling technique is a probability sampling technique where subjects are selected because of their simple accessibility and proximity to the research. This technique is

deemed appropriate for the study as any D1K1 and D2K2 contractor is regarded as suitable to respond to the questionnaire. Therefore, easily accessible D1K1 and D2K2 construction firms were used.

3.7 QUESTIONNAIRE DEVELOPMENT AND ADMINISTRATION

In order to achieve the aim and objectives of the study, an elaborate questionnaire was developed based on the objectives of the study. The collection and analyzing of people's views by the usage of an effective tool is known as questionnaire survey according to Spector (2006), questionnaire survey is an effective tool in collecting and analyzing people's views. The questionnaire used for this study has four (4) sections. The other three (3) sections were formulated based on the objectives of the study. Each section concentrated on one objective. The five-point Likert scale was used for the rating of the responses given by the respondents.

The questionnaire was developed using Microsoft Word 2016 developer toll and was subsequently distributed by hand supplemented by online delivery. The questionnaire distribution and retrieval took about two (2) weeks.

3.8 ANALYTICAL TOOLS

The data was collected, coded and entered into SPSS version 20. The data were analyzed using the Mean Score Ranking for objective one (1), objective two (2) and objective three (3). The mean scores were calculated based on the formula $M = \frac{\sum s}{n}$ (Cheung and Chan, 2011). Where "M", depicts the mean score, "s" is the respondents' score based on a five-point Likert scale, and "n" is the total number of respondents.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter analyze the data collected from fifty-nine (59) respondents. The questionnaire consisted of the background of the respondents and questions based on the objectives of the study. The background of the respondents was analyzed using percentages. The questions on the three objectives were analyzed using the mean score ranking and the content analysis. Prior to the analysis, the data collected was entered into the SPSS software version 20. They were subsequently analyzed and discussed as shown in subsequent sections.

4.2 BACKGROUND OF THE RESPONDENTS

The background of the respondents gives an indication of the reliability of the responses given by the participants. This section discusses the background of the respondents. Table 4.1 shows the summary of the respondents' background. The first question of the background of the respondents wanted to ascertain the category of the respondents as a construction firm. In Ghana construction firms are categorized as D1K1, D2K2, D3K3 and D4K4. However, for this study, the respondents were limited to D1K1 and D2K2. The category of the respondents depicts their financial class and other resource holdings (plant and labor). From their responses, the majority of the respondents were D2K2 construction firms.

The second question was designed to ascertain the number of years of experience of the respondents. The years of experience of respondents gives an indication of his familiarity and knowledge of the processes of the firm. From the responses, majority of the respondents had 11-15 years of experience. The least had above 20 years of experience

constituting only four (4) respondents. This gives an indication that, the responses given by the participants will be highly dependable.

Table 4.1: Background of the respondents

DESCRIPTION	FREQUENCY
Category of construction firm	
D1K1	16
D2K2	43
Years of experience	
Below 5 years	9
6-10 years	16
11-15 years	22
16-20 years	8
Above 20 years	4
Education Level	
HND	3
BSc	43
Post graduate	13
Number of projects	
Below 5	4
6-10	15
11-15	21
16-20	10
Above 20	9

Source: Field Survey, (2018).

The third question asked the respondents to indicate their highest level of education. This also gives an indication of the knowledge level of respondents. Majority of the respondents had Bsc degree constituting forty-three (43) in number of the respondents.

The last question under the background of the respondents wanted to ascertain the number of projects the participant has being involved in. The options were below 5, 6-

10, 11-15, 16-20 and above 20. The majority of the respondents indicated that they had executed 11-15 projects constituting twenty-one (21) respondents.

4.3 MEAN SCORE RANKING AND CONTENT ANALYSIS

This section analyzes and discuss the three objectives of the study using the mean score ranking and content analysis. The objectives of the study were to identify the cost control practices used in the Ghanaian construction industry, to identify the challenges associated with the cost control practices in the Ghanaian construction industry and to identify the strategies to improve the effectiveness of the cost control practices in the Ghanaian construction industry. With these objectives, an extensive literature review was conducted in which various variables were identified under cost control practices and challenges associated with cost control. This was developed into a questionnaire where the respondents were asked to rate the variables using the five-point Likert scale. Their responses are analyzed and discussed below.

4.3.1 Objective one: Cost control practices

With the first objective, the respondents were asked to indicate the cost control practices used often in the Ghanaian construction industry. They were to do the rating using the five-point Likert scale of 1 = Not often, 2 = Slightly often, 3 = Moderate, 4 = Often, 5 = Very often. Their responses were analyzed and shown in table 4.2.

From the table, it can be realized that, the most often used cost control practice is cashflow/S-curve. Cash flow can be described as the transfer of money into or out of the company (Harris and McCaffer, 1995). The cash flow aids the contractor in determining the economic feasibility of the construction project. The inflow represents the payments to the contractor while the outflows represents payments made or expenditure incurred

(Ahuja, et al., 1994). According to Harris and McCaffer (1995), cash flow aids in making provisions for difficult times before they arrive. The cash flow chart is mostly used as a means of control by plotting the actual expenditure curve

Material cost variance was ranked second. Material cost variance is the difference between the standard cost of materials and actual cost materials used. Material cost variance can be analyzed in terms of material price variance, material usage variance, material mix variance and material yield variance. The difference that exist between the real quantity used and the planned standard quantity is known as material usage variance. Material usage variance is the difference between the standard quantity planned and the actual quantity used. Also, material mix variance is that portion which is due to change in the composition of material mix.

Earned value was ranked third. Earned value is a measure of progress. According to Wilkens (1999), earned value provides a uniform unit of measure for reporting progress. It combines cost and schedule on a structured and personalized basis whereby the work is broken down into Work Breakdown Structure (WBS), cost accounts and work packages. The earned value of the work completed is then based on the budgeted value of the completed work segments (Harrison, 1992). Oberlender (1993), indicated that, earned value is used to define overall percentage complete for the whole project.

Overhead variance was ranked fourth. The difference between the standard overhead cost absorbed in the output realized and the real overhead cost is described as overhead variance. There are forms of overhead variance. These are the overhead expenditure variance and the overhead efficiency variance. The overhead expenditure variance is due to the difference between the standard allowance for the output achieved and the actual expenditure incurred.

Table 4.2: Cost control practices

DESCRIPTION	MEAN	RANK
Cash flow/S-curve	4.10	1 ST
Material cost variance	3.90	2 ND
Earned value	3.86	3 RD
Overhead variance	3.77	4 TH
Labor cost variance	3.69	5 TH
Sales variance	3.55	6 TH

Source: Field Survey, (2018).

4.3.2 Objective two: Challenges associated with cost control

With the second objective, the respondents were asked to indicate the challenges of cost control practices that occurs often in the Ghanaian construction industry. They were to do the rating using the five-point Likert scale of 1 = Not often, 2 = Slightly often, 3 = Moderate, 4 = Often, 5 = Very often. Their responses were analyzed and shown in table 4.3.

From the table, it can be realized that, lack of knowledge on the use of available tools and technology occurs most in the Ghanaian construction industry as indicated by the respondents. For a construction firm to be competitive among other firms, knowledge is a necessity (Martin 2010; Ademola, 2012). According to Ademola (2012), an insight of how cost is controlled in projects is considered as managerial and technical understanding and the absence of it has an effect on the cost control practice. Most construction professionals have difficulty in studying and understanding of the procedures involved in cost control practice by the usage of the right tools (Ademola, 2012).

Usage of old methods and concepts was ranked second. According to Song (2014), one of the ways that impedes on the practice of cost control is the reluctance in upgrading

outdated methods and concepts. According to Benjaoran (2009), most construction firm still engage in the usage of outdated project cost control methods is involves manual way of doing things, instinct, former work experience and paper-based information. Song (2014) also indicated that, knowledge about management of cost is not known to most owners and if known is very little and this impedes the practice of cost control in most construction firms. The difficulty in the application of outdated management of cost practices to present situations in relation to cost variance presents a challenge to these owners.

The difficulty in critically observing various sources of cost data daily was ranked third. As the construction work progress, earned value of each work element must be monitored to permit the identification of cost status at any given progress. The monitoring process may be involved with a vast quantum of data collection from different sources and parties. If a well-established standard procedure is not used to smoothen the advancement as well as guarantee completeness of data for cost control practice, it can be a huge barrier to its successful implementation (Sanni and Hashim 2013).

The fourth ranked factor was over emphasizing of results while ignoring the process of project cost control. Construction managers are very keen in cost control issues and constantly stress on its significance to effective construction management. Causes of the changes of cost and how to deal with the processes involved in the management are overlooked and all the focus is on the cost variance. Thus the practice of cost control is mostly neglected by most construction managers during the execution of the project (Song, 2014).

Table 4.3: Challenges associated with cost control

DESCRIPTION	MEAN	RANK
Lack of knowledge on the use of available tools and technology	3.68	1 ST
Usage of old methods and concepts	3.54	2 ND
Difficulty in monitoring different sources of day-to-day cost data	3.40	3 RD
Over emphasizing of results while ignoring the process of project cost control	3.32	4 TH
Lack of consistency in cost control by managers	3.24	5 TH
Lacking cost control processes and systems suitable to the organization	3.19	6 TH
Abandonment of complication cost control strategies	3.14	6 TH
Poor attitude towards ICT usage	3.02	8 TH

Source: Field Survey, (2018).

4.3.3 Objective three: Strategies to improve the use of cost control

With the third objective, the respondents were asked to indicate in writing, the strategies they think could be used to improve the usage of cost control practices of Ghanaian contractors. Their responses were analyzed using the content analysis.

They indicated that, construction firms should be consistent about their approaches of controlling cost. If managers become consistent on the cost control processes to adopt, it becomes easier in transferring the knowledge to others.

Furthermore, the respondents indicated that, clients and their advisors should closely monitor construction firms to ensure they are applying any form of cost control system on their project. This can serve as a motivation for construction firms to adopt such practices.

They also indicated that, construction firms must properly-establish standards and protocols in monitoring the sources of cost data that arises during the course of project execution.

Construction firms must also endeavor to educate their work personnel on the use of some cost control systems and its applicability on site so as to ensure its ease in adoption.

4.4 SUMMARY OF CHAPTER

This chapter analyzed and discussed data collected from fifty-nine (59) respondents. The data was analyzed using the mean score ranking and content analysis. With the objective one, it was realized that, the most often used cost control practice is cashflow/S-curve. Material cost variance was ranked second, followed by earned value and overhead variance. With the second objective, it was realized that, lack of knowledge on the use of available tools and technology occurs most in the Ghanaian construction industry as indicated by the respondents. Usage of old methods and concepts was ranked second followed by difficulty in monitoring different sources of day-to-day cost data and over emphasizing of results while ignoring the process of project cost control. With the third objective, the respondents indicated that, construction firms should be consistent about their approaches of controlling cost. Furthermore, the respondents indicated that, clients and their advisors should closely monitor construction firms to ensure they are applying any form of cost control system on their project. They also indicated that, construction firms must properly-establish standards and protocols in monitoring the sources of cost data that arises during the course of project execution. Lastly, construction firms must also endeavor to educate their work personnel on the use of some cost control systems and its applicability on site so as to ensure its ease in adoption.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The aim of the study was to is to determine the cost control practices used by construction firms in Ghana. In order to achieve the aim of the study, three (3) objectives were established which were to identify the cost control practices used in the Ghanaian construction industry, to identify the challenges associated with the cost control practices in the Ghanaian construction industry and to identify the strategies to improve the effectiveness of the cost control practices in the Ghanaian construction industry. With these objectives, an extensive literature review was conducted from which variables on cost control practices and its challenges were identified. The variables were subsequently used in the development of a structured questionnaire. The questionnaire was distributed and fifty-nine (59) was retrieved and used for the analysis of the study. The analysis was done using the mean score ranking and the content analysis. This chapter discusses the summary of the findings, limitations, further studies, conclusion and make recommendations.

5.2 SUMMARY OF FINDINGS

The data analysis was done with mean score ranking and content. The first and second objective were analyzed using the mean score ranking. The third was analyzed using the content analysis. With the objective one, it was realized that, the most often used cost control practice is cashflow/S-curve. Material cost variance was ranked second, followed by earned value and overhead variance. With the second objective, it was realized that, lack of knowledge on the use of available tools and technology occurs most in the Ghanaian construction industry as indicated by the respondents. Usage of old methods

and concepts was ranked second followed by difficulty in monitoring different sources of day-to-day cost data and over emphasizing of results while ignoring the process of project cost control. With the third objective, the respondents indicated that, construction firms should be consistent about their approaches of controlling cost. Furthermore, the respondents indicated that, clients and their advisors should closely monitor construction firms to ensure they are applying any form of cost control system on their project. They also indicated that, construction firms must properly-establish standards and protocols in monitoring the sources of cost data that arises during the course of project execution. Lastly, construction firms must also endeavor to educate their work personnel on the use of some cost control systems and its applicability on site so as to ensure its ease in adoption.

5.3 LIMITATIONS AND FURTHER STUDIES

1. This study was limited to D1K1 and D2K2 construction firms in the Accra metropolis.
2. This study was also limited to cost control practices that are used at the construction phase of a project.

In the future, studies can be conducted on the impact of contractor control practices of construction project performance.

5.4 CONCLUSION

Over the years, most projects have failed to meet some success factors of a project like cost and time. PCC is challenge to most contractors and members involved in a construction project and this is evident in the severity of the cost overrun in projects in the developing and Sub-Saharan countries. The study demonstrated that, construction

firms in Ghana are very much familiar with the S-curve cost control tool. The cash flow aids the contractor in determining the economic feasibility of the construction project. However, there are other suitable tools for controlling cost during the construction phase of a project. But, the study demonstrated that, there are numerous challenges in the proper implementation of these tools. These challenges include over reliance on old tools and techniques, lack of knowledge on the usage of current tools, lack of consistency in cost control approach and so on. Therefore, in order to improve the performance of projects in terms of cost, it is very significant for construction firms to expedite their cost control practices.

5.5 RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made;

1. Construction firms should be consistent about their approaches of controlling cost. If managers become consistent on the cost control processes to adopt, it becomes easier in transferring the knowledge to others.
2. Clients and their advisors should closely monitor construction firms to ensure they are applying any form of cost control system on their project. This can serve as a motivation for construction firms to adopt such practices.
3. Construction firms must properly-establish standards and protocols in monitoring the sources of cost data that arises during the course of project execution.
4. Construction firms must also endeavor to educate their work personnel on the use of some cost control systems and its applicability on site so as to ensure its ease in adoption.

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APPENDIX

RESEARCH QUESTIONNAIRE

TOPIC: EVALUATION OF THE COST CONTROL PRACTICES USED BY CONSTRUCTION FIRMS IN GHANA

SECTION A

RESPONDENT'S PROFILE

1. Please indicate your category in the Construction industry?
 - ☐ D1K1
 - ☐ D2K2
2. Please indicate your years of experience in your profession?
 - ☐ Below 5 years
 - ☐ 6-10 years
 - ☐ 11-15 years
 - ☐ Above 15 years
3. What is your highest level of education?
 - ☐ HND
 - ☐ BSc
 - ☐ Post Graduate
 - Others (specify).....
4. Please indicate the number of projects you have worked on for your firm?
 - ☐ Below 5 projects
 - ☐ 5 – 10 projects
 - ☐ Above 10 projects

SECTION B

OBJECTIVE ONE: COST CONTROL PRACTICES

6. Please indicate the cost control practices used **OFTEN** by construction firms in Ghana.

Please use the response scale below:

1 = Not often 2 = Slightly often 3 = Moderate 4 = Often 5 = Very often

No.	Cost control practices	1	2	3	4	5
1	Cash flow/S-curve					
2	Material cost variance					
3	Labor cost variance					
4	Sales variance					
5	Overhead variance					
6	Earned value					
	<i>If other, please specify</i>					

SECTION C

OBJECTIVE TWO: CHALLENGES ASSOCIATED WITH COST CONTROL

8. Please indicate the cost control challenge that occurs **OFTEN** in the use of cost control practices by Ghana contractors

Please use the response scale below:

1 = Not often 2 = Slightly often 3 = Moderate 4 = Often 5 = Very often

No.	Challenges associated with cost control	1	2	3	4	5
1	Usage of old methods and concepts					
2	Lack of knowledge on the use of available tools and technology					
3	Over emphasizing of results while ignoring the process of project cost control					
4	Lacking cost control processes and systems suitable to the organization					
5	Abandonment of complication cost control strategies					
6	Lack of consistency in cost control by managers					
7	Poor attitude towards ICT usage					
8	Difficulty in monitoring different sources of day-to-day cost data					
	<i>If other, please specify</i>					

SECTION D

**OBJECTIVE THREE: STRATEGIES TO IMPROVE THE USE OF COST CONTROL
PRACTICES**

9. In your opinion, what are the strategies that can be utilized to improve the usage of cost control practices by Ghanaian contractors.

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