

UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

**FACTORS INFLUENCING THE PROJECT COST FOR WORKS IN PUBLIC
INSTITUTIONS IN GHANA: PERSPECTIVE OF BUILDING CONTRACTORS
IN KUMASI METROPOLIS**



ABRAHMA OKAI ARYEE

AUGUST, 2016

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Submitted to the School of Graduate Studies, University of Education, Winneba in
partial fulfilment of the requirements for the award of the Master of Technology
(Construction) degree.**

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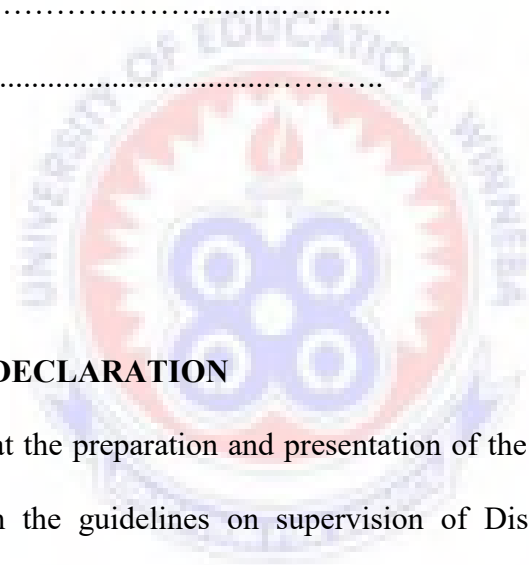
DECLARATION

CANDIDATE’S DECLARATION

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

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SUPERVISOR’S DECLARATION

I hereby declare that the preparation and presentation of the Dissertation was supervised in accordance with the guidelines on supervision of Dissertation laid down by the University of Education, Winneba.

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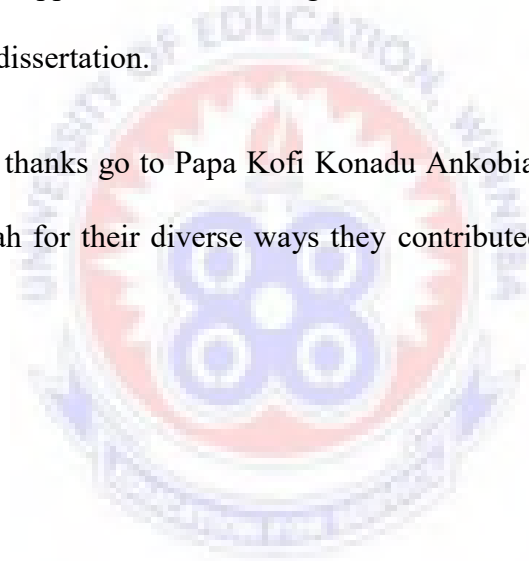
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DEDICATION

I dedicate this dissertation to my dear late father, Mr. E. O. Asafo-Adjei who nurtured in me the untiring interest in the value of education. Also to my late mother Mrs. Grace Asafo-Adjei for their prayers and companionship and rest of my family, who provided the support and encouragement that, enabled me to complete my M. Tech in Construction programme.



TABLE OF CONTENTS

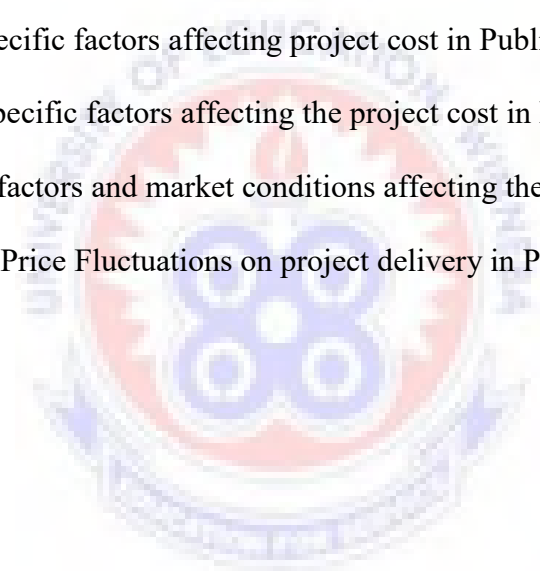
Content	Page
DECLARATION	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES	viii
ABSTRACT.....	ix
CHAPTER ONE	1
GENERAL INTRODUCTION.....	1
1.1 Background to the Study.....	1
1.2 Statement of the Problem.....	4
1.3 Purpose of the Study.....	4
1.4. Research Questions.....	5
1.5 Significance of the Study.....	5
1.6 Limitations of the Study.....	6
1.7. The Scope of the Study	7
1.8 Organisation of the Study	7
CHAPTER TWO	9
LITERATURE REVIEW	9
2.0 Introduction.....	9
2.1 Overview of the Construction Industry.....	9
2.2 The Nature of the Construction Industry	10

2.3 Cost –Price Distinction	12
2.4 Construction Costs Categories and Components.....	14
2.5 Factors Influencing Construction Costs.....	17
2.5.1 Cost overruns and cost escalations	18
2.5.2 Framework of influencing factors.....	21
2.6 Factors Affecting Cost and Time Performance	27
2.7 Empirical Literature	28
2.7.1 Project construction cost in Nigeria.....	28
2.7.2 Project construction cost in Ghana	29
CHAPTER THREE	31
RESEARCH METHODOLOGY.....	31
3.1 Introduction.....	31
3.2 Research Design.....	31
3.3 Population of the Study.....	31
3.4 Sampling Techniques Employed and Sample Size.....	32
3.4.1 Sampling Technique	32
3.4.2 Sample Size.....	32
3.5 Data Collection Instruments	33
3.5.1 Sources of Data.....	33
3.5.2 Development of Questionnaires.....	33
3.5.3 Reliability and Validity of Questionnaires	34
3.5.4 Ethical Considerations	35
3.6 Data Analysis Methods.....	35

CHAPTER FOUR	36
DATA PRESENTATION, ANALYSIS AND DISCUSSIONS	36
4.1 Introduction.....	36
4.2 Demographic Profile of Respondents	36
4.2.1 Gender of respondents	37
4.2.2 Profession of Respondent	37
4.2.3 Years of experience of Respondents.....	38
4.3 Internal Factors Affecting Project Cost	39
4.3.1 Factors Related To Clients Characteristics	39
4.3.2 Project Specific Factors	40
4.4. External Factors Affecting Project Cost	43
4.5 Effect of Price Fluctuations on Project Delivery in Public Institutions.....	45
4.5.1 Effect of client specific factors on price fluctuations	46
4.5.2 Effect of external factors and market conditions on the Price fluctuations	46
CHAPTER FIVE	48
SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	48
5.0 Introduction.....	48
5.1 Summary of Findings.....	48
5.2 Conclusion	49
5.3 Recommendations.....	50
5.4 Suggestion for Further Studies.....	51
REFERENCES	52
APPENDIX: QUESTIONNAIRE	61

LIST OF TABLES

Table	Page
Table 2.1: Four groups of factors influencing construction costs.....	24
Table 3.1 Categories of Contractors in Ghana.....	32
Table 3.2 Category D and K Contractors in Kumasi Metropolis.....	32
Table 4.1: Gender.....	37
Table 4.2 Profession of construction professionals in Kumasi Metropolis.....	38
Table 4.3 Years of Experience on Project Management.....	38
Table 4.4 Client specific factors affecting project cost in Public Institutions.....	39
Table 4.5 Project specific factors affecting the project cost in Public Institutions.....	41
Table 4.6 External factors and market conditions affecting the project cost.....	43
Table 4.7 Effect of Price Fluctuations on project delivery in Public Institutions.....	45



ABSTRACT

The study examined the factors influencing the project cost for works in Ghanaian public institutions from perspective of building contractors in Kumasi Metropolis. The study was descriptive in nature and involved survey of opinion by means of questionnaires. The target population of the study was registered contractors in Kumasi metropolis within the Ashanti Region. The number of registered construction firms was 80 out of which 50 were sampled for the study. Random sampling technique was used to select the sample size. All completed questionnaires were assembled and organised for processing. Data was coded and analysed using Statistical Package for Social Sciences (SPSS version 21). The study findings revealed that the most important factors that influence the project cost in public institutions are: material (prices/availability/supply/quality/imports), project complexity, currency exchange fluctuations, prevailing economy conditions, site requirements, location of project, type of structure, labour cost and availability, client method of payment and type of client. It is therefore recommended that clients and consultants should give more consideration to cost estimating process in order to enhance productivity and accuracy. Training, seminars, and workshops aimed at improving the local practice in cost estimating and increases the capabilities of estimators in using estimating software should be organized.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the Study

The future of the society is what is building today, and the goals along with other means and resources will allow the nations to determine the future of their country. Construction is a vital sector contributing significantly to the economics of all countries. Construction industry plays a major role in the development and achievement goals of society, It is considered as one of the largest industries and contributes to about 10% of the gross national product (GNP) in industrialized countries (Navon, 2005). Generally construction works are increasing rapidly to meet the growing needs of the population and to keep up with global development. To progress in terms of construction, project construction must be studied carefully and prepared well in order to get the best results, and to help in moving in the right direction to establish the future goals.

So failure does not only mean doing things wrong, but even doing things almost right, and so this idea will lead to recognize the best way to implement project management in construction projects and to open new era in thinking that will give value to construction industry. These led to study how projects are managed, and what are the major elements and problems affecting the construction industry, in order to help managers to plan and implement construction projects in a proper way that will lead to better results and less risks, and to achieve success with good quality.

Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion. The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability. Construction is becoming more complex, a more sophisticated approach is necessary to deal with initiating, planning, financing, designing, approving, implementing and completing a project (Takim and Akintoye, 2004).

The construction projects are complex in their nature because they involve a large number of parties as clients, contractors, consultants, stakeholders, shareholders and regulators. These parties can affect the performance of the projects through many related topics and factors such as time, cost, quality, client satisfaction, productivity and safety. There are many realistic reasons such as amendment of designs and drawings. In addition, there are other different reasons affecting construction projects performance such as poor management and leadership, inappropriate participants, poor relations and coordination, absence of motivation, control, monitor or decision making systems, inadequate infrastructure, political problems, cultural problems and economic conditions.

The development in the construction industry is increasing in size, technological complexity, interdependencies and variations in demand from the client. Success criteria

which relate to construction project often changes from project to project depending on participants, scope of services, project size, and sophistication of the owner related to the design of facilities, technological implications, and a variety of other factors.

Construction represents one of the most important industries in the development of nation especially in the developing countries. Specifically, construction is one of the most significant industries in the Ghanaian economy. It is estimated that the Gross Domestic Fixed Capital Formation of construction industry in Ghana is 45% to 60% of the total capital formation (Ofori, 2012). This means that constructed items are vital to the pursuit of economic activity as they provide the space needed for the production of all goods and services. Gundecha (2012) argues that the physical infrastructure built through construction activity is the backbone of every nation's economy because it represents the arteries for the assistance of productive activity by facilitating goods and services to be distributed. Gundecha (2012) further argued that built items also offer people the opportunity to improve their living standards.

The significance of the construction industry in the economic growth and national development has sparked efforts at all levels of national socio-economic progress to develop their industries to enable them to reach their potential. Ofori (2012) argues that construction companies are, however, especially susceptible to bankruptcy due to the disconnected nature of the industry, high cost of production, bureaucratic procedure involved in tendering, excessive competition, relatively low entry barrier, high uncertainty and risk involved, and unpredictable fluctuations in construction volume.

Among the factors affecting the construction industry, cost of tendering is the most important factor because it determines whether a contract would be awarded to contractors or not. It is therefore important for construction companies to evaluate the factors affecting the cost of tendering so that timely and appropriate strategies can be put in place to maintain their survival.

1.2 Statement of the Problem

The demand for more construction of all types, coupled with a tight monetary supply has provided the construction industry with a big challenge to cut costs. The problem of high contract costs of all aspects of construction is becoming obvious. Consequently, substantial increases are being observed in projects. This substantial increase has brought about loss of client confidence in consultants, added investment risks, inability to deliver value to clients, and disinvestment in the construction industry. The study therefore investigates the factors that influence the project cost in public institutions in Ghana.

1.3 Purpose of the Study

The main aim of the study is to investigate the factors that influence the project cost in public institutions in Ghana. The following are the specific objectives of the study:

1. To identify internal factors (client specific and project specific) that affect the project cost in public institutions.
2. To identify external factors that affect the project cost in public institutions.
3. To examine the effect of price fluctuations on project delivery in public institutions.

1.4. Research Questions

The following research questions are put forward to guide this study:

1. What are the internal factors (client specific and project specific) that affect the project cost in public institutions?
2. What are the external factors that affect the project cost in public institutions?
3. What is the effect of price fluctuations on project delivery in public institutions?

1.5 Significance of the Study

This study is aimed at recommending solutions to improve the existing conditions in the project cost of public institutions in Ghana. The results of this research will help various stakeholders in the public procurement system in the following ways:

First, the various public institutions will know the right cost of project to bargain for. This will help in the effective implementation of the procurement system in public institutions.

Second, the project cost would inform clients and other stakeholders to develop standards to reduce those high expenditures. It would also create more awareness to contractors and consultants on cost incurred.

This study would also help contractors to know the right process to follow before works and services are supplied or procured. This will help reduce arbitrariness in the use of the public procurement system.

Finally, the results of the study will add to literature in the study of construction cost in Ghana. Prospective researchers can make use of this study in their future works.

1.6 Limitations of the Study

The first limitation of this study arose from the co-operation from the respondents. Most of the respondents were of the view that the research was meant to find their wrong doings.

To mitigate this, networking and education of the respondents on the reason behind this project was undertaken. Apart from lack of co-operation, time constraint was another limiting factor to this study because the study coincided with other academic activities. This limited the researcher's ability to test larger samples from the population. Because of this a sample of public institutions and contractors were chosen for the study. This is common with most research projects as it is impossible to engage the whole population for a study. However, the choice of the participants was carefully done to have a true representation of the participants so as not to affect the data collected.

Another limitation could come from insincerity of respondents, that is, information given could not be reliable and that could feed into wrong generalizations to the total population of the study. Despite these limitations, greater efforts were made to gather sufficient and relevant data for the study. Services of research assistants was obtained to identify respondents.

1.7. The Scope of the Study

The study was aimed at assessing the factors affecting the project cost in public institutions in Ghana. The study should have covered all the contractors in the country but due to time and financial constraints only fifty (50) contractors in Kumasi were chosen. Data collected covered the factors driving project cost in public institution.

1.8 Organisation of the Dissertation

This dissertation is organized into five chapters. The introduction consists of the background of the study, statement of the problem, objectives of the study, significance of the study, limitations of the study and the scope of the study and the organization of the study are captured in chapter one.

Chapter two consists of review of related literature on construction project cost. Theories that relate to the subject area were also explained. Certain terms in the study were explained as well in chapter two.

In chapter three, the methodology used for the study is presented. This embraces the choice of the study area, population, sampling techniques, data collection procedures, research design and data analyses.

The presentation and discussion of results are captured in Chapter four. The chapter presents the results and the analysis of the study. Discussions and comparison of the

factors affecting cost of tendering are also looked at in this chapter. Finally, chapter five contains the summary, conclusion and recommendations of the study.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This study intends to investigate the factors that affect the project cost in works for public institutions by contractors. This chapter is therefore dedicated to reviewing and synthesizing related literature on construction cost.

2.1 Overview of the Construction Industry

Ofori (2012) argues that the construction industry is made up of organizations and persons who include companies, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers, plant and equipment suppliers, builders and merchants. According to the author, the construction industry has a close relationship with clients and financiers. The author further added that the government is also involved in the industry as purchaser (client), financier, regulator and operator.

Mohamed and Stewart (2003) also contend that construction covers the process by which physical infrastructure are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished. The authors further explained that the constructed infrastructure include: Buildings of Transportation systems and facilities which are airports, harbors, highways, subways, bridges, railroads, transit systems, pipelines and transmission and power lines. Wong (2007) also explains that those who play important roles in the construction industry can be divided into three levels of professional types.

The first level consists of quantity surveyors, architects, engineers, land surveyors, and project consultants and government authorities. The second level is made up of project managers, site supervisors, material suppliers and machines operators. And finally construction workers, plumbers, electricians, welders, plasterers, carpenters and steel workers constitute the third level. The industry has a close relationship with clients and financiers. The government is involved in the industry as purchaser (client), financier, regulator and operator.

Barrie and Paulson (2012) also contend that the construction industry is divided into four categories: residential construction, building construction, heavy engineering construction and industrial construction. The authors maintained that the residential construction is further explained as single family homes, multi-unit town houses, garden apartments, high-rise apartments and condominiums.

2.2 The Nature of the Construction Industry

Gann (2006) posits that the nature of the construction industry is quite different from other industries, such as the manufacturing or retail sector, where processes and the working environment are well defined and controlled. Gann (2006) maintains that the temporary nature and uniqueness of construction projects are often reflected in one-off locations, one-off designs solutions, one off project teams and usually large numbers of geographically dispersed organizations and individuals, which lead to a more fragmented communication platform and making project communication activities inevitably complex.

Thomas (2003) argues that majority of enterprises in the construction industry in least developed countries (LDCs) are small with a few of them being in the medium category. According to the author, world-wide, small and medium enterprises (SMEs) account for 90% of all enterprises and over 99% in developing countries. They are mostly owned by indigenous people. Jekale (2004) on the other hand argues that in developed countries and countries with economies in transition, other than the least developed countries, their local construction industries have the lions share in market opportunities.

It is argued by Sekou (2012) that a substantial part of the construction work takes place in the informal sector of industry too. Sekou (2012) maintains that about 80% of the population lives in the rural areas. The buildings and other small infrastructure facilities for this major part of the population are constructed by the informal sector. It also includes works carried out by individuals and groups on a self-help basis without contracting.

According to Mohamed and Stewart (2003), since the construction industry is a fundamental economic activity which permeates through most of the sectors of the economy it has a major role to play in achieving social economic development objectives of any country; local firms and Professionals should be fully involved in the process. The sector has indirect impact on the growth or stagnation of the overall economy. Furthermore, Ofori (2012) posits that the development of a strong construction industry should be supported by sectoral and macro-economic policies geared towards stimulating growth and competitive position of the local actors. Experience has shown that

development of the construction industry requires government commitment, many years of sustained effort and the right operating environment. A good economy is equally important as it creates demand for its services.

According to Love (2006), the truth about the construction industry is that the industry is faced with many new challenges, including the need to change current work practices; become more clients orientated; become more competitive; and become more productive. These challenges are attributable to factors that affect the working environment, including globalization of the economy; greater performance expectations from the clients; increased competition between local contractors; continued restructuring of work practices and industrial relations. Ofori (2000) asserts that it is against this background that at various levels of socio-economic development, several countries have recognized the need and importance of taking measures to improve the performance of their construction industry in order to meet the aspirations of its developmental goals.

2.3 Cost –Price Distinction

Before examining construction cost constituents and factors that affect them, it is noteworthy to point out that a lot of literature on construction and there is an unclear distinction between the words price and cost. The two words became synonymous and a source of confusion in construction contexts such as i.e. cost estimating, pricing, building cost or building price. Unambiguous definition of construction costs not only helps to identify relevant elements of construction costs and who incurred those costs but also facilitates the identification of factors that affect construction costs. For instance, whether

the land cost is a part of the construction costs or a separate item is very essential in determining not only who incurred these costs (developer or contractor) but also its influences on the total production costs especially when the contractor also acts as a developer. Fleming (2015) draws a distinction between building prices and building costs by referring to the building prices as the market price for building work payable by a client and the building costs as the costs incurred by a contractor in carrying out work. Building price reflects variation in profits whilst building cost does not. Another way to describe the relation between the concepts is to say that building costs can be estimated and described in two ways. One is the price charged for the finished building - building price according to Fleming (2015) and the other is the cost of the resources to create it (Ferry et al., 2009. The seller's price is a buyer's cost, such that the contractor's price is the client's cost while the subcontractor's price is the contractor's cost.

Duncan (1996) contends that care should be taken to distinguish cost estimating from pricing when a project is performed under a contract. He argues that pricing is the business decision that uses cost estimate as one of many considerations. But when the contractor also acts as a developer, or when a developer sells the finished project to the final user, land prices and other developer's overhead costs are included in the transaction and often are called price rather than cost. Bowen and Edwards (2015) describe a situation where the price and cost differentiation is crucial. They contend that price always reflects some consideration of profits while the term cost does not always do this. In the empirical part of this research, rental apartment projects are the centre of attention and in these projects developers use independent contractors who charge construction

cost plus some profit margin. In such a case construction price is the logical concept to use. The developer's overhead is also not easy to identify, as a number of overheads within an organization have to be divided between projects.

2.4 Construction Costs Categories and Components

Having discussed the difference between price and cost in the previous section, further clarification of the word "cost" itself is indeed necessary in order to be able to identify whether a specific cost element is quantity, location, or time dependent. In accounting circles, the word "cost" is seldom used without qualifying adjectives and hence different kinds of cost must be clearly explicated (Lock, 2003). There are some costs that are simply recognizable and self-explanatory that relate to a specific item or product such as labour or material costs. Thus, they have been termed as direct costs. Other costs that are neither specific nor easily identifiable, i.e. overhead costs are often labelled as indirect costs. Carr (2009) defines direct cost as the costs that are not counted if the activity has not been performed and indirect costs as the ones that would have occurred even if an activity had not been performed. Materials, labour, and equipment qualify as direct costs because of their physical traceability to the construction activity taken place while project and general overhead, and (perhaps) profits are indirect costs. Indirect costs are also those small costs that would be direct except that assigning them to activities is not economical (Carr, 2009). Ferry et al. (2009) did not consider profit as part of the contractor's costs. They see it as the difference between the builders' cost and the client's price. Akintoye and Skitmore (2011) regard the mark-up as a prior estimate of profitability.

Variable and fixed costs are two often-used terms in the construction literature that relate to direct and indirect costs respectively in an unclear way. While the distinction of direct and indirect costs depends much on traceability of specific cost to a particular activity, variable and fixed costs emphasise the rate at which different costs vary when the level of the work activity changes. Costs that remain virtually unchanged and continue to be incurred even though the workload might fluctuate between extreme limits are termed as fixed costs (Lock, 2003). Indirect costs usually represent the largest component of fixed costs. To the contrary, variable costs are typically confined to the direct costs and their rate of incurrence depends on the level of work activity. Stewart (2012) claims that fixed costs are only truly fixed over a given range of output because of the inflation that swells the operating and general overhead costs over time.

More broadly defined and less used construction cost terms are hard and soft costs. Geltner and Miller (2001) describe the former as direct costs of the physical components of the construction project such as land cost, labour, material and equipment, developer fees, construction management, and overhead costs. The soft costs include cost of design, legal, and financing.

Most of the components of construction costs are integrated in the above cost related sets of terms and some authors have tried to quantify them and put a figure on the different weights of these components in the total construction costs. Labour and materials costs have not only been prominently cited as components in the construction cost structure but they have also been tagged as the largest proportions in the total construction costs.

Bertelsen and Nielsen (2007) mention that in Denmark the typical building costs for social housing schemes can be divided as follows; materials 50 percent, labour 30 percent, heavy equipment 5 percent, construction management and supervision absorbs the other 15 percent. The Construction commission (SBI:s Byggekommisionen 2002) reports that construction materials were approximately 40 percent of contractors' costs in multi-family housing projects though this figure could be lower due to discounts on bulk material. Construction materials account for over half of the final cost of house building while the cost of labour account for less than third, and overheads and profit stand for the rest (Stone and Reiners, 2014).

Adams (2015) study that examines residential construction industry in the early nineteenth century not only supports the importance of labour and material costs in the total construction costs scheme but it also highlights the ambiguity surrounding the inclusion of other elements in the construction costs structure. He mentions that a simple labour-material breakdown in 1859 of all construction projects surveyed indicated that 56 percent of total costs were attributable to direct, on site, labour costs and 44 percent to materials. Beyond the labour material structure of the construction costs, Adams (2015) counted overhead and profit in labour costs in the 1959-1962 figures (it is not clear whether he included it in the 1859 figures). However, Xiao and Proverbs (2002) in their comparative analysis of the performance of contractors in three countries used unit price that is composed of labour, materials, plant, overheads and profits as separate percentage components. Adams (2015) was surprised to find out that the 1959-1962 cost structures were similar to those of the early century in terms of the total breakdown of costs

between labour and materials (52 and 47 percent respectively). His data show that there has been very little basic change in cost structure of residential building over a period of almost two centuries. He concluded that the cost structure of the industry has been stable for on site building over a long period of time.

Labour and materials costs alone would not provide an accurate picture of the movement of total construction costs (Adams, 2015). Wigren (2015) tries to separate construction costs changes into three main components; change in factor prices, in quality, and in efficiency. He uses a factor price index that measures price changes of all factors of production i.e. wages, prices of different kinds of building materials, transport costs, interest, value added tax, etc. However, the index was not constructed to measure regional cost changes.

2.5 Factors Influencing Construction Costs

Factors that could influence or determine the magnitude of construction costs are numerous. Chan and Park (2005) state that cost is affected by a large number of factors because of the fact that construction is a multidisciplinary industry and its work involves many parties such as the owner and various professionals, contractors and suppliers. Thus, a project cost not only depends on a single factor but a cluster of variables that are related to the characteristics of the project and to the construction team as well as the market conditions.

Generally, construction cost increases for the developer can arise in two situations (Donner, 2000). The first is when unexpected events or actions occur that force costs to

increase for the project as a whole and where the risk is already allocated in advance. Ferry et al. (2009) describe this form of risk allocation as contingencies and it is an amount the contractor is instructed to add to his tender as a cushion to absorb unforeseen extras. Though an adequate amount of risk allowance is estimated to be around 5% of the above-the-line cost for projects that does not entail excessive degree of risk (Lock, 2003). Performance on previous projects and the level of market competition dictate how much allowance to allocate for covering unforeseen conditions. This situation is often caused by factors that are beyond contractors or developers' control such as inflation. The second situation comes up when an unexpected event occurs but where the risk allocation is not specified in advance and the extra costs will depend on the bargaining power and anticipation of other party's behaviour.

2.5.1 Cost overruns and cost escalations

One may need to take up the question of whether a cost increase during a project can be categorized as cost overrun or a cost escalation. Basically, a distinction between the two terms is crucial in order to understand whether the cost increase experienced by a specific project is attributable to cost overruns that are particular to that project or that it could be characterized as cost escalation, which is a situation when costs change over time for similar projects in a region.

Cost escalation and cost overruns are often used interchangeably in the construction literature and pose some difficulty if one needs to know precisely the cause and the factors that are escalated. On one hand, cost escalation is usually attributed to many

factors pertaining to both the original cost estimate (Stewart, 2012) and to unforeseen overruns during construction, which indicates that cost overrun is one of the factors that are behind construction costs escalations. On the other hand, cost overruns among other factors are often caused by the escalation of the unit price of resources such as labour and materials.

Cost overrun, when the final cost of the project exceeds the original estimates (Avots, 2013), can be considered as an idiosyncratic or a unique cost increase. It is difficult to take a broad view of its occurrences in any specific city or region because of the uniqueness of the project in terms of architecture, geological, client quality requirements, and the efficiency of the actors in the building process, etc. Contractor-specific factors such as type of contract and context of contract contribute to the magnitude of contractor's cost overburden when a cost overrun occurs (Akinci and Fischer, 2008). Some of the most referred anomalies in the construction costs are delay of project start or delay of completion that cause unexpected cost increase, quality deficiency that could trigger disputes and repair costs, and cost increases due to factor prices or an unforeseen situation that could introduce extra costs. Koushki et al (2005) identified several factors that cause delays and cost increases in the construction of private residential projects in Kuwait. Changed orders, financial constraints and owner's lack of experience in construction were the main causes of time-delays while contractor-related problems, material-related problems and financial constraints were the main causes of cost overruns.

A cost escalation is defined “as the increase in any element of project costs when the cost of that element is compared between two different periods” (Lock, 2003). Davey (2000) and Stewart (1982) present factors that could be attributed to cost escalation though they are difficult to be categorized as cost overruns or cost escalation. Davey (2000) states that cost escalation causes fall into five categories:

1. Changes to requirements often initiated by the costumer
2. Technology costs arising from eagerness to use latest technology,
3. Changing quotations
4. Impact of risk by adding allowances to prevent excessive costs and expected outcomes
5. Organizational stability as a result of project team or work breakdown.

The last three factors could be the result of changing market conditions where unit prices are rising; uncertain outcomes that increase the amount or risk allowance added to the estimated cost; and that mergers or takeovers between struggling and flourishing firms took place.

Meanwhile, Stewart (2012) attributes cost escalations to several factors that are either not controllable or that to a varying degree are manageable. They include the accuracy of original cost estimate, degree of government regulation and control, construction completion delays, number of design changes, and labour related matters such as their availability, skills, and increases in fringe benefits. The author claims that generally cost escalation above the inflation rate is a combination of underestimating the amount of work that would be needed to undertake the project and overrunning the amount of work

that it should have taken to do the job. Notice that the factors that Stewart (2012) mentions cover both cost overruns and cost escalations according to the definition above.

2.5.2 Framework of influencing factors

Most of the significant factors affecting project costs are qualitative such as client priority on construction time, contractor's planning capability, procurement methods and market conditions including the level of construction activity (Elhag et al, 2005). Technological and project design, contractor's expertise and management ability, and the client's desired level of construction sophistication play an important role in determining the cost of the project. Gyourko and Saiz (2006) in their investigation on construction costs and the supply of housing mention some potential factors that can explain differences in construction costs across U.S. housing markets. The extent of unionization within the construction sector, local wages, topography of the area, and local regulatory environment cause higher costs according to their study.

Construction cost increases seem to materialize after the commencement of the construction but the problem is deep-rooted during contract estimation and tendering stage. Wallström (2015) claims that according to Sjögren (2010), ninety-five percent of the final cost of the construction is fixed before even the construction phase starts. Akinci and Fischer (1998) separate factors affecting cost estimates of project from those affecting final cost projects. Factors that affect cost estimates are estimator-specific factors, and design and project specific factors (vagueness in scope, design complexity, and project size). Factors that affect the total cost incurred at the end of project and that

increase the gap between the actual cost and the estimated cost of a project are also gathered into two major groups: Construction specific factors as well as economic and political environment-specific factors. The former includes unknown geological conditions, weather conditions, and client- and subcontractor generated risk factors. Contractor-specific factors affect the allocation of risk between the owner and the contractor and specifically contract clauses may result in ambiguity and disputes that could decrease the cost effectiveness in a project (Akinci and Fischer, 2008).

Similarly, Akintoye (2000) presents twenty-four variables that affect the project cost estimation and he groups them in seven areas. Some of them may also have an impact on the final construction costs. The seven factors are project complexity, technological requirements, project information, project team requirement, contract requirement, project duration, and market requirement. Shash and Abdul-Hadi (2012) also presented thirty-seven factors affecting contractor's mark-up decision in Saudi Arabia. They found that the size of a project was the most heavily contemplated factor among these factors when contractors are deciding the mark-up for a project.

Other factors that have been mentioned as affecting the price of the project during construction are the quality and the constructability of the design, managements techniques employed by the contractor, location of the project, and macroeconomic conditions (Williams, 2003). Iyer and Jha (2005) in their analysis of factors affecting cost performance of Indian construction projects state that conflict among project participants, presence of poor project specific attributes, hostile socio economic relations and climatic

conditions, aggressive competition at tender stage, and short bid preparation time adversely affect construction costs. They indicated that coordination among project participants was the most significant of all factors having maximum positive influence on cost performance.

In a follow-up study, Shash and Abdul-Hadi (2013) discussed how pre-qualification requirements might give contractors valuable information in evaluating the level of competitiveness. They assert that if pre-qualification requirements limit the contractors who can bid for the project to certain class or grade, contractors may have the ability to reasonably estimate the number of bidders and their identity, which in turn can affect the level of their bids. Mochtar and Arditi (2001) state that this type of mark up decision assessment, that includes learning about competitors' identity and how many of them there are, may help the bidder to determine the severity of the competition and accordingly in setting the optimum mark-up that maximizes expected profit and the chance of winning the project. How the client designs the bid process may therefore be one factor that affects the price/cost.

In order to carefully analyze these numerous and non-easily quantifiable factors influencing construction costs, four groups of factors were formed based on the extent to which factors could be influenced by the construction actors especially contractors and clients (see Table 2.1).

Table 2.1: Four groups of factors influencing construction costs

Category of factors	Factors influencing construction costs:
Project-specific factors	Project size Project complexity Quality
Client and contractor-related factors	Contractor type Client type Procurement method Contractor-Client relationship
Competition and Market conditions	Level of competition Level of construction activity
Macroeconomic and political factors	Inflation rate and interest rate General labour market rules Other government regulations

By aggregating many factors influencing construction costs into four groupings, one can determine which type of factor or layer to focus on. In the next step a detailed analysis of a specific interesting area could be made.

The project-specific layer contains factors that are considered to be related to a particular project such as the size, the complexity and the required quality of the project. Here, client quality requirements and project characteristics are in the hands of the clients and they are often subjected to pre-requisites that contractors must comply with. Furthermore, the size and complexity of the project affect the organizational structure of the contractor and the project work breakdown unit costs as well as duration of the project (Akintoye, 2000). The size of the contract is clearly a major determinant of the number of firms which can undertake the work (Hillebrandt and Hughes, 2000). A large project requires more of all inputs than a small project and only some of the total contractors in the

country have the capital, management, and other scarce inputs to carry out such a project. Besides, there is evidence that for main contractors labour expenditure required per unit of work decreases when the size of the contract increases (Stone and Reiner, 2015). According to the same source, the size of the contract does not appear to have any marked effect on the labour expenditure of subcontractors.

The size of the contract also affects the overhead percentage that contractors charge the developer. Contractors adjust the general or company overhead base to the nature of the contract, the size and complexity of the project, the contractor's need for work, and contractor's experience with the client or the number of contractors competing to win the project (Assaf et al, 2001). The adjustment may take the form of penetration strategy where contractor lowers the profit margin in order to outbid other competitors that are entrenched in the specific market (Mochtar and Arditi, 2001). Project-specific factors may favour certain contractors who have the capability to undertake the tendered project and thus limit the competition

Factors in the client and contractor related factors layer are of a qualitative nature with the exception of the contractor type. Large contractors can maintain sizeable manpower and machinery and obtain discounted construction materials. Stone and Reiners (2015) draw a connection between contract size and the size of contractors. They state that only the largest firm normally undertakes the largest contracts, while both small and large firms undertake the small contracts. When a contractor believes that it possess a competitive advantage over the other bidders in terms of delivering the owner's most

important requirements, the company tends to practice what Mochtar and Arditi (2001) termed as “skimming” where the bid offer is relatively higher than the figure a market normally would allow.

Risk allowances and mark-ups charged by contractors may depend on whether the client is a private or a public entity. Hendrickson and Au (2003) claim that contractors may tend to submit high bids for public projects in order to compensate for the bureaucratic and restrictive contract terms. Different procurement methods intend to fulfil different objectives; cost level certainty, completion time, quality work, etc. Municipal companies are subject to competition regulations and other constraints that favour certain contract form and procurements methods i.e. all-in-one or general contract and fix price. Contractor-client relationship, for example whether there exist long-run relationships or partnering relations between the parties can be important for what happens in changing economic conditions.

The competition and market condition layer comprises factors that are difficult to control by the contractor and client but that can have a huge impact on contractor’s costs and mark-ups. An unstable construction market would make it difficult for contractors to decide on the optimal level of overhead costs that enables contractors to win and efficiently administer projects. Similarly, the intensity of competition that contractors confront affects their bidding strategies. More competition encourages many contractors to tender any contract and also makes it difficult for contractors to develop a clear and decisive strategy (Drew et al., 2001). This especially concerns the mark-up level that

would allow a contractor to win the tender at a profit margin that is in line with the strategic position of the firm in that market (Akintoye, 2000).

Macroeconomic and political factors such as inflation and interest rate fluctuations as well as labour laws, general labour conflict and building regulations can impose heavy costs and delays in a building project. Direct costs are affected by the unit price increases while the influence of these factors on indirect costs often is through overhead costs. Generally, overhead costs are calculated as a percentage of direct costs and thus are affected directly by the inflation of unit prices of labour, materials, etc. in addition to other cost increases caused by government regulations. Labour strikes often cause delays that not only result in loss of productivity but also could induce quality deficiencies stemming from hasty job completion of the contractor or subcontractor that could result into repair cost, and disputes. Below is a summary of the four layers showing the influencing factors and their impact on direct and indirect costs.

2.6 Factors Affecting Cost and Time Performance

One of the most important problems in the construction industry is time and cost overruns. Time and cost overruns occur in every construction project and the magnitude of these delays and cost overruns varies considerably from project to project. So it is essential to define the actual causes of time and cost overruns in order to minimize and avoid the delays and increasing cost in any construction project.

Time overrun is defined as the extension of time beyond planned completion date traceable to the contractors. Delays are incidents that impact a project's progress and postpone project activities; delay causing incidents may include weather delays, unavailability of resources, design delays, etc. In general, project delays occur as a result of project activities that have both internal and external factors surrounding the project. Cost overrun is defined as excess of actual cost over budget. Cost overrun is also sometimes called "cost escalation", "cost increase", or "budget overrun". It is the difference between the original cost estimate of project and actual construction cost on completion of works of a commercial sector construction project. A number of unexpected problems and changes from original design arise during the construction phase, leading to problems in cost and time performance. It is found that poor site management, unforeseen ground conditions and low speed of decision making involving all project teams are the three most significant factors that cause delays and problems of time performance. It is remarked that effective communication, fast information transfer between project participants, good selection and training of managers, and detailed construction programs with advanced available software can help to accelerate the performance (Chan, 2002).

2.7 Empirical Literature

2.7.1 Project construction cost in Nigeria

Okpala and Aniekwu (2008) investigated causes of high costs of construction in Nigeria. The study revealed 27 factors contributing to high cost and delays in completion time. A questionnaire survey was conducted which included engineers, architects and quantity

surveyors. The top ranked factor was identified as price fluctuations. The factors identified in this study were largely influenced by the locality of the country in which the research was conducted (Okpala and Aniekwu 2008).

Elinwa and Buda (2013) investigated construction costs factors in Nigeria. A questionnaire survey was conducted, which involved architects, engineers and quantity surveyors. Thirty– one variables were assessed and analyses of results showed good arguments between responses. The top ranked factors, which contributed to construction cost included, cost of materials, fraudulent practices and fluctuation in prices of materials. Memon and Rahman (2010) investigated the factors affecting construction cost in large projects. Their Results showed that “Cash flow and financial difficulties faced by contractors”, “Contractor's poor site management and supervision”, “Inadequate contractor experience”, “Shortage of site workers” and “Incorrect planning and scheduling by contractors” were more significant factors that affect construction cost.

2.7.2 Project construction cost in Ghana

In Ghana, Frimpong (2003) found 26 factors that cause cost overruns in construction of ground water projects in Ghana. According to the contractors and consultants, monthly payments difficulties was the most important cost overruns factor, while owners ranked poor contractor management as the most important factor. Despite some difference in viewpoints among the three groups surveyed, there is a high degree of agreement among them with respect to their ranking of the factors. The overall ranking results indicate that the three groups felt that the major factors that can cause excessive groundwater project

cost overruns in developing countries are poor contractor management, monthly payment difficulties, material procurement, poor technical performances and escalation of material prices.

Cost is among the major considerations throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success. Despite its proven importance it is not uncommon to see a construction project failing to achieve its objectives within the specified cost. Therefore it is more important to assess and rank the most cost-influencing factors on construction cost.

These factors are incorrect planning and scheduling by contractors; fluctuation in prices of materials; frequent design changes; unforeseen ground conditions; shortages of materials; expropriation problems; political problems; inadequate contractor experience; change in the scope of the project; low speed of decisions making; cash flow and financial difficulties faced by contractors; contractor's poor site management and supervision; practice of assigning contract to lowest bidder; lack of communication among parties; shortage of site workers; delay in Material procurement; owner interference; equipment availability and failure; labour productivity; mistakes during construction; social and cultural impacts; underestimate project; duration resulting Schedule Delay; incompetent Project team (designers and contractors); necessary variations of works; poor technical performance; and slow payment of completed works.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter presents the particular methodology used to assemble the data for the research. This chapter therefore gives a comprehensive depiction of the choice of the study area. It explores the population from which subjects for the research were selected and the sampling procedures that were used.

3.2 Research Design

Research design is a plan employ to test the hypothesis to find solutions to the research questions. According to (Saunders et al,2007)., the design involved the identification of the problem, investigating the problem by collecting data through questionnaires and interviews, analysis of the data, drawing conclusions and then making recommendations. This study was therefore structured within the framework of descriptive research approach. Descriptive research design was adopted to obtain information, which concerns the current status of phenomenon. This method was employed to enable induction to be extended to other individuals who could not be covered in the research.

3.3 Population of the Study

The population of the study concerns all contractors in Kumasi Metropolis. These contractors are categorized into the following classes (A, B, C, S, D, K, E and G) as shown in Table 3.1.

Table 3.1 Categories of Contractors in Ghana

Class of contractors	Nature of works
A	Roads, Airports, and Related Structures
B	Bridges, Culverts and other Structures
C	Labour based road works
S	Steel bridges and structures: Construction rehabilitation and maintenance
D	General building works
K	General civil works
E	Electrical works
G	Plumbing works

3.4 Sampling Techniques Employed and Sample Size

3.4.1 Sampling Technique

The purposive sampling method was used to select D and K firms and used convenient sampling to select the respondents who are professionals in the construction industry from the selected firms.

3.4.2 Sample Size

The research focused on projects undertaken by category D and K. contractors, with a sample size of Fifty (50) as shown in Table 3.2.

Table 3.2 Category D and K Contractors in Kumasi Metropolis

Category	Number in Kumasi Metropolis
D	20
K	30
Total	50

Source: Association of contractors Office, June 2016.

3.5 Data Collection Instruments

The instrument for data collection was questionnaire. Questionnaire was used because it offers an opportunity to sample the views of large population. Additionally, the use of the questionnaire helps to ensure that one gets a high proportion of information that is usable; also it saves time and money since many respondents can be attended to at the same time.

The questionnaire was divided into four (4) sections. Section A solicited information on respondents' demographic characteristics; Section B on how the various internal factors that affect the cost of projects; Section C sought information on the external factors that affect the cost of projects while Section D had questions on effect of price fluctuations on project delivery in public institutions.

3.5.1 Sources of Data

Sources of data can be primary sources and secondary sources. Primary data sources are from data collected using questionnaires and interviews. Secondary data sources includes desk review of both published and unpublished material including policy documents, newspapers, internet, journals, articles and reports on tender evaluation.

3.5.2 Development of Questionnaires

Preliminary contacts with potential respondents based on information from the literature review served as a basis for questionnaires design for the different respondents. In the light of the above, questions were prepared for contractors.

The questionnaires were structured into four parts;

Part 1- Demographic data of respondents

Part 2- Client specific factors affecting project cost in public institutions

Part 3- Project specific factors affecting project cost in public institutions

Part 4- External and market condition factors affecting project cost in public institutions

3.5.3 Reliability and Validity of Questionnaires

Several validity and reliability issues need to be addressed in every research situation. Validity refers to the degree in which a test or other measuring device is truly measuring what it was intended to measure (Heffner, 2004). In this study, however, the researcher concentrated on ensuring that the instruments covered the relevant areas of the research question/topic (content validity). The construct that was used in the instrument were appropriate and related to the subject matter (construct validity), and the instruments were structured logically and were appealing to the eye; the instrument would be free from ambiguity, errors and easy to understand (face validity). The researcher was to ensure that the instruments (ISQI and IG) were piloted to eliminate all errors and any sentence that could have created a misunderstanding of the questions.

On the other hand, Heffner (2004) states that reliability is synonymous with the consistency of a test, survey, observation, or other measuring device. The reliability of test is threatened by errors from the participants, bias and observer errors. Considering the extensive use of the data collection instruments and the types of data collected, the validity of the study is assured. Aside this, the respondents were persons who were involved with procurement processes ensuring reliability.

3.5.4 Ethical Considerations

The procedures used in gaining access to the participants were sending out letters of introduction, permissions from heads of participants and permissions from the participant themselves. The purpose of the research was to assess factors influencing the project cost for works in public institutions in Ghana: perspective of building contractors in Kumasi metropolis. The respondents were given full assurance that, their responses would be treated with confidentiality.

3.6 Data Analysis Methods

Raw data can only be meaningful when it is processed into information for the purpose of making analysis. To this end, immediately after the field survey, data obtained were first edited to ensure consistency and accuracy in the responses and to check the response rate.

The data from the questionnaire were analyzed using SPSS (Statistical Package for Social Sciences) software. Statistical Package for Social Science (SPSS), Version 18 was used to analyze the primary data collected from the field with the questionnaire quantitatively. The data gathered were then analyzed through the means of relative frequencies and tables after the data was edited for completeness.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Introduction

This chapter deals with the analysis and discussion of the results of this research. It identifies client specific factors affecting the project cost in public institutions and identifies project specific factors affecting the project cost in public institutions. The result also identifies the external factors and market conditions affecting the project cost in public institutions. The results and discussion are presented in the form of Texts, Figures and Tables, and organized as follows; Response rate, Demographic profile of Respondents, client specific factors affecting the project cost, project specific factors affecting the project cost and external factors and market conditions affecting the project cost.

4.1 Response Rate

Eighty (80) questionnaires were administered, out of which 50 were completed and returned. The response rate was 62.50% (50/80). According to Oladapo (2005) and other researchers, Newman and Idrus (2002), Ellhag and Boussabaine (2009) and others have indicated that a response rate of 30% is good enough in construction studies.

4.2 Demographic Profile of Respondents

Before proceeding to analyze the general responses of the respondents in relation to the objectives of the study, the study sought to examine the demographic characteristics of

the respondents in order to show the suitability of the respondents in giving valid, reliable and authentic responses.

4.2.1 Gender of respondents

From Table 4.1, the dominant gender group is Male with 90% representation while females constitute minority with 10% representation. This statistic indicate that the construction business is male dominated. Studies by Memon & Rahman (2010) confirm the same observation that the construction industry employs dominantly males.

Table 4.1 Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	45	90.0	90.0	90.0
	Female	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

Source: Field Survey, 2016

4.2.2 Profession of Respondent

From Table 4.2 it can be seen that 14 (28%) of the respondents were project managers. 16 (32%) of respondents were quantity surveyors. It further shows that 10 (20%) of respondents were directors and another 20% were engineers. It can be observed that more of the respondents have key positions that guarantee accuracy of information obtained.

Table 4.2 Profession of construction professionals in Kumasi Metropolis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project Manager	14	28.0	28.0	28.0
	Quantity Surveyor	16	32.0	32.0	60.0
	Directors	10	20.0	20.0	80.0
	Engineer	10	20.0	20.0	100.0
	Total	50	100.0	100.0	

Source: Field Survey, 2016

4.2.3 Years of experience of Respondents

From Table 4.3, majority of the respondents, about 32%, have years of experience between 5 and 10 years. A further 28% of the respondents have years of experience between 11 and 15 years. Again, 22% of the respondents (have years of experience less than 5 years while 18% of the respondents had more than 15 years of experience in project management and project costing. This statistic shows that most respondents have 15 years or less experience managing construction projects. It therefore suggests that respondents are well knowledgeable in cost projects.

Table 4.3 Years of Experience on Project Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	11	22.0	22.0	22.0
	5-10 years	16	32.0	32.0	54.0
	11-15 years	14	28.0	28.0	82.0
	Above 15 years	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

Source: Field Survey, 2016

4.3 Internal Factors Affecting Project Cost

4.3.1 Factors Related To Clients Characteristics

This section presents and discusses findings on the factors related to client characteristics that affect the project cost in public institutions. Respondents were asked to rank their responses on a Likert scale of 1 to 5 where 1 stands for Strongly Disagree; 2 stands for Disagree; 3 stands for Neutral; 4 stand for Agree and 5 stands for Strongly Agree. The responses have been presented using the mean.

Table 4.4 Client specific factors affecting project cost in Public Institutions

Factors affecting project cost	N	Mean	Std. Deviation	Ranking
Client mode of payment	50	4.65	0.916	1 st
Client's scope of work	50	4.51	0.919	2 nd
Client's financial capabilities	50	3.98	1.043	3 rd
Client's experience in construction	50	3.77	0.939	4 th
Client's evaluation and awarding policy	50	2.54	1.450	5 th
Type of client	50	2.14	1.254	6 th

Source: Field Study, 2016

Respondents indicated their level of agreement or disagreement with client specific factors affecting project cost in public institutions in Kumasi Metroplis on a Likert scale of 1 to 5. Table 4.4 presents the mean score, standard deviation and ranking of client specific factors that affect project in public institution. Client specific factors relate to client mode of payment, type of client, client's financial capabilities, client's experience in construction, client's evaluation and awarding policy, and client scope of work. Based on the mean score and Standard Deviation, respondents considered client mode of payment [M=4.65, SD=0.916] and client's scope of work [M=4.51; SD=0.919] to be

influencing factors in affecting project cost while considering client's evaluation and awarding policy [M=2.54; SD=1.450] and type of client [M=2.14; SD=1.254] to be non influencing factors affecting project cost. However, respondents were neutral to factors such as client's financial capabilities [M=3.98; SD=1.043] and client's experience in construction [M=3.77; SD=0.939]. Ranking these factors, client mode of payment comes (1st), client's scope of work comes (2nd), client's financial capabilities come (3rd), client's experience in construction comes (4th), and type of client comes (5th).

From these observations, it can be deduced that client specific factors affecting project cost in public institutions are client mode of payment and clients' scope of work. This implies that building contractors should factor these elements in estimating project cost for public institutions. The result is in line with similar study carried out by Abdal-Hadi and Enshassi (2010) on factors affecting the accuracy of construction costs estimating, which concluded that client's method of payment have a very strong effect on the estimated cost of a contract. The result is further in agreement with a similar study carried out by Trost and Oberlender (2003) on factors influencing the project cost. The authors found that respondents ranked client financial capability in the 4th position.

4.3.2 Project Specific Factors

This section presents and discusses findings on the factors related to project specific characteristics that affect the project cost in public institutions. Respondents were asked to rank their responses on a Likert scale of 1 to 5 where 1 stands for Strongly Disagree; 2 stands for Disagree; 3 stands for Neutral; 4 stand for Agree and 5 stands for Strongly Agree. The responses were presented using the mean.

Table 4.5 Project specific factors affecting the project cost in Public Institutions

	N	Mean	Std. Deviation	Ranking
Project complexity	50	4.74	0.872	1 st
Site conditions	50	4.68	0.803	2 nd
Location of project (town, village camp)	50	4.32	0.870	3 rd
Type of structures (concrete, masonry)	50	4.37	0.827	4 th
Amount of specialist work	50	4.35	0.847	5 th
Type of project (residential, commercial)	50	4.22	1.068	6 th
Terms of payment/Advanced payment	50	4.21	1.073	7 th
Site conditions (topography, hot area etc)	50	4.10	1.171	8 th
Project size	50	3.88	1.298	9 th
Site constraints (storage, electricity etc)	50	3.85	1.189	10 th
Method/technique of construction	50	3.81	1.077	11 th
Project duration	50	3.75	1.045	12 th
Impact of project schedule	50	3.68	1.059	13 th
Type of contract	50	2.76	1.063	14 th
Tender selection method	50	2.57	1.111	15 th
Content of disputes resolution clause	50	2.46	1.121	16 th
Clear contract conditions	50	2.35	1.115	17 th
Risk sharing between parties	50	2.24	1.171	18 th
The taxes and financial requirements	50	2.14	1.254	19 th

Source: Field Study, 2016

Respondents indicated their level of agreement or disagreement with project specific factors affecting project cost in public institutions in Kumasi Metroplis on a Likert scale of 1 to 5. Table 4.5 presents the mean score, standard deviation and ranking of project specific factors that affect project in public institution. Based on the mean score and Standard Deviation, Project complexity was ranked in 1st [M=4.74; SD=0.872], Site conditions comes 2nd [M=4.68; SD=0.803], Project location ranks 3rd [M=4.32;

SD=0.870], Type of structures ranks 4th [M=4.37; SD=0.827], Amount of specialist work ranked in 5th position [M=4.35; SD=0.847], Type of project ranked in 6th [M=4.22; SD=1.068] and terms of payment ranked 7th position [M=4.21; SD=1.073], Site conditions ranked in 8th position [M=4.10; SD=1.171], Project size ranked in 9th position [M=3.88; SD=1.298], Site constraints ranked 10th [M=3.85; SD=1.189], Method of construction ranked 11th [M=3.81; SD=1.077], Project duration ranked 12th [M=3.75; SD=1.045], Impact of project schedule ranked 13th [M=3.81; SD=1.059], Type of contract ranked 14th [M=2.76; SD=1.063], Tender selection method ranked 15th [M=2.57; SD=1.111], Content of dispute resolution clause ranked 16th [M=2.46; SD=1.121], Clear contract conditions ranked 17th [M=2.35; SD=1.115], Risk sharing between parties ranked 18th [M=2.24; SD=1.171], and Taxes and financial constraint ranked 19th [M=2.14; SD=1.254]. From these observations, it can be deduced that project specific factors affecting project cost in public institutions are project complexity, site requirements, project location, type of structures, amount of specialist work, type of project, terms of lack of timely payment, and site conditions. This implies that building contractors should factor these elements in estimating project cost for public institutions. The findings are supported by study carried by Odusami and Onukwube (2008) who established that complexity of project, project location, type of structures, amount of specialist work, Type of project, terms of lack of timely payment, and Site conditions is one of the most important factors that affect cost of projects as important factors in determining project cost. However, the present results are in disagreement with Trost and Oberlender (2003) who stated that type of contract, tender selection method, content of

dispute resolution clause, clear contract conditions, risk sharing between parties, and taxes and financial constraint are influencing factors that affect project cost.

4.4. External Factors Affecting Project Cost

This section presents and discusses the results relating to the mean, standard deviation, and ranks factors related to external factors and market conditions. These factors which are related to the external factors and market conditions comprise 12 factors.

Table 4.6 External factors and market conditions affecting the project cost

External factors affecting cost of projects	N	Mean	Std. Deviation	Ranking
Material (prices/availability/quality)	50	4.92	0.802	1 st
Currency exchange fluctuation	50	4.83	0.813	2 nd
Prevailing economic climate	50	4.76	0.800	3 rd
Labour (costs/availability)	50	4.55	0.807	4 th
Equipment (costs/availability/supply)	50	4.53	0.807	5 th
Bidding climate	50	4.22	0.608	6 th
Number of competitors in the market	50	3.95	0.703	7 th
Impact of government regulations	50	3.87	0.071	8 th
Timing of advertisement (weather)	50	3.84	0.198	9 th
Social and cultural impact	50	2.76	0.089	10 th
Closure and blockade	50	2.48	0.955	11 th
Multiple projects being advertised	50	2.46	0.657	12 th

Source: Field Study, 2016

Respondents indicated their level of agreement or disagreement with external factors and market conditions affecting project cost in public institutions in Kumasi Metroplis on a Likert scale of 1 to 5. Table 4.6 presents the mean score, standard deviation and ranking of external factors and market conditions that affect project cost in public institution.

External factors and market conditions relate to material (prices/availability/quality), currency exchange fluctuation, prevailing economic climate, labour (cost/availability/skills), equipment (cost/availability/supply), bidding climate, number of competitors, impact of government regulations, timing of advertisement, social and cultural impact, closure and blockade, and multiple projects being advertised. From Table 4.6, it is illustrated that the prices/availability/supply/quality/imports of material was ranked in the 1st position by the respondents with a mean value of 4.92 and SD of 0.802. Similarly, currency exchange fluctuation was ranked in the 2nd position by respondents and had a mean of 4.83 and SD of 0.813. Prevailing economic climate was ranked in the 3rd position by the respondents with a mean mark of 4.76 and SD of 0.800. The cost and availability of labour was also ranked 4th with a mean mark of 4.55 and SD of 0.807. Cost, availability and supply of equipment ranked 5th with a mean mark of 4.53 and SD of 0.807. Bidding climate together with Number of competitors in the market were ranked in the 6th and 7th positions respectively with mean marks of 4.22 (SD=0.608) and 3.95 (SD=0.703) respectively. Impact of government regulations ranked 8th with mean score of 3.87 and SD of 0.071. Timing of advertisement ranked 9th with mean score of 3.84 and SD of 0.198. Social and cultural impact ranked 10th with mean score of 2.76 and SD of 0.089. Closure and blockade ranked 11th with mean score of 2.48 and SD of 0.955. Multiple projects being advertised ranked 12th with mean score of 2.46 and SD of 0.657. From these observations, it can be deduced that external factors and market conditions affecting project cost in public institutions are prices, availability, supply, quality, imports of material; currency exchange fluctuation; prevailing economic climate; the cost and availability of labour; cost, availability and supply of equipment; bidding

climate. This implies that building contractors should factor these elements in estimating project cost for public institutions. These results are in consonance with those of Enshassi et al. (2007) who revealed that continuing increase in materials price, labour cost, and equipment cost may be justified by the increase in import duties and other domestic taxes in Ghana and the instability of local market. The results further confirm the findings of Trost and Oberlender (2003) who ranked prevailing economic climate and bidding climate highly as influencing factors in project cost.

4.5 Effects of Price Fluctuations on Project Delivery in Public Institutions

This section presents and discusses the results relating to the mean, standard deviation, and ranks effects of price fluctuations on project delivery in public institutions as illustrated in Table 4.7.

Table 4.7 Effects of Price Fluctuations on project delivery in Public Institutions

Factors affecting project cost	N	Mean	Std. Deviation	Ranking
Price fluctuations inflate project cost	50	4.82	0.809	1 st
Price fluctuations delay delivery of projects	50	4.35	1.115	2 nd
Price fluctuations bring project to halt	50	4.18	0.636	3 rd
Price fluctuations change the direction of project	50	4.14	1.468	4 th
Price fluctuations extend project delivery deadline	50	4.04	1.348	6 th

Source: Field Study, 2016

From the table respondents rank price fluctuations to influence project delivery in public institutions as follows: Price fluctuations inflate project cost [Ranked = 1st, M=4.82, SD=0.809]; Price fluctuations delay delivery of projects [Ranked = 2nd, M=4.35, SD=1.115]; Price fluctuations bring project to halt [Ranked = 3rd, M=4.18, SD=0.636];

Price fluctuations change the direction of project [Ranked = 4th, M=4.14, SD=1.468];
Price fluctuations extend project delivery deadline [Ranked = 5th, M=4.04, SD=1.348].

4.5.1 Effect of client specific factors on price fluctuations

The influence of client specific factors on price fluctuation effect on project delivery, Clause 14.4 of fedic conditions of Contract says that the Client is obliged to pay for work done within 28days, failure to effect payment, the contractor has the right to abandoned site, this could result in delays in project delivery; client scope of work inflate project cost when the scope of work keeps on increasing from the defined scope. Client's financial capabilities also affect the project delivery and completion deadline since client with immediate cash available is likely to speed project delivery while client with financial difficulties would extend project completion date. Client's experience in construction affects the project direction since more experienced client want to be more involved in the project delivery and therefore influence the project direction. The result is in line with similar study carried out by Abdal-Hadi and Enshassi (2010) on factors affecting the accuracy of construction costs estimating, which concluded that client's method of payment have a very strong effect on the estimated cost of a contract.

4.5.2 Effect of external factors and market conditions on the Price fluctuations

External factors such as material prices, currency exchange fluctuation, and labour costs influence project delivery. Material prices influence project delivery such that they factor into the cost of the project which becomes high when material prices increase. This inflates project cost and can halt the project. Currency exchange fluctuation also influences the project delivery. A weakened currency exchange position raises the cost of

material inputs which then inflate the project cost. A strong currency exchange position reduces the cost of material inputs which then deflate the project cost. Labour costs influence the project delivery. Increase in labour cost also inflates the cost of project while decrease in labour cost deflate the cost of project. These results are in consonance with those of Enshassi et al. (2007) who revealed that continuous increase in materials price, labour cost, and equipment cost may be justified by the increase in import duties and other domestic taxes in Ghana and the instability of local market.



CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The main aim of the study was to investigate the factors that influence the project cost in public institutions in Ghana. This research had three primary objectives, which were achieved through the data collection using survey techniques and the detail analysis of the survey results. This chapter comprises the summary of major findings, conclusions drawn from the findings and practical recommendations to improve the cost estimation practice in the public institutions in Ghana, and additional study in this subject are proposed.

5.1 Summary of Findings

The study revealed that the most important factors that influence the project cost in public institutions are: material (prices/availability/supply/quality/imports); project complexity, currency exchange fluctuations, prevailing economy conditions, site requirements, location of project, type of structure, labour cost and availability, client method of payment and type of client.

The study further ascertained that the least important factors that affect the project cost are: taxes and financial requirements, clear scope definition, client's awarding and evaluation policy, risk sharing between parties, clear contract conditions and clients experience level.

The study further revealed that the major factors in the project specific factor group which affect the project cost are: project complexity, site requirements and the location of the project whilst the major factors in the client characteristics group which influence the project cost are: clients' mode of payment, type of client and financial capabilities of the client.

The study further revealed that the effect of price fluctuations on project delivery in public institutions are inflated project cost, delayed delivery of projects, project being brought to halt, changed in project direction, and extended project delivery deadline.

5.2 Conclusion

The result of analysis of different group of factors considered in the questionnaire concluded that the ten most important factors affecting the accuracy of the project cost are: material (prices/ availability/ supply/ quality/ imports) project complexity, currency exchange fluctuations, prevailing economy conditions, site requirements, location of project, type of structure, labour cost and availability, client method of payment and type of client. These findings demonstrate how these factors can greatly influence the project cost in public institutions. It is instructive to note that both clients and consultants must be aware for these factors when preparing the project cost estimate.

The least important factors as agreed by respondents are: taxes and financial requirements, clear scope definition, client's awarding and evaluation policy, risk sharing between parties, clear contract conditions and clients experience level. The results

demonstrate that these factors have a little impact on the project cost in public institutions. The major factors in the client characteristics group which affect the project cost are: clients' method of payment, type of client and financial capabilities of the client.

The major factors in the project specific factor group which affect the project cost are: Project complexity, site requirements and the location of the project. The major factors in the external factors and market conditions group which affect the project cost are: material (prices /availability /supply /quality/imports), currency exchange fluctuation and the prevailing economic conditions. This result indicates the materials are considered the main factor that affects the project price.

5.3 Recommendations

Based on the findings of the study, the following recommendations are the most important that can be deduced.

It was ascertained that material, equipment and labour were among the top ranked factors that influenced the project cost in public institutions. It is thus recommended that clients and consultants should give more consideration to cost estimating process in order to enhance productivity and accuracy. The performance of their estimates in terms of accuracy should be monitored and a qualified technical staff should be hired in order to obtain the accurate estimate.

The study further ascertained that currency exchange fluctuations and economic environment affected the project cost. Government is thus recommended to adopt

material prices list to allow estimators, if there is a change in the costs of certain items, to come up with the best estimates.

The government and other stakeholders on the construction industry must conduct training courses, seminars, and workshops in estimating methods, estimating process and computer applications in estimating. This training, seminars, and workshops should aim to improve the local practice in cost estimating and increases the capabilities of estimators in using estimating software packages.

It is further recommended that cost estimation based on updated price information should be considered in order to come up with accurate estimate and avoid any wrong estimation. To ensure stability in the prices of materials and other inputs, a strong control in the material price by the Government should be made to minimize or eliminate the supplier manipulation. Government should also consider a reduction in the taxes of building materials to make these materials available at an affordable cost.

5.4 Suggestion for Further Studies

The study was limited to Kumasi Metropolis in the Ashanti region. It is suggested to that similar studies are conducted in other regions in Ghana. Further, studies should be undertaken to include all categories of contractors (A, B, C, E, F, G).

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APPENDIX: QUESTIONNAIRE

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

This questionnaire is part of a study aimed at: **Factors influencing the project cost for works in public institutions in Ghana: Perspective of building contractors in Ashanti region**

This questionnaire is to collect information that would be used in completing the research topic stated above. The information collected is for purely academic purposes and would be treated with utmost confidence. There is no right or wrong answer therefore no particular response is targeted. Thank you.

1. Type of Works. Consultant Client (MMDAs)
2. Position of Respondent. Project Manager Head of Department
Office Eng. Estimator Other (Mention pls)
3. Yearsof experience of respondents.
Less than 5 years 5-10 years 11-15 years More than 15 years
4. The number of projects your organization has prepared cost estimate during the last five years. Less than 10 10 to 20 21-30 More than 30
5. The size of projects that your organization prepared cost estimate during the last five years (millions of Cedis).
Less than 1 From 1 to 5 5 to 10 11 to 15 above 15
6. Are you satisfied with the accuracy level of pre-tender cost estimate?
Very satisfied Satisfied Neutral Not satisfied Very not satisfied

7. Is there an estimating unit in your organization /firm? Yes []No[]
8. How many employees are working in estimating unit in your organization / firm?
 Less than 3 [] 3 to 5 []above 5 []
9. In case of there is no estimating unit in your organization/firm, in your opinion, what are the main reasons for nonexistence of an estimating unit?
 Estimating unit is not necessary []
 Volume of the work is small, so there is no need for estimating unit []
 Increase the general overhead of the organization/firm[]
 Other reasons

Section Two: Factors affecting the project cost in public institutions

Please express your opinion on how the degree of importance of these factors affecting the project cost in public institutions

<i>Factors related to clients characteristics</i>	Strongly Agree [5]	Agree [4]	Neutral [3]	Disagree [2]	Strongly Disagree [1]
Type of client (Government/ UN Agencies/ NGOs ...etc)					
Client experience level					
Clear scope definition for the client					
Financial capabilities of the client					
Client's method of payment					
Experience of procuring construction					
Client's evaluation and awarding policy					

<i>Factors related to project characteristics</i>					
Type of project (residential, commercial, industrial, etc)					
Type of structures (concrete, steel, masonry, etc)					
Project size					
Project duration					
Location of project (town, village camp)					
Site conditions (topography, hot area etc)					
Site constraints (access, storage, electricity etc)					
Site requirements					
Project complexity					
Method of construction/ techniques requirements					
Impact of project schedule					
<i>Factors related to contract requirement and procurement method</i>					
Type of contract					
Clear contract conditions					
Tender selection method (open, selected, negotiation etc.)					

Method of procurement (traditional, design and build, project management, etc)					
Risk sharing between construction parties					
Amount of specialist work					
Content of disputes resolution methods clause (litigation/arbitration/others)					
The taxes and other financial requirements on project					
Terms of payment/Advanced payment					
<i>External factors and market conditions</i>					
Material (prices/availability/supply/quality/imports)					
Labour (costs/availability/performance/productivity)					
Impact of government regulations requirement					
Equipment (costs/availability/supply/condition)					
Number of competitors in the market					
Multiple projects being advertised at the same time					
Classification and level of competitors					
Bidding climate comprising of competitiveness					

The prevailing economic climate					
Currency exchange fluctuation					
Timing of advertisement (weather effects)					
Social and cultural impact					
Closure and blockade					
Donor type					

4.5 EFFECT OF PRICE FLUCTUATIONS ON PROJECT DELIVERY IN PUBLIC INSTITUTIONS

Please express your opinion on how the degree of importance of these factors affecting the project cost in public institutions

	Strongly Agree [5]	Agree [4]	Neutral [3]	Disagree [2]	Strongly Disagree [1]
Price fluctuations inflate project cost					
Price fluctuations delay delivery of projects					
Price fluctuations bring project to halt					
Price fluctuations change the direction of project					
Price fluctuations extend project delivery deadline					