

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,**

**KUMASI, GHANA**

**Management of Delays in Construction Projects in Bia West District**

**By**

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

**MASTER OF SCIENCE**

**NOVEMBER, 2016**

**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, except where due acknowledgement has been made in the text.

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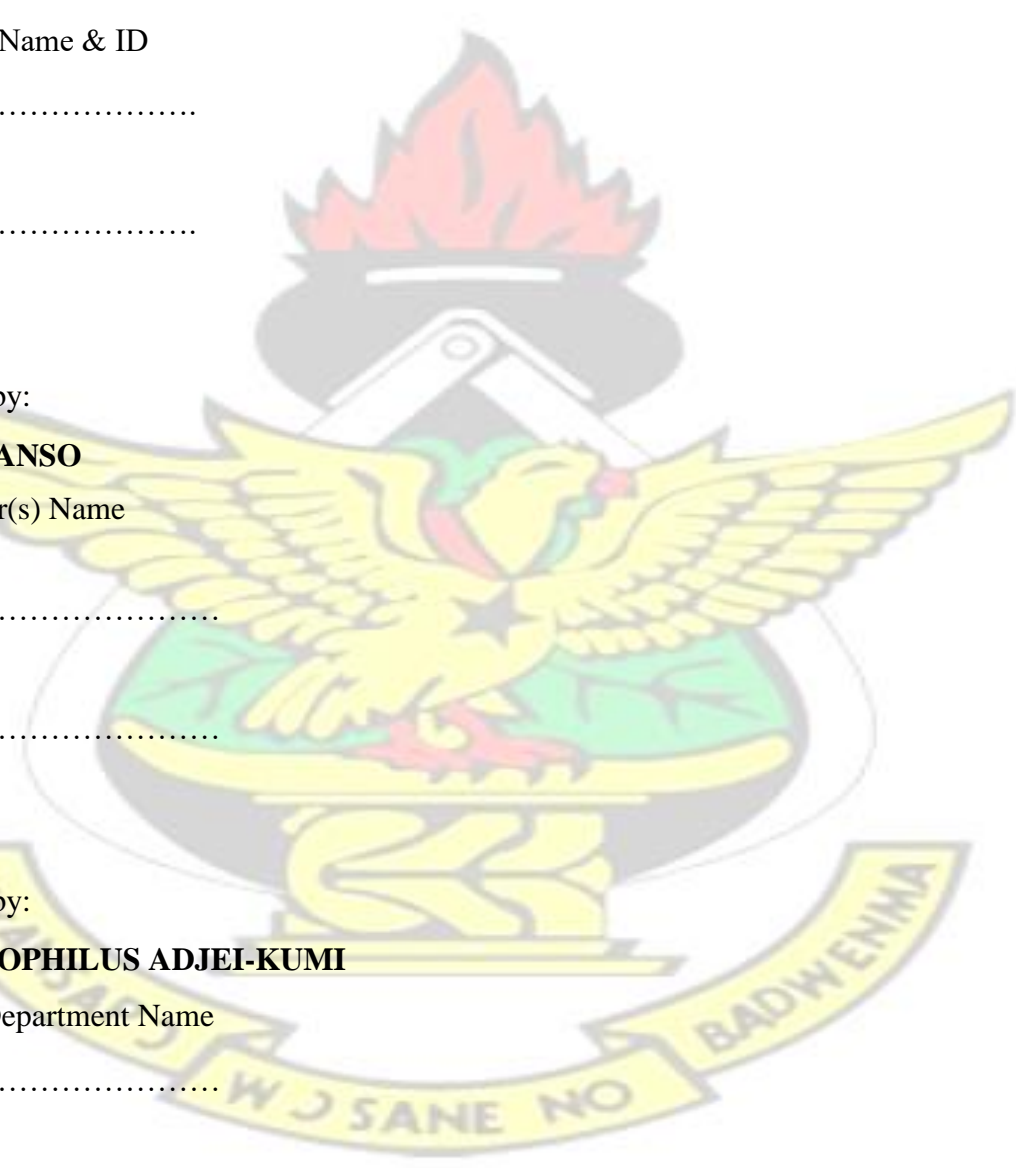
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## **ABSTRACT**

Delay in construction project management is endemic in Bia West District and it is demanded therefore to be recognized since delay recurs from one project to the other. Its alarming rate is likely to go out of hand if reliable project management approach is not put in place to curtail it. The researcher focused this study on the management of delays that pertains to construction projects in Bia West District. The objectives of the research are to identify the critical factors that caused delays of government construction projects in Bia West District, to study the present use of project management knowledge tools and techniques in managing delays in construction project and to develop a framework to enhance management of construction project delays in Bia West District. Targets groups of respondents were A2 B2 and D2 K2 classified financial roads and building contractors respectively. The study was limited to contractors in Western Region and it was thus conducted with the use of literature review and surveys. Questionnaires and personal interview techniques were also used to collect data. Results from the study divulge that the actual sources of delays in project delivery are; Inadequate financial resources of clients, delays in honouring payment for work done, underestimation of project duration, poor communication between contracting parties, complexity, difficulties in accessing bank credit (client); change orders during construction and others. It was recommended that, initial proper planning and controlling is essential to the client in order to have proper action plan, procurement plan, and budget plan prepared before commencement of project. Payment schedule must be agreed by the parties involved. On the part of the contractor adequate knowledge of project management, principles, tools and techniques is required to reduce delays. Consultants must plan very well to ensure that contract processes are duly followed, thus approval of drawings, documentation and other things to reduce variation during construction. They should monitor their assigned work very well by insisting that corrections are done at the appropriate time to reduce or avoid rework.

### **KEY WORDS**

Delays, Construction projects, Bia West District

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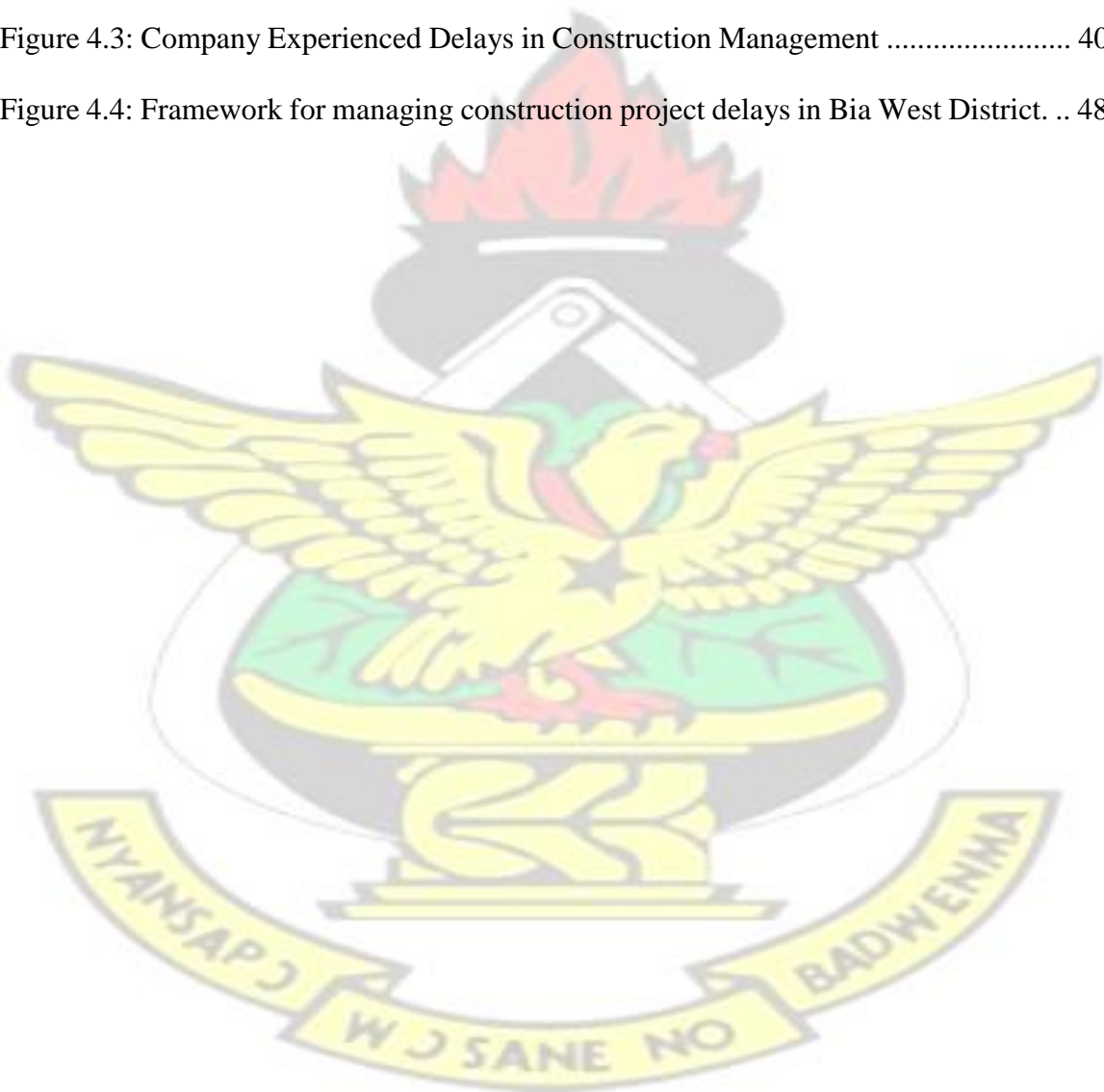
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## ACKNOWLEDGEMENT

I would like to express my profound gratitude to all my lecturers who have given me ideas and advice during the writing of this dissertation. I also wish to express thanks to my supervisor, Dr. Anthony Kwame Danso, for his assistance and kind comments during the preparation of this project.

Special acknowledgement to my father, my beloved wife and my lovely children for their encouragement during these times. I would like to sincerely thank those organization and individuals who spared their precious time to respond to the questionnaire.

Finally, my appreciation also goes to all those who contributed directly and indirectly for making this dissertation possible.



## DEDICATION

I dedicate this work to God Almighty for His support through this study. I also dedicate it to my able and caring wife Faustina Duodu Asiedu, my children and my family.

# KNUST



# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY

The increasing demand for public construction in Ghana indicates the significance of the industry of construction to the country's social and economic development.

The construction industry is among those industries that face the plague of project failures in terms project delivery. According Smith and Jaggar, (2007) it has been argued that the diverse kinds of construction projects including their multifaceted nature make planning, forecasting, managing and controlling of projects more difficult. Consequently, decisions that are taken at the initial stages of the management aspect of the project process become critical to the success of the project (Miller *et al.*, 2000). The construction industry is one of the industries that cannot run from problem or challenges. One of the challenges faced by the industry is project delay. The industry of construction has a poor standing as in the industry coping with delays and thus, a number of major projects fails in meeting the schedule deadline.

Delay is known to be the most risky, common, complex and costly problem the industry encountered (Cheung *et al*, 2001) within both public and private construction projects around the world. Assaf and Al-hajji (2006) defined delay as the —time overrun which could either be beyond the date parties agreed to deliver a project or beyond the scheduled time of completion inside a contractl.

Construction projects have generally led to significant economic and social benefits for the contractors, government and the society as a whole in Ghana. However, delays that prevail in those projects are important and pose great challenges to their implementations.

In addition, its impact does not only affect the industry of construction but it affect the whole economy of the state. Delays are known to be caused mostly by mismanagement of event which should have been managed instead in a systematic way to analyze the consequences of that particular event on the construction project and as well the way to lessen the chances of additional delay. Keane and Caletka (2008) in their quest to analyze delay in construction project in the United Kingdom said, construction industry involves complex and dynamic process, that consists of effective co-ordination of multiple discreet business units such as trade professionals, skilled labor, manufactures, trade unions, financiers, local authorities, contractors and others. A study on delay in Malaysian government construction projects was conducted by Sambasivan and Soon (2007). It was revealed that approximately 17.3 percent of these projects executed in the year 2005 were delayed exceeding three months after the schedule time of completion for the projects.

According to Sweis *et al.* (2008) when construction projects are executed successfully the consequences thereof are socio-economic growth, an improved standards of living and creation of wealth, and thus, countries may be assessed as —underdeveloped, —developed and —developing on the basis of quality and quantity of accomplished construction projects inside their province (Abdullah *et al.*, 2011). Tucker *et al.* (1999) conducted a study which made known the five (5) significant factors that cause delays particularly in the construction industry of the United States. They include lack of complete documentations, changes in design, changes in order, approval for building authorization and inspection pressures by statutory bodies.

Several studies which are related to delays in construction projects have shown the causes of delays to vary from one country to the other. A study conducted by Chan and Kumarasswamy (2002) outlines four major causes of delays in the construction industry of Hong Kong as follows; management related, project complexity, project environment, and project scope. These factors were further studied to come out with more insight as well understand their respective importance.

Sambasivan and Soon (2007) carried out a study on what causes delays in construction projects in Malaysia. A survey involving 150 respondents was conducted by them with which they finally drew conclusion that the 10 most significant causes of delay include the following: material shortage; mistakes during construction stage; poor site management from contractors; subcontractor's problem; improper management information system; improper planning of contractors; inadequate experience of contractor; failure and availability of equipment's; improper payment and finance from client; material shortage; and labour supply.

A study on the causes of delays in construction projects in the Ghanaian settings was conducted by Fugar and Agyakwah-Baah (2010). They identified the following factors; poor supervision of the works on site; underestimation of project costs; delays in honouring payment certificate; difficulties in accessing bank credit; and underestimation of project complexity etc. Enshassi *et al.*, (2009) revealed delay is the most frequent challenges confronting the industry of construction and global phenomenon. They believed causes are having adverse consequences on the success of projects in terms of quantity, time, cost and safety.

Most previous studies have focused largely on the key causes of construction projects delays and its solutions in Ghana with limited empirical evidence on the contribution of project management approaches to managing these delays (Kim, *et al*, 2008). This study seeks to fill this yawning gap, as various research findings have suggested that problems within construction project in relation to delays can be reduced drastically by effective implementation of project management concepts (Frame, 2002)

## **1.2 PROBLEM STATEMENT**

Though delay in public construction projects including its impact and possible solutions for a successful project delivery has been the focus by most researchers. Nevertheless, quite few of such studies adopted the use of project management approaches to manage the delays. The client and other stakeholder in the industry of construction continues to criticize bitterly concerning the industry failing to execute projects just within the set time frame, acceptable quality, and budgeted cost, there remain an incessant challenge of delay which impedes the capabilities of all the parties involved. A significant factor which contributes to this problem is lack of application of project management approaches to tackle these delays. This has resulted in poor quality of works, loss of productivity, delayed projects' completion, increase of total cost of project, unemployment, liquidation of construction firms, disputes and litigations. Its alarming rate is likely to go out hand if reliable project management approach is not put in place to curtail it in Bia West District. There are number of construction project that are delayed during their pre-contract and post-contract stages. For example, contractors that are working on four major roads project which form part of the Gang of six roads are no more in operation as result of lack of payment and other pertinent technical issues with government (Bentil, 2014). Inability for these projects to be completed on time brings serious challenge to vehicular movement,

loss of jobs as well as the inhabitants in the neighbourhoods feeling uncomfortable due to dust and pollutions causing health hazards.

### **1.3 AIMS AND OBJECTIVES**

#### **1.3.1 Aim of the Study**

This research aimed at assessing the critical factors causing delays in government construction projects by considering the potential contribution of project or construction management tool and techniques to develop a framework to enhance its management.

#### **1.3.2 Objectives of the study**

In an attempt to accomplishing the research aim, these specific objectives were set:

- To identify the critical factors causing delays in government construction project in Bia West District
- To study the present use of project management knowledge, tools and techniques in managing delays in construction projects.
- To develop a framework to enhance management of construction project delays in Bia West District.

#### **1.3.3 Research Question**

- I. What are the critical factors causing delays in government construction project in Bia West District?
- II. What are the appropriate tools and techniques in project management that could be used to manage delays in government construction projects?
- III. What are the possible process models or framework that could be used to enhance the management of construction delays in Bia West District?

#### **1.4 SIGNIFICANCE OF THE STUDY**

This study will make an approximate contribution to the management aspect of construction as it could guide policy makers, consultants as well as contractors in addressing the challenge of delays which is facing the industry of construction; this will enhance the delivery of project within the set time frame. Based on this study, the construction industry can raise their awareness of delay issues and hence increasing the understanding of implementing a good project control techniques. Also this research is to make known to readers about the challenges faced by contractors, consultants and subcontractors in the execution of the Ghanaian government construction projects particularly in the Bia West District and the way forward. Consequently, this study serves as a guideline for further studies that pertains to the management of construction projects and for future development to lessen the risk involved delays.

#### **1.5 SCOPE OF THE STUDY**

Owing to the broad and complex nature of the construction industry, the study was focused on Building and road Contractors with D2K2 and A2B2 financial classifications. The study covered the Ghanaian construction industry, specifically contractors working in the Bia West district, Western Region. The study focused on Bia West District due to the proximity of the researcher, making the distribution and retrieval of questionnaires easier. The focus of the study on D2K2 and A2B2 contractors was due to their concentration in the Bia West District Assembly.

#### **1.6 SUMMARY OF METHODOLOGY**

The study involved the use of both primary and secondary data. Secondary data were sourced from books, journals, pertinent articles, and published and unpublished

dissertations of students. Primary data involved the use of self-administered questionnaires to road contractors and consultants. The questionnaire incorporated the use of close ended questions and a Likert scale to rate and answer questions posed to respondents. The questionnaires provided feedback on views of respondents about the significant causes of delays in the delivery of construction projects and their respective impacts on stakeholders of the project particularly contractors. The relative importance index was used in analysing the data collected to identify key challenges and opportunities.

### **1.7 LIMITATIONS**

This research was limited to contractors working in the Bia West District, Western Region of Ghana. Again, only D2K2 Building Contractor in the A2B2 Category of Ghanaian Contractors were surveyed. Any generalization from this study should look at this limitation.

### **1.8 STRUCTURE OF THE STUDY**

The structure of the thesis is in five (5) interdependent chapters, and followed the following outline. The chapter one presents "General Introduction" as it gives the background to the research and the problem necessitating research efforts. The research aims, research questions, objectives, and scope are all contained in this chapter. The chapter two contains the literature review. The review provides a wide-ranging coverage on earlier works. The chapter 3 which is the research methodology will stress on the systematic approach that will be engaged in the research and as well provide discussions on the data collection analytical tools. The chapter four is the results and discussion of data gathered. The last chapter which is the chapter five presents a summary of the findings of the study, conclusion and recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 INTRODUCTION**

The objectives of this study include the establishment of causes and effects of delay construction projects in the Bia West District and finding solutions to them by the use of project management approach. This chapter reviews literature on most important causes of delays in construction projects and its effects on the people. This section also develops solutions to the issues.

#### **2.1 GHANA GOVERNMENT CONSTRUCTION PROJECTS**

The Ghanaian government undertakes a key role in the industry of construction owing to the resources exhaustive nature of its activities. Funding of such project sources from a budgetary allocation, donor agencies contributions as well as other concern parties. The federal administration construction project cover four key areas, they include road construction, construction of buildings, other construction (i.e. harbour, dam, airport etc.) and maintenance. These are national assets owing to the capital intensive nature of their construction. However, there exist a lot of delays in government projects as compared to the private ones as this is as a result of several factors which have been elaborated on subsequently in this study.

##### **2.1.1 Project management Approach**

According to the PMI (2013), project management method is fundamentally designed to apply tools and techniques as well as the needed knowledge and skills to the activities of a project so as to meet the project's requirement. The importance of project management techniques and tools in achieving project expectations and objectives have been reported

in the literature (Milosevic, 2003: Murphy and Ledwith, 2007). For instance, the use of project management principles have been regarded very effective in managing and controlling project activities (Murphy and Ledwith, 2007). There are techniques that can be used to solve many problems confronting projects such as those relating to project planning, human resources management, cost management, time management among others. However, the application of project management principles to drive project success is still at its early stage in the Kingdom of Saudi Arabia (CIOB, 2008).

### **2.1.2 Definition of construction delay**

Delay in construction is a state in which the actual progress of the phases of a construction project becomes slower than as planned or completing the project late (CIOB, 2008). Delay in the setting of construction refers to prolonged period of construction and interruptions of events that distracts the programme of the construction. Delay is acknowledged as the most risky, costly, common, and complex problem encountered during projects (Cheung *et al.*, 2001). Delays are synonymous with construction projects. Delay has been established as one of the commonest experience in the construction project globally (Ahmed, *et al.*, 2003). Multiple studies have identified incident of delay as a major problem facing construction projects in the world (Kaliba, *et al.*, 2009). A project is considered delayed only when its postulated time of completion has been accomplished (Majid, 2006). According to Pourrostan *et al.* (2011) project delays form the major challenges for the industry of construction in the emerging countries. However, delays are not only experienced in the emerging countries, delays are a global phenomenon (Memon *et al.*, 2011).

## 2.2 BACKGROUND TO MANAGEMENT OF DELAY IN CONSTRUCTION PROJECTS

Delays in construction projects are known to be among the commonest problem facing the industry as it causes a number of negative impact on both the project itself and the parties involved. Thus, it is very important to pinpoint the main causes of these delays so as to reduce and do away with them as well as their corresponding outlays. According to Aibihu and Odeyinka (2006), construction projects still continue to face the challenge of delays even in this current phase of knowledge in technology as well as organization management. Pickarance (2005) stated that, delay in the setting of construction refers to a project happening later than the anticipated time specified in terms and conditions of the contract or exceeding the date set by parties involved.

According to Akinsola (1996), when project are delayed, they are either giving time extension or the project activities augmented and thus causing extra cost. Even though parties involved in the project would agree up on the additional cost and time that are related with the delay, in most cases problems exist between the contractors and the clients as regards whether a contractor has the right to claim for extra cost (Akinsola, 1996). Abdullah *et al.* (2011) stated that, countries are assessed as —underdeveloped, —developed, and —developing on the basis of quality and quantity of accomplished construction projects inside their territory. Long *et al.* (2004) established that, many researchers have carried out a number of studies concerning the factors that causes delays as well as cost overruns and their effects on output, quality, and safety form the common problems in some project types. According to Ochoa (2013), a project’s success or failure, which is for commercial construction projects, it depends largely on the schedule of the project and whether that schedule is reality and is attainable. Delays that pertains to construction schedule have negative impact on both the contractors and the owners to the

extent that delays cause owners to absorb or pay additional cost and still are not able to use or occupy their property for its intended purpose (Ochoa, 2013). Several attempts by researchers as well as project professionals to tackle the effect and causes of delays in construction projects have not met the positive results needed as Sambasivan and Soon (2007) suggests.

Dayi (2010) concluded on his study conducted in Ankara Turkey that, delay could occur in the preconstruction stage described as the beginning to the stage of contract signing between the client and the contractor, but many construction projects delay in the stage of the construction. Keane and Caletka (2008) also said industry of construction is one that involves dynamic and complex process. Delays in construction are usually experienced in the public sector but at times too in the private sector as well according to Yang *et al.* (2010).

### **Planning Techniques**

Among the most common and the most widely used techniques for project planning include network analysis, which can be activity on the arrow or on the node; linked bar charts and bar charts; and line of balance which use for repetitive project activities.

#### **a. Line of Balance**

This is another planning technique used for repetitive project activities, the principles behind its usage source from the control and planning of manufacturing process. The basis for this technique is finding the needed resources at each stage so as to make the next stage achievable. Line of balance has been used for construction activities mostly to house holding and, to a lesser degree, to jetty work.

## **b. Bar Charts and Linked Bar Charts**

Bar charts among other techniques form the most widely used and the easiest to understand. Even in most cases where the most sophisticated technique is used, work schedule is mostly presented in a form of bar-chart.

## **c. Network Analysis**

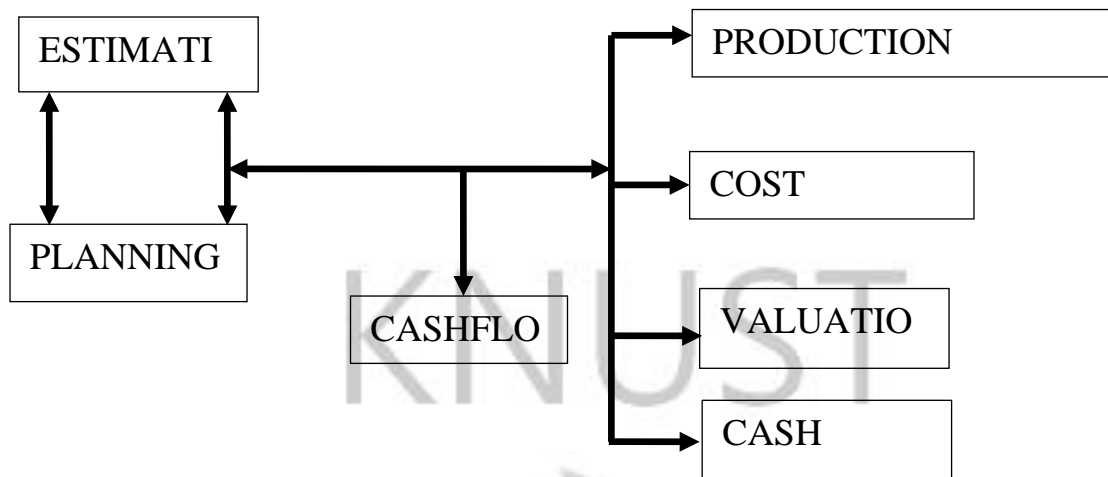
This offers every advantages thereof so as to be able to manipulate the data of planning through holding these data in files of the computer. Planning data is linked to the logic when in network to define the relationships existing among activities (Lewis, 2011)

### **The Client**

The organization of the client has interest in the plan of the entire project straight from land acquisition to the delivery and use of facility. Mostly, the organization of the client has interest in finding out the times of cash outflows for which that has affected the provision as well as the tactical decisions of the management of project (Burke, 2010).

### **The Contractor**

This is among the three parties of the construction process which has in history put enough effort in the planning phase as the outcome of a well-planned, carefully controlled and monitored contract indicate right in the profitability to the company as well as the contract.



**Figure 2.1: Contractor's Management Functions**

**Source: Oakland (1995)**

### **Construction quality management tools and techniques**

Management and employees' ability to control their respective work processes, to recognize problems, to implement effective remedies, and to trace their root cause become a keystone of an incessant quality enhancement programme. An extensive range of quality techniques and tools is at hand to firms, these tools ranges from simple to brainstorming techniques, pareto analysis, ranking and rating, cause-and-effect diagrams to a more sophisticated technique. These are discussed as follows:

#### **□ Brainstorming**

Brainstorming is a technique used in encouraging imaginative rational as well as generating ideas from small groups of people making use of their co-operative point of view. It is particularly suitable for generating list of problems, ascertaining the causes of problem, coming out with the possible solutions and finally advancing action plans (Oakland, 1995).

### □ Pareto Analysis

The Pareto analysis is one of the simplest techniques that assist in separating the foremost causes of problems from those that are minor. It is referred to as the 80/20 rule (i.e. 80 percent of the problem are as a result of 20 percent of the causes).

### □ Ranking And Rating

This is a process structured which places in order of penchant list of options as well as rate to achieve change. This technique helps in choosing the best among the options as it makes the choice of selection a less emotional and as well upsurges the commitment in choosing an option. Ranking and rating is most useful to decide which chosen problem to handle or the solution to first implement.

### **Risk management**

Loose and waste that result from indecision inside a project, or the firm in general, can be vapid through demanding application of techniques in managing risk by using an improved work-study processes. The risks are first and foremost identified, then control measures are assigned, and exploitation of innovative opportunities follow after, all regularized in a procedure that is practical. The approach typically embraces the following steps;

- **Risk identification;** Risk Analysis/assessment; Risk Response and Install & maintain (ISO Guide 73: 2009)

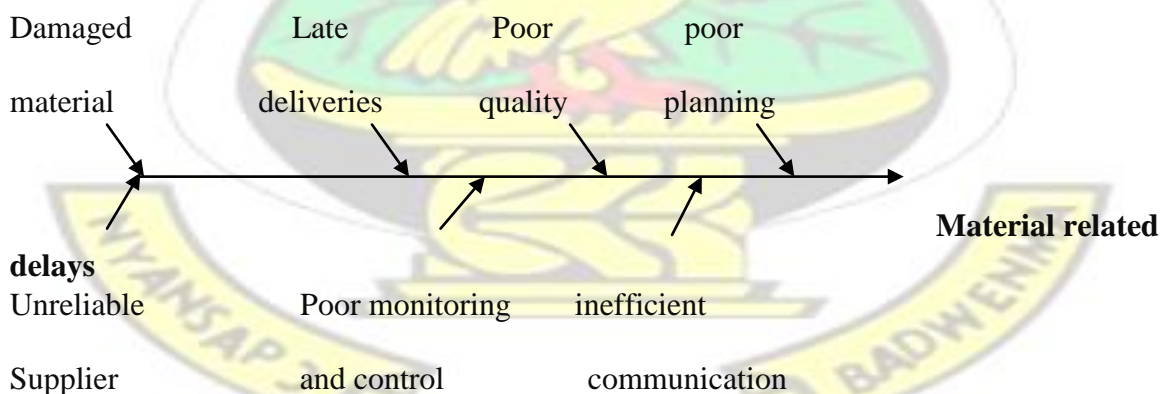
According to Flangan (2002), owners of projects have turn to be more astute as they are unwilling in accepting risk. It is general practice for owners to apportion some risk to the other parties who are down the chain through lessing the financial cost by delaying of payment.

## □ Managing Project Performance

According to Farris *et al*, (2006), the ability to evaluate the performance of the completed project will assist in determining benchmarks of high performance project from low performance projects for potential improvement. A study carried out by Sweis *et al*, (2008) indicates that as the complexity of a project upsurges the lesser it is for that particular project will be delivered on time or just after the date of completion, when engage the traditional methods of management.

### Causes – And – Effect Diagrams

These are way of showing the possible causes or the cause of a particular problem which is the effect. Causes-and-effect diagrams are at times referred to as Fishbone diagram or Ishikawa. The actual use of these diagrams are to identify the basic cause of a particular challenge or problem and afterwards they thus define the problem's nature as indicated in the figure 2.2.



**Figure 2.2: A simple cause-and-effect diagram for managing materials – related quality**

**Source: Oakland (1995)**

## □ Stakeholder management

A stakeholder is any individual or party affected (e.g. Rights violated, restricted or ignored) by the actions of an organization, company, firm or project, who therefore needs to be motivated and managed towards support of corporate objectives and cooperation.

Whether as internal members of a coalition or project team or an external party, each may have vested interests that pose a threat or benefit impacting on the outcomes and effective management of construction work. (Harris, 2010)

## 2.3 CLASSIFICATION OF DELAYS

Delays related to construction projects are caused as result of a number of factors. Ahmed *et al.* (2003) grouped delay in two broad categories: the internal causes which come from parties involved in a particular contract; and external ones come from the proceedings that exceed the parties' control. These include the act of God, actions of the government, as well as material supplies. Scott (1993) identified three categories of delays namely; employer's responsible delays; contractors responsible delay and external delays. However, Ahmed *et al.* (2003) and Ochoa (2013) believe that, delay can be grouped to be under concurrent, excusable, and non-excusable delays. In addition, Trauner *et al.* (2009) came out with an opinion based on study conducted that construction delays could be as: non-excusable or excusable, non-concurrent or concurrent, non-critical or critical, and non-compensable or compensable.

### 2.3.1 Excusable non-excusable delays

Construction project delays are fundamentally excusable or non-excusable. According to Ahmed *et al.* (2003) delays is excusable or non-excusable depending on the sections

contained in the terms of contract. An excusable delays generally is as a result of an unanticipated occurrence that exceed the control of contractor and the subcontractors (Trauner *et al.*, 2009). The writer also believe that delays coming from issues such as labour unrest, flood, differing site conditions, forced majeure or Acts of God, client variation, delays from unexpected occurrences result in a control that exceed that of the contractor which is referred to as excusable delays.

### **2.3.2 Compensable versus non –compensable delays**

With Non-compensable delays, Ahmed *et al.* (2003) and Mubarak (2005) grouped both excusable non-compensable and that of the compensable one; the delays that are compensable are caused by the client or the designer (i.e. architect/engineer). Under conditions like that, the contractor may be given an extension of time or the opportunity will be given to him to reclaim for cost relating to the delays or both.

Mubarak (2003); Ahmed *et al.* (2003); Trauner *et al.* (2009); and Ochoa (2013) established that, for an excusable delay, one can classify it as excusable noncompensable as well as excusable compensable. Delays that are compensable result either through the client or the architect/engineer as Mubarak (2005) opines.

Trauner (2009) claimed that, factors specified within the terms of the contract that causes delays like contradictory site conditions are the factors that regardless of them being excusable they do not render to the contractor any compensation. According to Mubarak (2005), delays that are excusable non-compensable are usually above the client or the contractor's control like fire, conflicts, labour unrest, weather conditions, national crises etc. Trauner *et al.* (2009) stressed that whether delays are non-compensable or compensable, it depends essentially on the contract condition. The contract condition will

have some effect on the kinds of delays which require extension of time or fiscal compensation.

### **2.3.3 Concurrent Delays**

Levy (2006) describes this type of delay to be an overlapping one. The author identified concurrent delays to be generated by either the clients or the contractor. Levy (2006) further stressed that, when these delays happen the two parties are held accountable where none of the two parties can repossessed damages. Concurrent delays comprise of more than one independent causes that occur in the same frame of time (Mubarak, 2005).

These delays sometimes include non-excusable and excusable delays.

### **2.3.4 Critical or non-critical delays**

Almost all studies carried out on delays seeks to find out the effect of the delays on the entire project life even as the project progresses (Trauner *et al.*, 2009). They stress again that, delays in which the outcomes cause an extension in the time of the project is considered to be non-critical delays and critical delays that have no effect on the project completion. Again, Trauner *et al.* (2009) claim that challenge of critical delays result from the forecast of a critical path method. All projects have what is called critical path and should it happens that these critical undertakings along the path as they delayed then the completion of the project date ought to be extended. The researchers believe that the critical factors used in determining the date of completion of a project are contractor's duration as to the critical path's activities, the project itself, the project's physical restraints, and the activity sequence and phasing.

### 2.3.5 Related studies

Related studies have been carried out by a number researchers to determine the causes of delay in construction project: Anyman (2000) conducted studies on the causes of delays on 130 public projects in Jordan. The study was carried out on the following buildings: residential, office and administration buildings, school building, communication facilities and medical centres. The outcome of the result showed that the main causes of delay in construction of public is projects related to designers, economic conditions, user changes, weather, site conditions, late deliveries and increases in quantity. Related studies have revealed that the causes of delay vary from country to country. The study carried out by Sunjka and Jacob (2013) revealed that the ten (10) most common causes of project delays in the Niger Delta region in Nigeria includes youth commotion, communal catastrophes, lack of proper planning, poor contract management, late identification and resolution of drawing and specification errors. Ibrahim (2006) worked on finding out the causes of delay in construction projects and their severity according to contractors and consultants and stated that cost, time and quality have proven their importance as the main measures for construction project success.

A similar study in Malaysia by Alaghbari *et al* (2007), also revealed that financial problems were the main factors based on a list of thirty-one (31), factors like clients, contractors, consultant and coordination problems were the second most important factors causing delay in construction. In the kingdom of Saudi Arabia, a research conducted by Albogamy *et al.*, (2012) on solving construction delays identified the following major ten (10) contributing factors causing delays: poor qualification, low performance of the lowest bidder contractor in the government tendering system, skills and experience of the contractors' technical staff, delays in sub-contractors work, poor planning and scheduling

of the project by the contractor, delay in progress payments by the owner, shortage of qualified engineers, delay in preparation of shop drawings cash flow problem faced by the contractor, inadequate early planning of the project and nonutilization of professional construction contractual management.

Ramya *et al.*, (2015) studied the delay factors and their impact on project completion in Malaysian construction industry. The study result indicated ten (10) most important causes of delay from a list of twenty-eight (28) different causes. The ten most important causes of delay were; (1) contractor's improper planning (2) contractors' poor site management (3) incomplete (4) client's inadequate financial resources and payments for complemented work (5) problems with subcontractors (6) shortage of material (7) labour supply (8) equipment availability and failure, (9) Lack of communication between parties and (10) mistake during the construction stage.

A similar study in Saudi Arabia by Assaf *et al* (2006) identified fifty-six (56) causes of delay in large building construction project and their relative importance. The study was conducted on contractors, owners, and architects/engineers. The result indicated that all three groups generally agree on the ranking off individual delay factors. The factors were grouped into nine (9) major groups and ranked. The nine groups were material, financing government relation, manpower, equipment, changes, scheduling and controlling, environment, and contractual relationships. Focused on the contractors surveyed, the most important delay factors were (1) preparation and approval of shop drawings (2) delays in contractor's progress (3) payment by owners and (4) design changes. From the Architect and Engineers perspective, the cash problem during construction, the coordination between subcontractors and the slow decision making sometimes by owner were seen as

some of the causes of the delay. However the owners strongly agreed that design errors, labour shortage and inadequate labour skills were important delay factors.

Fugar and Agyakwah-Baah (2010) indicated that delay in construction projects is still a major problem in Ghana in spite of the numerous studies conducted by researchers. They identified a total number of thirty-two factors that causes delays in projects which the respondents of the research (client, professional contractors and consultant) ranked according to the order off significance. The study results revealed top ten (10) factors concerned with delays in construction projects in Ghana are: Delay in honouring payment certificate for work done, cost underestimation, underestimation of project complexity, problem with credit accessibility especially with banks, inadequate or poor supervision, underestimation of time for completion of projects by contractors, materials shortage, poor management by professional, site management problem, price fluctuation/high interest rate: The respondents agreed that the top three of the groups off financial delay were the finance, the material and finally the scheduling and control.

In Ghana, Frimpong *et al.* (2003) carried out a study to find out the major causes of delays in construction projects and identified five factors that cause delay in the construction industry, these include; (i) poor payment to contractors; (2) material procurement challenges (3) poor contract management, (4) lack of knowledgeable performance as well as escalation in price of materials. However, an enhanced project management technique was suggested to be the best way out in overcoming overruns of time in the implementation of project.

In Hong Kong, a research carried out to determine the —major causes of delays in construction projects revealed that extreme low bid, insufficient labour and equipment resources that turns to affect the contractor’s capital, inexperience contractors, unexpected

conditions of ground works that conflict that of utilities, and poor consultants' supervision (Lo *et al.*, 2006).

### **2.3.6 Summary of Causes of Construction Project Delays**

Studies that are related to delays in construction projects have shown that most of the causes of delays are commonly global, like, bad supervision, delay in carrying out payment certificate over a task performed, inadequacy of a client's fiscal resources, poor management of site by contractors, project cost underestimation, problem of access to bank credit; variations orders; design and specifications errors; poor communication among parties; delays in works of sub-contractors; slow making of decision; incomplete or lack of adequate document before starting work; price fluctuation of materials; delay by statutory authorities etc.

### **2.4 EFFECTS OF DELAYS**

According to study by Sambasivan and Soon (2007), on the impact of construction delays in the industry of construction, the following six impacts were pinpointed: total abandonment; Arbitration; time overrun; Cost overrun; dispute; Litigation. Additionally, Ahmed *et al.* (2000) stated that impact of delays in construction project could cause; provocative relationship, cash flow problem, disbelief, project rejection, general sense of trepidation among parties and lawsuit.

The study by Kikwes, (2012) also revealed that disruption and delays in construction project create the following consequences; negative social impact, misunderstanding causing dispute, time overrun, resources wasting in relation to equipment as well as labour, and work going beyond budget. Most construction contract deals with delays in

construction projects and disruption through making provisions inside a contract that a contractor ought to make submission of claims for time extension and cost recovery after proper notification that events met are expected to or are resulting in delays to completion (Hamzah *et al.*, 2011 and Briamah, 2009) cost budgeted as well as specified quality outcome in other unanticipated negative effect and failure to achieve the beset time. Mostly, in times where projects are being delayed, projects are one or the other protracted or the time accelerated and thus, invites extra cost (Fawzy *et al.*, 2012 and McGraw *et al.*, 2009).

The effect of delays on projects can cause confrontational relationship, general sense of trepidation, lawsuit, project rejection, disbelief, and cash flow problems (Ahmed *et al.*, 2000). Ahmed *et al.* (2000) further identified wrong project appraisal and price fluctuation to be among the causes of construction project delay. Nwachukwa (2009) adopted a systematic strategy to analyse the effect material constraints to the success of managing projects in construction industry of Nigeria. He established that the attitude of a project client together with the management team towards the management of material resources is significant as it has an effect on achieving the objectives of the project.

Particularly, materials' procurement delays can affect negatively the construction programme and this could cause delays in achieving the set time for the project. A research carried out by Kikwasi (2012) indicates that disruption as well as delays in projects lead to time overrun, disagreement resulting in dispute, work exceeding budget, wasting of labour and equipment resources, and negative social impact.

According to Li *et al.* (2000) when delay happens there exist conceivable conditions that a manager of project might face the challenge of extra money to finish the task conceding the quality of the project by reducing specification and standard as well as rework

consequently to amend the project. The research conducted by Aibinu and Jagboro (2002) on effect of the delivery of project in the construction industry of Nigeria discovered the following; cost overrun, time overrun, project budgeted cost, work exceeding schedule, arbitration (ADR) disagreement, lawsuit, and complete abandonment. Study carried out by Kamming *et al.* (1997) on manipulating factors on thirty-one (31) multi-storey projects in the Indonesian setting showed that the overrun of cost happens mostly and are thus severe as compared to time overruns. Again, they explain that, key factors affecting overruns of cost include inflation on material cost, as well as wrong assessment on material degree of densities with regards to scarcity and availability.

In the research's quest to examine the effect pinpointed by other researchers and their related studies universally, the following were observe to be the main effect in project adversarial relationship, time overrun, cost overrun, distrust, cash flow problems, arbitration, litigation and complete abandonment.

#### **2.4.1 Recommended Project Management Solution of Construction Delays**

##### **□ Extensive and Robust Project Management Plan**

Suggestion on how to manage construction delays based on empirical evidence are generally inadequate. Nonetheless, some researchers have suggested that one of the possible ways of reducing delays during the implementation phase of construction project is to have an extensive and robust, project management plan (Abdelnaser, *et al.*, 2005).

A study carried out by Nguyen *et al.*, (2004) also suggest five factors that are needed to minimize the occurrence of delays as availability of resources, precise preliminary cost estimates recast, competent project team (Nyuyen *et al.*, 2004)

## □ Project Management Principles

Previous studies suggests that key factors contributing to delays may be managed through project management principles. The key factors causing construction delays that have been identified across the literature are, ineffectual scheduling and planning of the construction project by a contractor, delay in progress payment by the client, changing order by the project's client, skills as well as experience of the staff of the contractor, delay in granting key alterations in the work scope by consultants. Lack of capacity to manage these factors may be linked to the poor implementation of project management principles across publicly executed construction project (Aimobarak *et al.*, 2013.)

## □ Managing ineffective planning and scheduling

There exist some tools and techniques of project management that can be applied to enhance planning and scheduling of projects within the public sector in Ghana. They include Critical Path Method (CPM), Work Breakdown Structures (WBS), Critical Chain Method (CCM), Precedence Diagram Method (PDM), Program Evaluation Review Technique (PERT) and Gantt Chart (PMI, 2013). Again, to control the project's activities against the plan and the programme, some tools and techniques like EVM, Project management information system, analytical techniques and schedule compression etc. have been recommended (APM, 2006).

- Work breakdown structure is referred to as a common focal point for indicating the totality of a project from the higher hierarchy to the lowest (Haugan, 2002). It helps in the allocation of time to various tasks that are embedded in a construction project (Burke, 2013). Work breakdown structure can enhance timely completion and manageability of construction projects activities. Generally, work breakdown allows easy planning and scheduling of a project and its activities (Lanford and

McCann, 1983). In addition to the WBS, CPM has been recognized as another project management tool or technique. CPM is regarded as an effective time management tool for complex project (PMI 2013). It helps in the logical display of the sequence and timing of each activity (Yamin and Harmelink, 2001). Also, CPM communicates interdependency and thus gives a more effective time management technique for large and complex projects (Kallantzis *et al*, 2007). The approach of CPM includes dissecting the project into logical sequence of undertakings that are to be accomplished, calculating the time frame for each undertaking (PMI, 2013). CPM promote good planning and communication for effective management of time, help in the assessment and calculation of time to complete the project, indicate critical activities that may influence project duration, and indicate float times for all activities.

- **Managing poor qualifications, skills and experience of the contractors' staff**

Lack of project management skills and experience among contractors' staff for public construction projects in Ghana can be managed using projects management principles. The potential staff should be examined for the needed experience for the successful implementation of the project. Also, each team member may be screened to be sure they all possess requisite competencies needed to complete tasks or activities allocated to them within the system (Crawford, 2005). Staff knowledge on project stakeholders experience executing similar projects and awareness of nuances of the project environment must be evaluated. Again, regular training can be provided for the project team members to build their capacity and soft skills (PMI, 2013). Also, it is important to acknowledge that the lack of qualified and experienced manpower can be blamed, partly, on the current boom

in the construction sector, especially with respect to large and more complex construction projects as suggested by Al- Kharashi and Skitmore (2009). Another important factor here may also relate to the education and training system in the country (Cordesman, 2003 and Baki, 2004). The policy makers must as a matter of urgency, design policies and incentives that encourage engineering education to create a large pool of educated and well qualified experts for contractors to recruit from.

#### □ **Managing Delay in Progress Payment by the Client**

The managing of delay in headway imbursement by the project's client (basically government) may be done by exploring the use of project management principles. A robust cost management plan, can be applied to solve the issue of delay in headway imbursement by the project's client. By adopting to the use of effective cost management plan, policies, procedures and documentation for planning, managing and controlling project cost including cash flows needed for the project can be determined from the outset of the project (PMI 2013). The use of cost management plan will help in the realistic determination of the amount, location and timing of progress payment of projects from a client's perspective (Dayannd and Padam, 2001). In addition, the issue of cash flow forecasting should be the concern for all parties, it is also necessary that information in connection with project expenditures be unambiguous to clients. Generally, a robust cost management plan can minimize the time of progress payment delay by the client because it will lay out implications of not making payment available as at when due (Ulusoy and Cebelli, 2000)

### □ **Managing change order during construction**

Change order is described as addition or deletion from the project scope which may result to cost or time overruns or underruns (Park and Pena – Mora, 2003). It is a well-known practice in construction projects for clients to change orders during construction by either adding or deleting some activities or deliverable to it (Idds *et al.*, 2007). Taking into consideration the importance of change order in project management, it is always necessary to inform all parties about the implication of change order and its potential effect on the project progress. In order to minimize this issue causing unwanted delay in construction projects, change order proposed by the client may be managed by using project management principle like expert judgment, meetings and change control tools based on the project organization and environmental constraints (PMI, 2013). Quick approval of key alterations in relation to the work scope by consultant is paramount to avoid project delays. The reason is that such changes may impact project management plan, project documents or deliverable (PMI, 2013). This problem can be avoided by engaging the services of competent consultant who understands the implications of certain action on the performance of project (Berggren *et al.*, 2001)

### □ **Delay rectification**

A study by Abdul – Rahman *et al.*, (2006) found that approximately 29.2 percent of the participants recommend the upsurge in productivity through overtime working or work by shift, 24 percent of the participants chose the request for time extension; this can be done on the condition that delay was compensable or justifiable (Mobarak *et al.*, 2008). There were two basic processes indicated by

13.5 percent of the total respondents as they suggested the implementation of delayed undertakings by subcontractors and consequently asked for regular meetings on site with all project team groups. Approximately 9.4 percent of the participants chose asking the management board to render more authorities to the project manager and 4.2 percent of the participants believed that they ought to modify the method of construction. According to Rahman *et al.*, (2006), the ten ways he suggested ought to be done in order

to get a failing construction project back on track were:

- Double check all dependencies
- Improve process
- Prevent all scope change
- Fast track it
- Reallocate resources
- Check time – constraint activities
- Crash the schedule
- Scale back the scope of work
- Swap resource
- Work overtime

#### □ **Proper cash flow forecasting**

The significance of this pursues to identify and understand the cash flow characteristics of an organization, including its strength and weakness, create cash flow forecasts and the use of related tools to enhance cash flow planning as well as management. Cash flow is improved through the implementation of germane strategies and the use of cash flow information for enhancing the entire operations of the project. According to the Project Management Institute (PMI), project defines the art of coordinating and directing resources (i.e. human and material

resources) through the various phases of project to achieve a pre-set cost, quality, objectives of scope, time, and participating objectives. The management aspect of construction project includes planning, coordination, and controlling of the various operations inside the project.

Further documents that are included at the planning phase of construction are;

- Scope statement and the scope documentation: this document defines the benefits, deliverables, need, key milestone and objectives of the business.
- Work breakdown structure (WBS): this is a visual representation which split the project scope into chunks that are manageable.
- Communication plan: the communication plan gives an outline or a guide to the communication goals as well as the communication objectives. It does the same for communication tools and methods and communication roles.
- Risk management plan: risk management plan assist projects managers in identifying predictable risk, like changing requirements, unrealistic cost and time estimates etc. (Esposito, 2015).
- Execution: execution comes in as soon as the work commences. Here the project team starts in assigning the resources of the project, implements projects management plans, set up systems tracking the project, implement tasks, keep posted the projects' plan, and adjust the plan of the project.
- Closure: this forms the last phase of the project. Here project managers from time to time hold inquest meetings in order to assess what went well during the execution of the project and thus ascertain failures. The team then creates what is called a project punch list which contains all the tasks that could not be accomplished and thus performs the last budget so as to create a report for the

project.

According to the CIOB (2004), the practice of paying contractors on time and efficiently in construction projects remains a key factor which can make a proximate contribution to the success of a project. Again, a smooth cash flow enhances a better delivery of projects on time and within the estimated budget.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 INTRODUCTION**

This chapter attends to the detailed discussion of the research methodology engaged in the study. Important subjects upsetting the philosophical stance of the researcher including the strategies espoused for this research is discussed explicitly. Likewise, a brief discussion of the strategy used in the questionnaire design, the target respondents, the sample size required and the questionnaire administration. Finally, the mode of data presentation in addition to the statistical tools to be used for the critical analysis of the data gathered is discussed.

#### **3.1 RESEARCH APPROACH**

For the selection of research approach, Parrington (2002) argued that it relies on the aim and the objectives of the research and the research questions as well. Before selecting the right research designs, three criteria ought to be taken into consideration; that is, the degree of risk, time availability, and the nature of the research topic as stated by Creswell (2003).

Actually, the two basic methods engaged in instituting what is true or false in a study and thus for drawing final conclusions are induction as well as deduction. Whiles induction method is undertaking in a less structured qualitative research method, deduction method is preferred using structured qualitative research method as this research tries to generalize the finding for the purpose of representing the whole population and as a result making the choice of the deduction approach the greatest fitting. Deduction approach aims at generalizing findings from sample to population with the inductive aims of investigating new ideas or the generation of theory (Saunders *et al.*, 2007).

### **3.2 RESEARCH DESIGN AND JUSTIFICATION**

To achieve the research objective, a review of existing literature on delays in government construction projects were conducted. Subsequently, for analysis purposes, closed and opened-ended questionnaire was made available to respondents to elicit for information. At the initial stage of the data collection process, useful literature on the definition of delays in government construction projects were reviewed. The literature gathered on these was studied to determine the actual causes of these delays through formulating questionnaire and the interview schedule (Saunders *et al.*, 2007). Though, in formulating the review, information that supports empirical study results was considered in that, the evidence quality made available by unreliable data is weaker than that made available by empirical study (Aveyard, 2007).

Finally, information was gathered from Construction professionals (contractors) who work with public and private organizations and consultancy firms in the Western Region of Ghana through a closed as well as opened-ended questionnaire. Critical consideration was taken to ensure that the questionnaire reports the research objectives when preparing the questionnaire.

### **3.3 TARGET RESPONDENTS**

The population in research setting refers to the measurement of interest or collection of all possible individuals or objects (Mason *et al.*, 1997). Cooper *et al.*, (2001) highlighted that population includes all the individuals whom the measurement is being taken. The study population would include contractors classified under A2 B2 and D2 K2 in government construction projects in the Bia West District, Western region of Ghana.

### 3.4.1 Population Definition

The selection of participants in terms of answering the questionnaire was just limited to contractors under the A2 B2 and the D2 K2 classes in Ghana precisely Western region. The basis for this selection was contractors under these classes are easy to be located and they also have enough experience in the management of construction project delays by reason of the size as well as the type of projects they undertake. The entire population was 84 as obtained from the Ministry of Roads and Transportation and the Ministry of Water Resources, Works and Housing.

### 3.4.2 Sampling technique and sample sizing

The study adopted a purposive sampling method. Tayie (2005) explains a purposive sample as one that comprises of subjects who are selected based on certain specific characteristics needed for a study and rules out subjects who do not meet this standard. The nature of the project is such that privilege and sensitive information is required. This necessitated the use of purposive sampling technique for the study.

A total of fifty-two (52) contractors using the Kish formula (1965) formed the basis on which the study was conducted.

$$N = \frac{n^1}{1 + n^1/N}$$

Where n = sample size

N = Total population size (the Number of A<sub>2</sub> B<sub>2</sub> and D<sub>2</sub> K<sub>2</sub> road and Building contractors in the country) N = 84

$$n_1 = \frac{S_2}{V^2 S}$$

maximum

standard  
deviation  
among the  
population  
of elements

(Total error of 0.1 at a confidence interval of 95%)

V = standard error of the distribution assumed to be 0.05

$S^2 = P(1-p)$  where p represent the proportion of population elements belonging to the class defined.

$$S^2 = 0.5(1-0.5) S^2$$

$$= 0.25$$

$$n^1 = \frac{0.25}{0.05^2}$$

$$n^1 = 100$$

$$n = \frac{100}{1 + 100} = 45.66 =$$

46

$$\frac{100}{1 + 100}$$

84

$$12/100 * 46 = 5.52 = 6$$

$$6 + 46 = 52$$

Therefore the total number of contractors = 52

### 3.5 DATA COLLECTION

In order to achieve the set research objectives, this study focused on only contractors in the construction industry. The reason behind this was that contractors are the stakeholders that are directly challenged with the issues of delays in the industry. Depending on the research questions as well the research objectives, a complete data collection from contractors was done in a practicable manner.

A critical look at the research objectives and existing literature, a well-structured questionnaire was prepared and administered to the various respondents by the researcher. The design of the questionnaire was in two main sections: the first section formed the demography of respondents while the second section will address the specific objectives. Practically all the questionnaires have both closed and opened ended questions to certify consistency of respondent feedback. For the reason that it is not totally possible to design all questions as closed-ended, some of the questions were left open-ended, to acquire numerical data or to lobby some written comment. A five point Likert scale of 1 to 5 was employed so as to measure the strength of respondent's view or opinion on the critical causes of delays in project delivery inside the industry of construction.

Contractors as well as stakeholders, the appropriate tools and techniques in project management today that could be used to manage delays in government construction projects, as well as the possible process or framework that could be used to enhance the management of construction delays in Bia West District respectively. A five point Likert scale of 1 to 5 was employed so as to measure the strength of respondent's view or opinion. All the 52 questionnaires given out to contractors were retrieved answered.

### **3.6 RESPONSE TO QUESTIONS**

The design of the questionnaire made the answering of questions clearer to the respondents as they answered exactly as expected. Respondents were made to freely answer the questions without any pressure even as they go through questionnaire because they had ample time in answering them. The researcher had discussions with some of the respondents for the purpose of finding out the reason behind the provided answers.

### 3.7 METHOD OF ANALYSIS

Relative Importance Index (RII) was employed in analyzing the retrieved data from the study's respondents as it assisted in the identifying the appropriate tools and techniques in project management that could be used to manage delays in government construction project.

Note, the nearness of a value's importance index for an identified factor to 1, the more fitting a factor or an option is to be used in managing the delay therefore the more appropriate that particular factor or option. The RIIs of the various factors gotten were ranked so as to determine the one that appears most among the factors.

$$\text{Relative Importance Index (RII)} = \frac{\sum W}{AN}$$

Where, W = weights given to each factor by the respondents and ranges from 1 to 5, where '1' is very low and '5' is very high.

A = the highest weight (i.e. 5 in this study)

N = the total number of respondents

## CHAPTER FOUR

### DATA COLLECTION AND DATA ANALYSIS

#### 4.0 INTRODUCTION

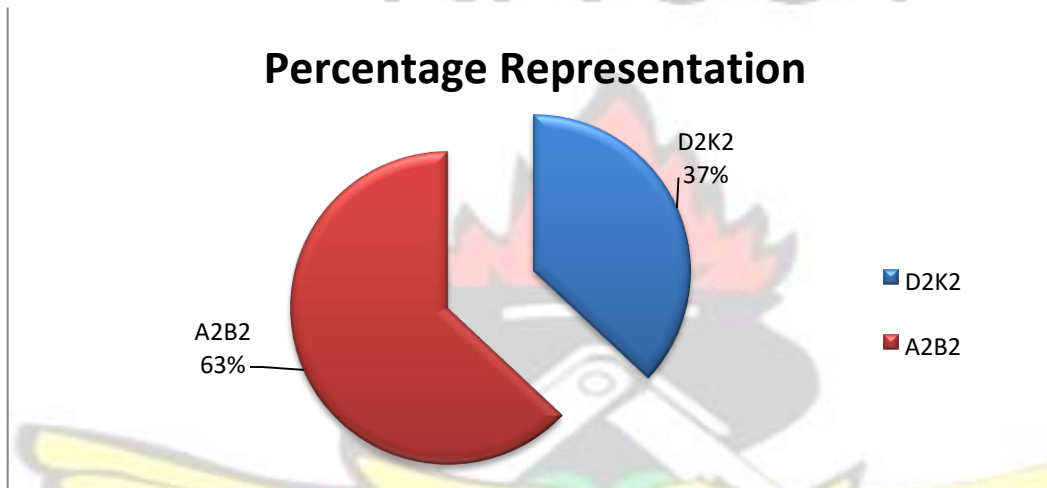
This chapter presents the analysis of data and discussion of results from the questionnaire surveys.

The Statistical Packages for Social Science (SPSS) were used to analyse the data so as to obtain some level of significance or agreement of the structured questions. The results were to also render an enhanced reflections on the study proposed.

#### 4.1 RESPONDENTS' BACKGROUND AND EXPERIENCE

In management of Delays in construction projects, analysis of the participants indicated that a total of 33 (63.5%) formed contractors classified under A2 B2 whereas the remaining 19 (36.5%) formed contractors classified under D2 K2 as indicated in figure

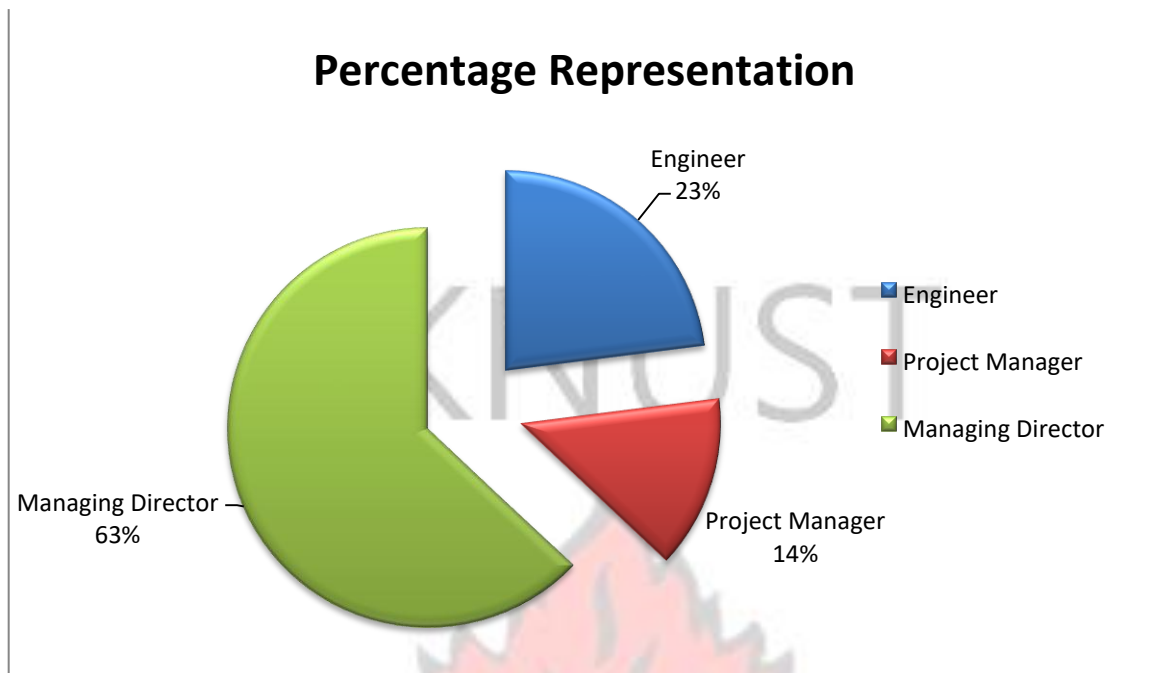
4.1.



**Figure 4.1: Classification of Respondent Company**

**Source: Author's field data (2016)**

77% of the participants formed top management. This gave a dependable data because the respondent were known to be involved in managing affairs of the company and therefore have the way in to all relevant data to answer the questionnaires effectively.

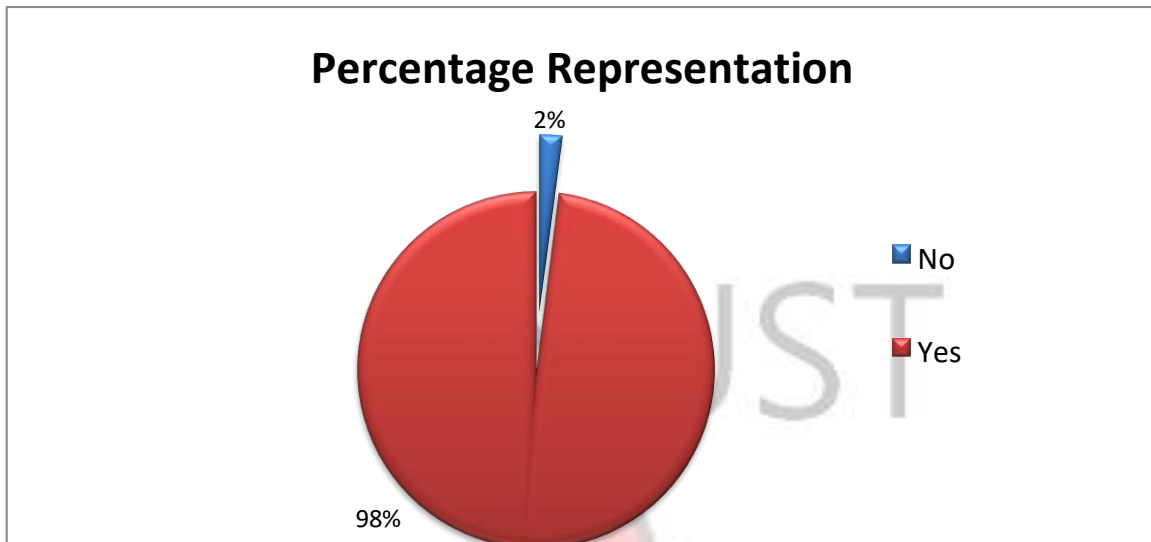


**Figure 4.2: Position of the Respondents in the Company**

**Source: Author’s field data (2016)**

The survey indicated that majority of the participants had experience in managing the delays in construction projects which they expressed displeasure.

It revealed that a total of fifty-one (51) respondents, forming 98.1%, had experienced delays in construction management with the exception of only one (1) of the respondent, forming 1.9% had no experience in the management of delays in construction since August 2016 from the employer



**Figure 4.3: Company Experienced Delays in Construction Management**

**Source: author’s field data (2016)**

#### **4.3 IDENTIFYING THE CRITICAL FACTORS CAUSING DELAYS IN GOVERNMENT CONSTRUCTION PROJECT**

Respondents for this study were asked to rank the critical factors causing delays in government construction project and how each significantly contributes to the delays. The critical factors that cause delays were identified to be twenty-three (23) which were observed to be significant. To determine the importance of the factors that causes delay, the Relative importance index was used. The Relative index of 70 percent and above was chosen to be highly significant.

This means that the first twelve ranking‘ were highly important. As shown from Table 4.1, the first two factors, thus clients inadequate financial resources with relative index of 96 percent and delays in honouring payment certificate for work done with index of 93 percent were the most important cause of delay. And by ranking, it implies all the respondent ranked these two factors as extremely important contributing factor of delay.

The third and fourth ones were equally extremely important, thus, underestimation of the project duration with 83 percent and poor communication between contracting parties with index of 82 percent. The rest of the factors are ranked in table 4.1 below

**Table 4.1: Relative Important Index (RII) of critical factors causing delays in government construction projects.**

<b>Causes of Delay</b>	<b>RII</b>	<b>Ranking</b>
Lack of complete document before commencement	0.520	23
Delays in honouring payment for work completed	0.930	2
Foundation conditions encountered on site	0.650	18
Errors in design and specification	0.750	11
Poor communication between contracting parties	0.820	4
Complexity, difficulties in access bank credit (client)	0.790	5
Change orders during construction	0.780	6
Delay in instruction from consultants	0.770	10
Building approved delays by statutory authorities	0.660	15
Materials procurement difficulties	0.650	17
Unfavourable site conditions	0.610	20
Mistake in soil investigation	0.650	19
Bureaucracy in decision making	0.770	8
Delays in sub-contractors work	0.780	7
Underestimation of the project cost	0.740	12
Poor supervision of work on site	0.690	13
Contractors poor site management	0.680	14
Complexity, difficulties in accessing bank credit (contractors)	0.660	16
Increment weather condition	0.580	21
Material price esclations	0.570	22
Insufficient financial Resources of clients	0.960	1
Underestimation of the project duration	0.830	3
Contractors improper planning during construction	0.770	9

**Source: Field study 2016.**

### **4.3.1 Discussion of result on critical factors contributing to delays**

Brief discussion on the critical factors causing delays in construction projects in the descending ranking order.

#### **4.3.1.1 Client inadequate financial resource**

The inadequate clients financial resource with relative index of 0.960 was ranked first as the extremely significant contributing factor of delay by respondents. This may also lead to delay in honouring payment certificates for work done which was ranked second with an index of 0.930 as also significant contributing factor of delay.

A research done by Fugar and Agyakwah-Baah (2010) found these problem as the main contributing factor that cause delay in building project in Ghana. Payment delays may result in cost over runs hence adequate funding prior to the award of contract is seem necessary to ensure that project cost remains within budget. According to Arditi *et al.*, (1985) long delays as a result of inadequate funding in inflationary periods increase costoverruns extremely. To reduce these challenges, contracting parties most especially the client should address the challenges related to funding before project commencement and prepare a good payment schedule to ensure that payments are honoured on time.

#### **4.3.1.2 Underestimation of the project duration**

Underestimation of the project duration was ranked third with relative index of 0.830. In order to ensure that costs are kept within budget, historical data which affect project costs such as size of project, proper scope definition, etc. must be kept. According to bill *et al*, 2006 a consistent mistake is that adjustment for myriad factor are not made and similarly, the basis of any cost estimate is to determine to project scope, design and specifications (Beattie, 2002). According to Sawczuk, (1996). It is not surprising that proper planning

and clear definition of project-scope and specifications was ranked highest among the mitigating ways.

#### **4.3.1.3 Poor Communication between contracting parties**

The communication between contracting parties was ranked fourth with 82 percent, because information flow between contracting parties depends on communications. This implies that the establishment of clear communication channels is necessary so that corrective cost control measures can be implemented by parties in charge (Oosthuizen *et al*, 1998).

#### **4.3.1.4 Complexity in accessing bank credit**

This was ranked fifth with index of 0.780. All construction projects needs adequate funding for successful execution and completion. A study conducted by Mbachu and Nkado (2004) revealed that globally, the construction industry is plagued with cost overruns in project delivery which makes it unattractive for investors. Contributing factors six to ten are all significant causes of delay that need solutions to minimize its effect in project execution. Human resources schedule, quality plan, plant and equipment schedule and work schedule plan all put together will reduce delays to breasts minimum.

### **4.4 USE OF PROJECT MANAGEMENT KNOWLEDGE, TOOLS AND TECHNIQUES TO MANAGE THE DELAYS.**

Respondents were asked to rank the solutions on the critical factors of delays which were categorized under four major headings.

**Table 4.2: Ranking of solution for critical delay factors – project management**

<b>approach</b>			
<b>Strategy No.</b>	<b>Project Management Solutions For Critical Delay Factors</b>	<b>RII</b>	<b>Ranking</b>
<b>1</b>	<b>Managing ineffective planning and scheduling Tools:-</b> <ul style="list-style-type: none"> <li>• Critical Path Method (CPM),</li> <li>• Program Evaluation Review Technique (PERT),</li> <li>• Critical Chain Project Management (CCPM),</li> <li>• Work Breakdown Structure (WBS) etc</li> </ul>	0.748	2 <sup>nd</sup>
<b>2</b>	<b>Managing delay in progress payment by client Tools:-</b> <ul style="list-style-type: none"> <li>• Cash flow forecasting</li> <li>• Robust cost management plan</li> <li>• Risk management plan</li> </ul>	0.851	1 <sup>st</sup>
<b>3</b>	<b>Managing change order during construction Tool:-</b> <ul style="list-style-type: none"> <li>• Expert judgment, meetings</li> <li>• Change control tools based on the project organisation and environmental constraints (PMB) and Quick</li> <li>• Approval of major changes</li> </ul>	0.646	3 <sup>rd</sup>
<b>4</b>	<b>Managing poor Qualification, skill and experience of the contractors' staff Tools:-</b> <ul style="list-style-type: none"> <li>• Posses requisite competencies (Crawford, 2005)</li> <li>• Project stakeholders experience</li> <li>• Regular training etc</li> </ul>	0.473	4 <sup>th</sup>

**Source: author's field data (2016)**

#### **4.4.1 Discussion of result on Ranking of Solutions for Critical Factors Causing Delays.**

Table 4.2 depicts ranking of solution for critical factors on solution to causes of delay in government construction project. It comprises of: managing ineffective planning and scheduling, managing delay in progress payment by client, managing change order during

construction and managing poor qualification, skill and experience of the contractors' staff and their respective tools to be employed to manage them.

#### **4.4.1.1 Strategy 1: Managing ineffective planning and scheduling.**

This was ranked second of the four categorized project management approach solutions with R.I.I of 0.748. Every project requires adequate planning for successful execution and some of respondents were of the view that tools such as Work Breakdown Structure (WBS) allows easy planning and scheduling of a project and its activities (Lanford and McCann, 1983).

The Critical Path Method (CPM) is regarded as an effective time management tool for complex project (PMI 2013). According to Yamin and Harmelink (2001) CPM helps in the logical display of the sequence and timing of each activity. In addition, to control the activities of the project against the plan and the schedule, tools and techniques like Program Evaluation Review Technique (PERT) and Earned Valued Management (EVM) are recommended (APM, 2006)

#### **4.4.1.2 Strategy 2: Managing Delay in progress payment by client.**

Section of the respondents ranked this solution as the first among the others with R.I.I. 0.851 because they believe that paying contractors and subcontractors efficiently and on time in construction project becomes a key factor which thus contribute to the success of a project. Respondents had the view that a number of project management tools and techniques like cash flow forecasting, robust cost management plan and risk management plan can be used to manage this effect. A smooth flow of cash in construction project

enhances an effective project delivery as work is delivered on time and within the stated budget (C10B, 2004).

A study conducted by Chen *et al.* (2005) revealed that a consistent pay-out of interim imbursement stands crucial for constructors to be sustain in business, and whether payments are made late or are not made to meet the certified amount, it simply means huge problems would be faced by the contractors since cash flow is going to be affected.

#### **4.4.1.3 Strategy 3: managing change order during construction**

This solution was ranked third with R.I.I. of 0.646 by the respondents. This issue is a well-known practice in construction projects for clients to change orders during construction by either adding or deleting some activities or deliverable to it (Idds *et al.*, 2007). To reduce this issue causing unwanted delay in construction projects, this problem may be managed by using project management tools like expert judgment, meetings and change control tools (PMI 2013). Kikwasi (2012) study indicates that client variation is one of the predominant causes of delay. Quick approval of major changes in relation to the scope of work by consultant is critical to avoid project delays. The engagement of the services of competent consultant will also help to reduce errors and faulty design (Berggren, *et al.*, 2001).

#### **4.4.1.4 Strategy 4: Managing Poor Qualification, Skill and Experience of the contractors' staff**

Respondent ranked this project management solution fourth with the R. I. I. of 0.473. The respondents were of the view that lack of project management skills and experience among contractors' staff can be managed by using project management tools. The

potential staff should be scrutinized for the needed experience for the implementation of the project. Again each team member may be screened to be sure they all possess requisite competencies needed to complete tasks or activities allocated to them within the system (Crawford, 2005). Regular training can be provided for the project team members to build their capacity and soft skills (PMI, 2013).

#### **4.5 TO DEVELOP FRAMEWORK TO ENHANCE MANAGEMENT OF CONSTRUCTION PROJECT DELAYS IN BIA WEST DISTRICT.**

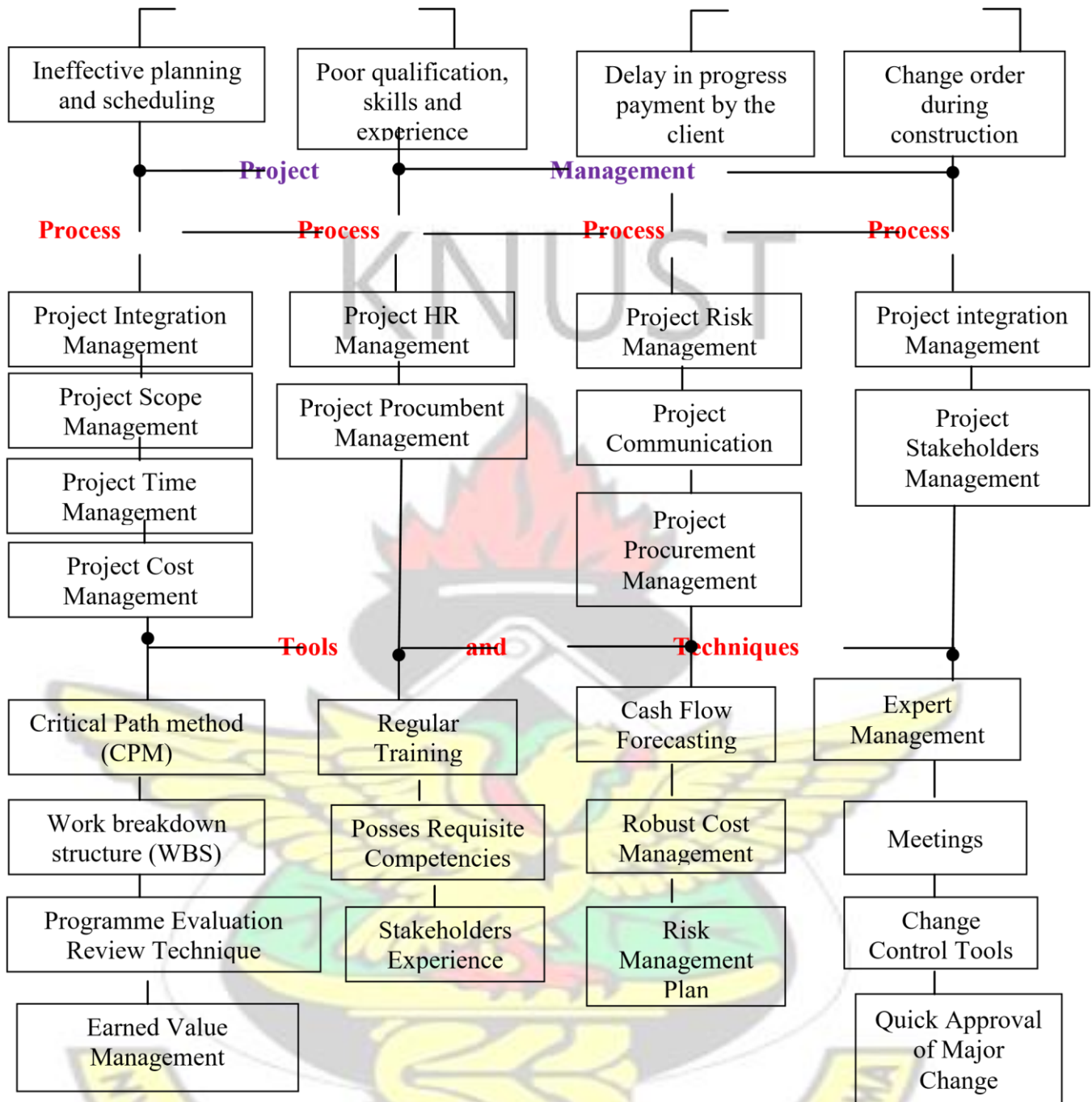
The result obtained from the respondents in relation to the project management solution for critical delay factors in table 4.2 was adopted to develop a framework to enhance the management of construction project delays. As indicated from figure 4.4 below, the critical delay factors can broadly be grouped into excusable and non-excusable delays. These delays are further categorized into four main headings with the delay in progress payment by the client and the change order during construction under excusable whilst ineffective planning and scheduling and poor qualification, skills and experience also under the non-excusable.

The project management process then commences with the assistance of the respective tools and techniques to manage the critical delay factor as shown in figure 4.4 below.

#### **CRITICAL DELAY FACTORS**

**Non-excusable**

**Excusable**



**Figure 4.4: Framework for managing construction project delays in Bia West District.**

**Source: Author's field data (2016)**

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

#### 5.1 OVERVIEW

The main objectives of this study were to identify the critical factors that cause delays in government construction projects to Bia West Districts, to study the present use of project management knowledge, tools and techniques in managing delays in construction project and to develop a framework to enhance management of construction project delays in Big West.

The chapter also summaries the previous chapters including their respective findings as it draws conclusions for this research in conformance to the study's aim and objectives.

#### 5.2 SUMMARY OF FINDING

The study reveals that a total of fifty-one (51) respondents, forming 98.1%, had experienced delays in construction management with the exception of only one (1) of the respondent, forming 1.9% had no experience in the management of delays in construction.

From literature review, It was established that inadequate financial resources for work clients; delays in honouring payment for work completed; underestimation of the project duration; poor communication between contracting parties, complexity, difficulties in accessing bank credit (client); cheque orders during construction and the others and represent 0.960, 0.930, 0.830, 0.820, 0.790, 0.780, and others with RII respectively. The study again revealed that the critical delay factors have critical effects like time overrun, cost overrun, total abandonment of projects and poor quality of work. In addition, it revealed the ten ways to get slipping project back on track. They included: work overtime;

re-allocated resources. Double check all dependencies; check time-constraint activities; swap resource; crash the schedule; fast track it, prevent all scope of work.

It was also revealed that, delays in government construction projects can be management by considering project management principles, and problems such as ineffective planning and scheduling could be managed by the use of tools and techniques like work breakdown structure (WBS); Critical Path Method (CPM); Program Evaluation Review Techniques (PERT) and others. Delay in progress payment by client problem could be solved by employing tools such as cash flow forecasting; robust cost management plan and risk management plan. Change order during construction could be managed by using tools like expert judgment-; meetings and change control tools and finally the problem of poor qualification, skill and experience of the contractors' staff by engaging the service of competent consultant and training of staff regularly.

### **5.3 CONCLUSIONS**

Findings from this research indicate that managing delay in progress payment by client in government construction project is a key issue that leads to the success of a project.

This study has revealed that contractors' major problem or fear had to be with the poor payment practice and that factors contributing to frequent incident of delays in construction project in Bia West District are ineffective planning and scheduling of the project by contractors; delay in progress payment by the client; poor qualification, skills and experience of the contractors' and change order by the client. Moreover, it has been argued that these critical factors can be better managed by employing appropriate project management tools and techniques. The intended framework is supposed to assist

stakeholders in Bia West District to enhance the effectiveness of the management of public construction projects.

## **5.4 RECOMMENDATIONS**

To improve on the management of delays in construction projects in Bia West District the following recommendations are noteworthy.

### **5.4.1 Client**

Initial planning and controlling is essential to the client in order to have proper action plan, procurement plan and budget plan prepared before starting of project. Payment schedules must be agreed by the parties involved. Good communication channel must be used by the contracting parties to ensure free flow of information to avoid delays.

### **5.4.2 Contractor**

On the part of the contractor, adequate knowledge in project management principles, tools and techniques in managing construction project is essential in order to reduce delays. Contractors should have good site managers for the smooth execution of works. They should plan their works properly and provide the entire schedule to clients for smooth flow of their staff to meet the current trends in project management.

### **5.4.3 Consultants**

The consultants must plan very well to ensure that contract process are duly followed, thus, approval of drawings, documentation and other things to reduce variation during construction. They should monitor their assigned work very well by insisting that corrections are done at the appropriate time to reduce or avoid rework. This is because they

serve as an intermediary between client and contractors their skills in communication is therefore essential to help smooth flow of information to other contracting parties.

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## **APPENDIX**

### **QUESTIONNAIRE FOR RESPONDENTS**

**TOPIC: MANAGEMENT OF DELAYS IN CONSTRUCTION PROJECTS IN  
BIA WEST DISTRICT.**

Please, I wish to seek your opinion on the above mentioned subject. This questionnaire is designed to sample views from financial class A2B2 & D2K2 categories of Road and Building contractors respectively. The information provided would be treated confidential and use for specifically for academic purposes. The information would be vital for establishing the most significant causes of delay and the appropriate project management still and techniques to manage them in construction project in Ghana.

**SECTION A GENERAL ORGANISATION INFORMATION**

Please, tick one box and fill in the blanks if you select other.

Organisation/company name: .....

Address: .....

1. The classification category of the respondent company  
A2B2 [ ]      D2K2 [ ]
2. The position of the respondents in the company  
Managing Director [ ]      Project Manager [ ]      Engineer [ ]  
Site Manager [ ]      Foreman [ ]
3. State the number of years the organisation/company have experience in construction  
0-5year [ ]      5-10years [ ]      10-15years [ ]  
15-20years [ ]      more than 20 years [ ]
4. Has the company faced delay in execution of construction projects since January 2010?  
Yes [ ]      No [ ]

**SECTION B**

**Objective of the study:** to identify the critical factors causing delays in government construction project in Bia West District.

**Question:** Please, tick in the appropriate columns to indicate how much you agree that the following factors cause delay in construction project.

<b>Causes of Delay</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Lack of complete document before commencement					
Delays in honouring payment for work completed					
Foundation conditions encountered on site					
Errors in design and specification					
Poor communication between contracting parties					
Complexity, difficulties in access bank credit (client)					
Change orders during construction					
Delay in instruction from consultants					
Building approved delays by statutory authorities					
Materials procurement difficulties					
Unfavourable site conditions					
Mistake in soil investigation					
Bureaucracy in decision making					
Delays in sub-contractors work					
Underestimation of the project cost					
Poor supervision of work on site					
Contractors poor site management					
Complexity, difficulties in accessing bank credit (contractors)					
Increment weather condition					
Material price esclations					
Insufficient financial Resources of clients					
Underestimation of the project duration					
Contractors improper planning during construction					

### SECTION C

## Objective of Study

To study the present use of project management knowledge, tools and techniques in managing delays in construction projects.

**Question:** Please, tick in the appropriate columns to indicate how much you agree that the following project management approach and tools can be used to manage the delays.

Each scale represents the following;

(5) strongly agree, (4) agree (3) neither agree nor disagree (2) disagree (1) strongly disagree

Strategy No	Adoption of Project Management Approach To manage construction delays	1	2	3	4	5
1	Managing ineffective planning and scheduling Tools:- Critical Path Method (CPM), Program Evaluation Review Technique (PERT), Critical Chain Project Management (CCPM), Work Breakdown Structure (WBS)					
2	Managing delay in progress payment by client Tools:- Cash flow forecasting, Robust cost management plan, Risk management plan					
3	Managing change order during construction Tool:- Expert judgment, meetings, change control tools based on the project organisation and environmental constraints and Quick approval of major changes					
4	Managing poor Qualification, skill and experience of the contractors' staff Tools:- Posses requisite competencies, Project stakeholders experience and regular training etc					