

**TIMELY DELIVERY OF ROAD CONSTRUCTION PROJECT AT OPTIMAL
COST; THE ROLE OF SURVEY AND DESIGN DEPARTMENT**

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DECLARATION

I hereby declare that this submission is my own work towards the MSc Project 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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ABSTRACT

Construction survey and design has an important role in the timely delivery of the project in Ghana, especially in road or highway construction. There are several interpretations of design, as well as the survey when it comes to the delivery of highways. This is probably because the design effort has been made rather independently by researchers from different backgrounds, who work on different design phases. In Ghana, limited research had been done with regards to the roles played by Survey and Design department in contributing to the timely delivery of construction roads at optimal cost. The aim is to identify the roles of survey and design department in the Ghana Highway Authority in achieving the timely delivery of road construction projects at an optimal cost. In achieving this, the following objectives were established: to identify the factors that affects the timely delivery of road construction projects at an optimal cost, to ascertain the effects of untimely delivery of projects at an optimal cost and to identify the roles of survey and design department in enhancing the timely delivery of road construction projects at optimal cost. The study adopted quantitative approach where survey questionnaires were administered via e-mail and personal delivery to the respondents in the Ghana Highway Authority and construction firms, Upper West region. 60 out of 88 questionnaires were successfully collected from the targeted population in Ghana, at a response rate of 68.18%. The completed questionnaires were coded and entered into the Statistical Package for Social Sciences current version twenty-three. . The data analysis technique adopted was mean score ranking and Kendall's coefficient of Concordance. The mean score ranking was used to find out the most significant factors which influence the respondents and Kendall's coefficient of Concordance was used to determine the level of agreement on the variables by the respondents. The study adopted the quantitative research strategy, where the targeted respondents were allowed to respond to structured questionnaires. The results revealed that public interruption is the most agreed on factor that affects the timely delivery of road construction projects at an optimal cost. The study revealed that calling for arbitration is a major effect of untimely delivery of projects at an optimal cost. Finally, the study portrayed that, the major role of Survey and Design department in mitigating delay on road construction is preparing a detailed design. The study contributed to knowledge by creating awareness that preparation of detailed drawing is capable of helping to minimize untimely delivery of road project in Ghana. The following recommendations are made: the construction industry should be very mindful with the factors that are liable to cause delay in the construction industry and try mitigate them at the early stage of construction, the construction industry, especially the Ghana Highway Authority should make efficient use of the strategies mitigating construction delays and enough awareness should be created to help know the effects of road construction delays. The research study was presented with undeniable constraints in its conduct, as well as the scope of the study. Most of the respondents were busy but the researcher managed to attain an appropriate number that can be analysed for generalization. Also, the study was based on published papers from conference proceedings and journals. The research can therefore be used as bases for a recommendation for future research works. It is proved that further research is important in the following subject: development of framework policy to help mitigate delay on construction project and further analytical tools can be used to still analyse the effects of delay on construction projects in Ghana.

Keywords: Road construction: Construction industry, Ghana, optimal cost, Survey and Design department, timely delivery.

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DEDICATION

I dedicate this work with love to my family. This is to express my appreciation for the extra tasks they took upon themselves, just to ensure that I had free mind and enough time to concentrate on my studies.

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My foremost thanks go to God for His grace and mercies upon my life. I wish to acknowledge my supervisor, Dr Barbara Simons for the constructive criticisms and invaluable suggestions she gave throughout the entire project.

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CHAPTER ONE

1.1 RESEARCH BACKGROUND

Roads have always been a fundamental and indispensable infrastructure to society since the invention of the motor vehicles (Psarianos et al., 2001). This even deserves more consideration given that in the 15 European Union (EU) countries, 1 out of 2 people own a car (Hseih et al., 2004). Roads also the primary means of transporting goods to reach consumers (Psarianos et al., 2001).

Ensuring that roads are operable is be a basic concern for most modern societies. Likewise, road safety is also a major concern. The latter has always been a concern even of late given the continuous rise in car ownership and travelling vehicle-kilometres. These have increased the rate of accidents in Europe and the rest of the world. In the year 1998, 43,000 people lost the lives in Europe from road accidents (Gaturu and Muturi, 2014). Akintoye et al. (2005) revealed that worldwide, about 500,000 fall victims to these accidents while 15,000,000 are injured annually. Therefore, how operable and how safe road networks are having been major concerns in the EU and in North America. The design parameters and the equipment to be installed must be clearly known to effectively manage existing road networks. Most existing roads have little data whiles for newer roads, much data abound (Kariungi, 2014). Road mapping is a useful tool to filling in the gap in data (Ramelyte and Babaitis, 2013).

The study also considers a cost-effective road surveying system. This system was the brain child of the National Technical University of Athens. About 1,300km of road in Greece has been survey using this system. Of the length, 500km were assessed and

measures were put in place to evaluate how operable and safe the stretch of road is (Psarianos et al., 2001).

The primary objective of projects within the construction industry is to make sure these projects are completed within the time stated, the cost and quality (Meroka, 2011). This entails constant monitoring of progress on the part of project managers and undertaking corrective measures (Kerzner, 2003). The passing years have uncovered several general factors responsible for project time and cost overruns in literature. In a survey of 50 contractors, consultants and client organizations in Nigeria, Mansfield et al. (1994) discovered that financial constraints and delay in payment, shortage of materials, poor contract management, importation of materials and plant items, changes in design, delays by subcontractor and nominated suppliers were the foremost factors responsible. Construction survey and design has an important role in the timely delivery of the project in Ghana, especially in road or highway construction. There are several interpretations of cross-layer design, as well as the survey when it comes to the delivery of highways (Srivastava and Motani, 2005). This is probably because the cross-layer design effort has been made rather independently by researchers from different backgrounds, who work on different layers of the Stack (Srivastava and Motani, 2005). In Ghana, limited research (Frimpong et al., 2003; Akintoye et al., 2005; Assaf and Al-Hejji 2006) had been done with regards to the roles played by survey and design department in contributing to the timely delivery of construction roads at optimal cost.

1.2 PROBLEM STATEMENT

In a more extensive survey in Hong Kong, Kumaraswamy and Chan (1998) administered 400 questionnaires with follow up interviews. His research uncovered several influencing factors of project cost overruns and time overruns. The study

pointed to delays in design information, long wait for drawing approval, poor site management and supervision, mistakes and discrepancies in design documents, etc. Similar research outcomes were had by Frimpong et al. (2003) when researched in Ghana. Also, Assaf and Al-Hejji (2006) experienced similar outcomes in Saudi Arabia. Al-Momani (2000) revealed in his research that changes in design, weather, site conditions, economic conditions, late deliveries, etc. could be causes of delays in Jordan by examining 130 public projects.

While all these literatures reveal to much extent the factors responsible for cost and time overruns in construction projects, they are still scarce. This drives the need for more recent and pertinent investigations to reflect prevailing project conditions. Most of the research findings were from the United Kingdom. In Ghana, although construction projects around the globe share common grounds and characteristics, nonetheless, there still remain country-specific conditions, there are few studies conducted in Ghana that considered construction delay including Bajjou and Chafi (2018), Amoatey and Ankrah (2017), Akomah and Jackson (2016), Aforla et al. (2016), without considering Survey and Design Department. The aim of this study is to identify the roles of survey and design department in achieving the timely delivery of road construction projects at an optimal cost.

1.3 RESEARCH QUESTIONS

The research study sought to answer the following questions:

1. What are the factors that affect the timely delivery of road construction projects at an optimal cost?
2. What are the effects of untimely delivery of projects at an optimal cost?

3. What are the roles of survey and design department in enhancing the timely delivery of road construction projects?

1.4 AIM AND OBJECTIVES

1.4.1 Aim of Research

The aim of the research was to identify the role of survey and design department in enhancing the timely delivery of road construction projects at an optimal cost.

1.4.2 Specific Objectives

The following objectives helped in achieving the aim of the research study:

1. To identify the factors that affects the timely delivery of road construction projects at an optimal cost.
2. To ascertain the effects of untimely delivery of projects at an optimal cost.
3. To identify the roles of Survey and Design department in enhancing the timely delivery of road construction projects at optimal cost.

1.5 JUSTIFICATION OF STUDY

This importance of the research study will help to necessitate the need to understand the role of survey and design department in contributing to the timely delivery of construction road project, and also to knowledge in this area. The importance of the study will again help in addressing the roles played by survey and design department as considered in achieving timely delivery of road project. The study will again help Road construction companies to focus on the significant benefits and opportunities that design and survey department can pave in the construction industry. Much forethought

will be given to the positive impact of design and survey in the construction industry after the study has declared its outcome.

1.6 RESEARCH SCOPE

The contextual scope of the study was focused on the role of design and survey department on road construction project in Ghana. The geographical scope of this study was limited to the Ghana Highways Authority, Upper West region. The choice of location was due to the larger population of construction professionals found in that region. What this means is that you would find the prime variables of the study in this location. Again, the Ghana Highways Authority at the Upper West region was a central focus in this study because of its convenient proximity to the researcher in aiding the retrieval of information. Questionnaires would be distributed to just the respondents that have the skills and knowledge regarding the research topic. The respondents constituted the workers in charge of survey and design department at Ghana Highways Authority, Upper West Region.

1.7 SUMMARY OF METHODOLOGY

In accomplishing the fore-stated objectives enumerated in this study, a logical and sequential structure would be followed. Desk research which was based on library-related books, scientific journals and periodicals and internet research, as well as a web-based search, will be used to review existing related literature. This study adopted the quantitative research method. Quantitative research entails the use of structured questions with possible responses provided and would engage many respondents. It is a process of making inquiries with the aim of testing a theory with variables, assessed using numbers, and analysed with statistical techniques.

Structured questionnaires were administered to relevant persons who have the experience and knowledge on design and survey in road construction management. Statistical Package for Social Sciences (SPSS) and Microsoft Excel was the statistical tools employed for the organisation of the data presentation, description and analysis. The study evaluated, and made recommendations for further research that are thought to be valuable and were well presented in the form of table and chart.

1.8 RESEARCH LIMITATION

The research study is presented with some limitations that are undeniable with respect to the conducts and the scope. One limitation will be the difficulty in getting respondents in providing the information needed, due to their busy life and working schedule, and also difficulty in retrieving the answered questionnaires. The study will be also limited to only published literature. The analysis and conclusion of this research will be dependent on data collected from respondents by using the data collection instrument. These limitations, however, will not nullify the findings from this survey. This research work is specifically set forth to be used as the bases for a recommendation for further future research work to be conducted in the same field and also give suggestion on why each limitation exists.

1.9 RESEARCH STRUCTURE

This thesis will be structured in five chapters. Chapter one, being the introductory part, also includes the problem statement, research questions, aim, objectives, the scope of the study, research methodology and significance of the research. Chapter two will cover the review of relevant literature on the topic and an overview of the impact of design and survey, as well as its effect of the timely delivery of construction road

project. Chapter three will focus on the methodology and procedure that will be used for the study. Chapter four will deal with the analysis of the data gathered as chapter five will present a summary of findings, conclusion and recommendations.

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CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter two deals with the literature of the research study. It consists of the previous works that have been done with regards to the research area. It also portrays the available methodologies that were previously used for previous works by other researchers.

2.2 CONCEPTUAL REVIEW

2.2.1 Road Construction

Infrastructure is a crucial to nations in fostering economic prosperity. Even so is the road infrastructure. This investment in developing countries take up a big part of public expenditure (Kerali, 2006). This particular infrastructure has proven to be a backbone in Ghana. The Ghana shared growth and Development agenda listed road infrastructure as one of its vital concerns in solving infrastructure and human settlement issues in Ghana (Cheteni, 2013). Most transportation in Ghana in via these roads. As a result, this infrastructure has presented to be significant in fostering wealth creation. Road networks opens up several opportunities for people and it connects them to resources that weren't available them before. Road development fosters the mobility of goods, people and services. 94% and 97% of freight ton-miles and passenger miles in Ghana accounts for the total road transport (Cheteni, 2013). This infrastructure also aids the functioning of other sectors and industries, for instance the mining, tourism, education, energy, agriculture, health sectors among others. Nonetheless, the cost of this indispensable infrastructure is exorbitant. Road development puts huge burden on the

national budget. Still, it proves to be indispensable to national economic growth (Fouracre et al., 2003).

Ghana still faces many drawbacks and challenges to providing adequate infrastructure. The nation is still plagued with infrastructure deficits despite a 39.2 billion dollars in Gross domestic Product (World Bank report on Ghana, 2011). Road infrastructure in Ghana is mainly financed by the government of Ghana. This funding is sourced from the Ghana Road Fund, Donor Funds, and the Consolidated Fund. The Consolidated Fund in turn is sourced from taxes, charges, fees, and government incomes from profitable economic ventures (Ghana infrastructure plan (GIP), 2012). Huge funds are needed to close the infrastructure deficit gap. The World Bank estimates that 2.5 billion US dollars will be required annually for a decade to close this gap. In comparison to the government has stated on its balance sheet, it would be a herculean task for the nation to close this gap.

This study contributes to closing the gap by identifying the role of survey and design department in enhancing the timely delivery of road construction projects at an optimal cost.

2.2.2 Effective and Efficient Delivery of Road Construction Projects

The construction industry goes a long way to promote development and even contribute significantly to societies achieving its goals. One of the largest industries around the world is the construction industry. 10% of the Gross National Products of most industrialized nations can be attributed to construction (Navon, 2005). This industry involves a complexity of clients, contractors, consultants, shareholders and regulators. A nation's economy can have long reaching effects on project performance (Navon,

2005). Performance of construction industry is related to many topics and factors such as time, cost, quality, client satisfaction; productivity and safety. However, most construction project suffers from delay. The construction industry in the Gaza Strip is an example. It suffers many problems and complex issues regarding performance. An instance was the dwelling units within the Rafah Area, 14 of them, whose performance fell due to 110-day delay. Some credited reasons were design alterations, change in drawings, and closure. Generally, in the Gaza Strip, project performance suffers due to absence of motivation, control, poor management and leadership, cultural and economic conditions, decision-making systems, and inappropriate participants (Ghana infrastructure plan (GIP), 2012).

The Indonesian construction industry's productivity is wildly affected by factors like material, equipment and labour availability, the method used, and the quality of site management (Arditi and Mochtar, 2006). In a bid to improve project performance, concepts like the Total Quality Control and Total Quality Management are extensively used.

Studies show that the construction industries of developing countries, particularly in Africa, face many problems. For instance, Ghana is well known for slow growth of construction industry. Three major reasons can be attributed to this. These countries have poor economic backgrounds and as such lack adequate resources to allocate to better the construction industry. In addition, there few job opportunities in these nations regarding the industry due to economic weakness. This takes away the potential innovative capacity that could have been available. Second, the significance of construction industry is overlooked by governments. As such, plans, policies and

programmes neglect to cater for this industry. Finally, the construction industry in these countries are generally weak and quaint. That in itself makes it difficult to improve.

As previous noted, the construction industry is a complex one. It involves several parties: the client(s), contractors, consultants, shareholders, regulators and others. Project performance is essential, therefore the factors influencing project performance must be enquired into and revealed.

2.2.3 Road Development Trend in Ghana

This study considered the nature and trend of the road development in Ghana by depending on empirical review. Ghana Investment Promotion Centre (GIPC) (2009) reported that distribution of road networks within that year was 63%, 19%, and 18% for feeder, trunk, and urban roads respectively. In that same year, it was reported that the complete portfolio for roads grew from 37321km in 2000 to 67450km in 2009. Within the period, the annual average growth for urban, feeder, and trunk roads were 182.2km, 1801.9km, and 171.7km respectively. Paved roads stretched at a length of 12442km while unpaved roads also stretched for 53868km. Most of these roads face the challenge of poor surfaces and increased congestion due to high traffic densities. Most of these roads are rapidly deteriorating. Only 41% of the road network is considered fair. Notwithstanding the need for expanding the road networks, the principal concern should be improving the quality of the roads. This can be accomplished in several ways: improved construction technology, decongesting traffic, better maintenance and regulation, and improving rural connectivity. In general, many resources have been pushed into the road sector of late. This sector takes as much as 1.5% of the country's GDP (Ghana Investment Promotion Centre, (GIPC), 2009).

2.2.4 Road Infrastructure Gap in Ghana

In Ghana, the stretch of roads, both primary and secondary, are enough to maintain regional and national connectivity. The recorded statistics on road networks are quite favourable given that 75% of paved roads and 74% of unpaved roads are in fair conditions. However, there is still a road infrastructure gap — the difference between the amounts of road infrastructure needed to foster economic growth and that which is actually available. This gap is measured by evaluating the difference between the amount of investment needed for the present and future requirements of the country and the ability of the economic budget to meet it. US\$ 5,497 million dollars is required according to the Consultative Group Meeting on June 19, 2012 to close the road infrastructure gap. This estimated budget is expected to be used in expanding length and lanes, upgrading road pavement and road furniture, and better connectivity of road in all road sectors: Urban roads, Feeder roads and Highways (Ghana Investment Promotion Centre, (GIPC), 2009).

2.3 THEORETICAL REVIEW

This study therefore relies on the theories below to draw conclusion on the issues regarding the untimely delivery of project:

2.3.1 Contingency Theory

According to a theory propounded by Fred Edward Fiedler, decisions made by managers must be holistic, encompassing every aspect of the prevailing situation. And if actions will be taken, it must be taken on key aspects surrounding that prevailing situation. Construction projects being uniquely set apart from the other and characterized by a complex nature, it requires management in line with its unique traits

and setting within the project duration (Sawega 2015). This occurrence is taken into account under the contingency theory. And what this theory does is to attempt to identify the best practices tailored to the needs of various construction projects. In that regard, this theory plays down the idea of managing projects one way. After all, projects vary with the conditions surrounding them. Mutema (2013) put forth that the interrelationship and continuous interaction between an organization and the prevailing environment is what the contingency theory focuses on. Under the contingency theory, there exist an array of risk factors (contextual variables) that have a hand in influencing project objectives. Cost, environment, the people involved, organizational structure and size, strategy, culture, technology are amongst some of these variables. Creating budget contingencies and schedule contingencies enables project managers to avoid time and cost overruns (Lester, 2006). The right apportioning of contingencies to these areas can be effective in regulating entire projects and dealing with unforeseen variables.

2.3.2 General Systems Theory

According to this theory, several parts assembled together purposed to accomplish a goal can be referred to as a system (Bertalanffy Ludwig Von, 1971). Omitting a single unit of this system changes the original nature of the system. In a car, for instance, it will cease to be functional if the carburettor for some reason was removed. In different words, a collection of inputs, outputs and processes can also be termed a system. The project team is part of this definition given that any project succeeds when its parts effectively interact among themselves. More to this, Memon et al (2013) says some blame for project failure can be apportioned to the friction between different parties to a project.

2.3.3 The ADKAR Model of Change

The ADKAR model was theorized by Hiatt (2006). His years as an engineer and in-depth experience in project leadership formed the foundation for this model. Hiatt asserted that the inability to adjust and adapt to change can account for most project failures and that managing this effectively could turn this situation around for projects. Fundamentally, this model was founded on several change management techniques. However, the unique message underlying this model is that success in facilitating change begins with the change in one person.

2.3.4 Utility Theory

The extent to which an economic activity is satisfying is its Utility. The Utility of a project influences its value. However, whether a project would be satisfying is dependent on the stakeholders involved and their expectations. In ascertaining project success, it is always prudent to consider the project's long-term outcome, particularly the impact of the project. Al-Carlos et al. (2014) said that as a result, Utility must be a vital element to be given consideration when defining project lead time. A utility-based approach can prove to be particularly helpful to project managers in planning how to allocate long-range contingencies (Lester, 2006). This approach will be informed by interaction between the utility expected and anticipated challenges in allocating time and cost contingencies. The contingency theory and Utility theory share a relationship that ultimately enhances performance. Project delays affect stakeholders, particularly the users since it detracts from the benefits that could have been had had the project been completed as scheduled.

2.4 EMPIRICAL REVIEW

2.4.1 Time of Project Completion and Effective and Efficient Delivery of Road Construction Projects

There have been a pooling of knowledge around the world over the past three decades regarding project time performance and that contributed immensely to that understanding into the subject (Chan and Kumaraswamy, 2002). This issue of project performance has always been a subject of research since the 1960s (Iyer and Jha, 2005). These research studies do range from theoretical work to structured research. Pheng and Chuan (2006) added that several studies have been conducted into preproject performance regarding cost and time factors.

Chan and Kumaraswamy (2005) stated an observation that unforeseen design problems and alterations usually arose during the construction phase. This affected the time schedule and ultimate the project performance. Chan and Kumaraswamy (2005) found out that hesitations in effective decision making, unforeseen ground conditions, poor site management were the crucial factors leading to delays and problems of time performance in building works. Generally, cost and time performance issues on projects are a widespread concern within the construction industry (Okuwoga, 2008). Project complexity, project team experience level, client type, his characteristics, as well the contractor's qualities are strongly allied to cost performance (Dissanayaka and Kumaraswamy, 2005). Reichelt and Lyneis (1999) observed the feedback dynamics in regulating a project's schedule and budget performance.

2.4.2 Cases of non-completion of Road construction projects

A project is said to have a defined beginning and defined end. A project also has a set of goals, a series of activities and a limited budget. Road project completion entails

regulating the relationship between cost, quality and time. Project cost is the cost incurred to realize a project (PMI, 2010). Project duration is the amount of time needed to undertake a project to completion. A project is said to be on time if it is completed before at planned completion (Project Management Institute, 2004). Abbas (2006) said that delays are simply the late completion of road works. Delay occurs when a project falls behind the planned project schedule. Any actions of the parties to the contract can be result in delays. A contract delay affects both client and contractor adversely. Ultimately, issues of delay tend to give rise to disputes. Delays can lead to cost overruns. A cost overrun being exceeding of the final cost over the initial estimates (Azhar and Farouqi, 2008).

Construction delays occur all over the world and many studies have been carried out to assess the causes of delays in construction with respect to road construction. Sambasivan and Yau (2007) stated that about 17.3 percent of government contract projects in Malaysia were considered sick, which means they are delayed by more than three months or are abandoned completely. According to Assaf and Al-Hejji (2006) from Saudi Arabia only 30 percent of construction projects were completed within the scheduled completion dates and the average time over run was between 10 percent and 30 percent. In the assessment of Agaba (2009) points to poor designs, poor specifications, and issues with management as the causes of delays in construction. El-Razek et al. (2008) also uncovered that poor communication, coordination difficulty, and delayed payments were the causes of delays. The very nature of the construction industry makes contract claims inevitable. Among the types of claims raise, delay claims stand out the most. Modern construction process have come identify with delays and its arising claims (Yates and Epstein, 2006).

Yates and Epstrin (2006) further asserted that the project delay claims process began primarily at the beginning of the project. These delays have the potential to disrupt work flow and cause significant loss to all parties involved (Power and Scott, 2004). The client, contractor and subcontractors all bear in this loss. Regardless, these said delays can result from the actions of either client or the contractor. In a study of 130 projects, Al-Momani (2000) found out that unfavourable weather conditions, poor economic conditions, change orders, poor design, negligence of the owner, poor site conditions, late delivery of goods, poor design, and increases in quantities are the main causes of delays. In another 28 cases in Jordan, Odeh and Battaineh (2002) found eight distinct groups through their questionnaire regarding untimely delivery of projects. Aibinu and Jagboro (2002) also found six consequences of delays on projects: Cost overruns, time overruns, arbitration, dispute, total abandonment, and litigation for Nigerian construction industry. Delay claims then to be assessed later and one of the reasons Kurmarswamy and Yogeswaran (2003) gave was the submission of claims related to extension of time at the end of the construction period. Scott (1997) observed the poor attitude of contractors and supervisors toward delay claims. Also, in India, Iyer and Kalidindi (2002) identified Time Delay and Extension clause to be the most significant clause, second only to the Final and Binding Power in construction contracts. Moreover, it was observed that disputes tend to be the biggest concern regarding delay of construction projects.

According to Ssepuuya (2008), projects in Uganda do experience delays including overruns in cost. This has been a major cause for concern. An example was the Northern by-pass constructed in Kampala. It was supposed to take two and half years. It however took 5 years instead and its cost increased over 100 percent. In Zambia, a study done by Kaliba et al. (2009) observed that delays were caused by financial

difficulties from either contractor or client, delayed in payments, modifying of contracts, poor economic conditions, equipment unavailability, construction mistakes, poor supervision, material procurement, staffing issues, poor communication, changing specifications, strikes and labour disputes. Ellis and Thomas (2003) argue that it has become a norm rather than the exception for road construction projects in Malawi to experience delay. In Kenya, it is a well-known fact that time and cost overruns are common in the public sector (Musa, 1999). His finding showed that inexperienced project management, ineffective communication, poor infrastructure, tendering methods, variation, poor project environment, inadequate resources, inadequate planning, and lack of motivation as being some of the major contributions to time and cost overruns. This study therefore goes further to identify the factors affecting the timely delivery of road project in Ghana at an optimal cost.

2.4.3 Factor Affecting the Timely Delivery of Road Construction Projects at An Optimal Cost

The construction industry, particular that regarding buildings, has always been a major help and contributor to the economies of both developed and developing countries. About 10% and 4% of the GDP of developed countries and developing countries respectively are derived from this industry (Gwaya et al, 2014). Usually, with construction projects, one of the major criteria for assessing project performance has always been the project duration or schedule: Was the project completed on time and according to schedule. However, the construction industry has experienced the bulk of criticisms for failing to meet project schedules oftentimes (Jagboro and Ogunsemi, 2006). In Australia, during the 1960s, for instance had about 7 out of 8 projects completed behind schedule. Hong Kong fared better with 70% of projects lagging behind schedule

(Chan and Kumaraswamy, 1996). Also, in Nigeria, 7 out of 10 fell victim to this problem of delay while in Saudi Arabia, 37% of contractors admitted to encountering this problem (Al-Khahil and Al-Ghafly, 1999; Jagboro and Ogunsemi, 2006).

Among the major causes identified by Al-Momani to be responsible for delay in Jordan to be the weather, poor design of projects and change orders (Tung, 2014). Change orders here refers to any alterations to the initial design during the actual progressive execution of the project either by the project sponsor or an agent. Likewise, in Malaysia, those causes identified were poor planning, contractor inexperience, and poor site management. In Hong Kong as well, Tung (2014) again discovered changes in ground conditions, inadequate resources and underbidding to be the causes of project delays. Over the space of many years, much research has been undertaken to uncover some of these causes of project delays in order to effectively manage the execution of projects in a way that guards against delays. In such research finding in the United States, in surveying a group of contractors, engineers and architects, it was discovered that the weather, delays of subcontractors and poor labour supply were the major contributors to construction delays (Baldwin et al., 1971). Regardless of the abounding research findings on these causes of delays, they can nonetheless be categorized into two: Universal factors and local factors. The universal factors include change orders (Al-Momani, 2000) while the local causes include cultural and social factors (Assaf and AlHejji, 2006). Still, further research revealed some of the more severe causes to project delays. They include financial constraints, change orders, preparation and approval of drawings setback, resources shortfalls caused by contractor issues, public interruptions, and poor planning (Yang et al., 2013).

With regards to road construction, Iyer and Jha (2005) pointed to support from management, leadership skills, experience, competence and coordinating skills of the project manager, decision making, owner's competence, coordination among project participants, social conditions, climatic conditions, monitoring and feedback by participants and lastly economic conditions as the factors affecting performance. Iyer and Jha (2005) clarified that the coordination that exists among project participants was most crucial of amongst the factors. This one factor had major influence on a project's cost performance. In Australia, 161 projects were examined to ascertain the existing relations between cost performance and project scope factors. The concluded observation was that number of building floors and the gross floor area was the main time performance determinants of any project. Essentially, it's critical to continuously evaluate how optimum cost is affected by untimely delivery of projects.

2.4.4 Effects of Untimely Delivery of Road Projects at an Optimal Cost

In their research, Aibinu and Jagboro (2002) said that effects delays had on project delivery could be seen in six ways. They were cost overrun, time overrun, total abandonment, disputes, arbitration, and litigation. Similar was discovered by Sambasivan and Soon (2007) with regards to the Malaysian construction industry. In Pakistan, Haseeb et al. (2011) found claims, stunted growth of the construction industry, and clash to be the effects of the delay. Ramabodu and Verster (2010) in their research also observed the reasons for cost overruns. They found contractual claims, scope of site works, inadequate cost planning, poor monitoring of funds, additional works, delays of cost variations and incomplete design at the time of tender. In the Ghanaian industry too, Chileshe and Berko (2010) points to variations, delay in

monthly payments, schedule slippage and inflation. All these reveal delay causes and the effect of cost overrun.

The liabilities of construction delays could be borne by either the client and his team, the contractor and his team, and natural causes (Akinsiku and Akinsulire, 2012). Delays always create severe inconveniences to the parties in contract as well as adversely influencing project performance. Research points to delays having immediate consequences leading to overruns in cost and time. Litigations and abandoning of projects also arise. In Haseeb et al. (2011) investigative discovery, delays lead to much litigation, lawsuit, disputes, and abandoning of the project. Between cost overruns and time overruns, Kaming et al. (1997) found cost overruns to be more prevalent and severe in his research involving 31 high-rise projects in Indonesia. In addition, they credited the main causes of cost overruns to increases in material cost as a result of inflation, complex nature of project and poor estimate of materials. In cases of delays, the project manager is faced with three possible situations: rework, added costs, and quality decline (Akinsiku and Akinsulire, 2012). In his bid to solve these and meet the project schedule, he, the project manager, could advise for overtime work or he allocated further resources or both (Akinsiku and Akinsulire, 2012). However, infusing additional resources comes with added costs. Moreover, opting for overtime will ultimately lead to decline in productivity and performance. That in turn circles back potential rework.

2.4.5 Roles in Enhancing the Timely Delivery of Road Construction Projects

In addressing the conventional methods of reducing the causes of construction delay, it was suggested that error prevention should be viewed as a continuous process rather than a product of certain activities or behaviours, as it involves people, organisations

and project systems (Love et al., 2012). Love et al. (2014) noted that people-related error management includes cognition, behaviour, motivation and learning; organisational error management includes quality, culture and training, and project-related error management includes the use of integrated procurement methods, Building Information Modelling (BIM) and Computer-Aided Design (CAD). Other methods of managing design errors include specialists' involvement in design planning and processing of construction works, preparation of detailed design, provision of elaborate project brief, day-to-day management of the project (Ismail et al., 2012) reports among client, consultant and contractors, establishment of oversight committee, and budgetary allocations (Asamaoh and Offei-Nyako, 2013). Several researchers have worked on the strategies to help ensure timely delivery of construction in various aspects as shown below on the **Table 2.1**.

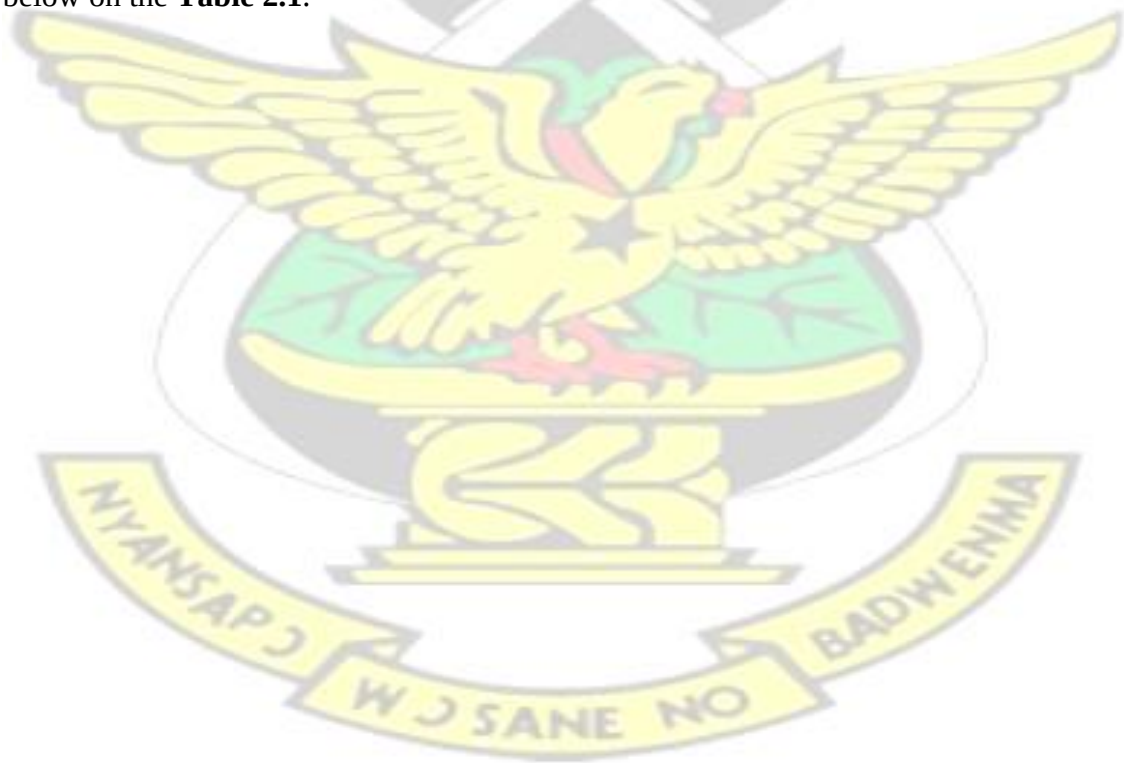


Table 2.1: Causes, Effect and role to help mitigate untimely delivery of project

Classification	Causes	Effects	Role to help Mitigate
(Alaryan et al., 2014; Osman et al., 2009; Fisk, 1997)	(Muhammad et al., 2015; Memmon et al., 2014; Alaryan et al., 2014; Asamaoh and Offei-Nyako, 2013; Mohammad et al., 2010; CIL, 1990; Oladapo, 2007)	(Keane et al., 2012; Olsen et al., 2012; Osman et al., 2009; Jawad et al., 2009; Aljishi and Almarzong, 2008)	(Love et al., 2014; Asamaoh and OffeiNyako, 2013; Love et al., 2012; Ismail et al., 2012)
Design error and omission	Inadequate details in drawings, lack of knowledge, inadequate project objectives, and design complexity	Completion schedule delay, and increased project cost	Viewing error prevention as a continuous process, organisations and project systems cognition, motivation and learning; quality control, culture and training, use of integrated procurement methods, Building Information Modeling (BIM), Computer Aided Design (CAD), specialists' involvement in design planning, preparation of detailed designs, elaborate project brief, day-to-day management of the project, establishment of oversight committee, and budgeting allocations
Design Changes	Change in schedule, change in scope, clients' financial problems, change in specifications, safety consideration, poor planning, technology change, slow decision-making process, noncompliance of design with government regulation, aesthetics, and cost	Additional payment for contractors, rework, demolition, completion schedule delay, increased overhead expenses, rework, and demolition	Quality control, culture and training, Building Information Modeling (BIM), Computer-Aided Design (CAD), specialist involvement in design planning, detailed design, and elaborate project brief
Unforeseen conditions	Poor workmanship, government regulations, and weather conditions	Increased overhead expenses, and completion schedule delay	Motivation and learning

Source,: (Author's construct, 2019)

2.5 CONCEPTUAL FRAMEWORK

A conceptual review was adopted for this study as in Mugenda and Mugenda (2003). It's a representation with diagrams of a hypothesis establishing the relationship existing between the dependent variables and independent variables used in the study (Mugenda and Mugenda, 2003 cited in Sawega, 2014). In reviewing literature, it was discovered that the independent variables responsible for project timeliness were project monitoring, project resource allocation, project planning, and project leadership. Conversely, the dependent variable was timely project completion. This framework was divided in the following sections:

2.5.1 Review of Variables

All four independent variables are reviewed in this section and a relationship is established between these variables and timely project completion.

2.5.1.1 Project Resource Allocation

Resources are the project requirements in terms of the materials needed for its harmonious and effective execution. These resources include that of labour, facilities, and equipment. A technique like activity resources estimation can be used to ascertain the need for any specific resources on a project activity (PMI, 2010; Conchuir, 2011). Activity resources estimation entails determining the type of resource needed and its quantity. The wrong or poor estimation of resources has been hypothesized as influencing project delays. This happens because project scheduling depends in many ways on the correct estimation of the resources to be used. Ultimately, projects tend to suffer and lag behind completion dates due to this. Accuracy, therefore, is crucial.

A perfect example of this relationship between project timeliness and resource estimation and allocation is the Machakos 33km road. The Machakos was built by its government as a connecting road joining the Garissa Road to Machakos-Kitui Road. The project duration was between 18th March and 18th June in the year 2014. It took a record three months exactly to complete. The road cost 650 million which was far below the initial estimate of 1.6 billion. The road in addition was completed three days ahead of schedule and fortified with street lights, CCTV cameras and road signage (The Star June, 2014; Standard July, 2014). This incredible was credited to excellent planning, astute leadership and proper allocation of resources.

2.5.1.2 Project Leadership

In managing projects to a successful end, competent leadership and proper stakeholder management have been singled out as immense contributors (Turner and Muller, 2004; Muller and Turner, 2010). Kalsen et al (2014) came up with a number suggestions on how successful results can be had by project managers and the project team overall. These suggestions were founded on positive psychology theory —an optimistic human vision. They insisted on the employment of positive emotions, meaning, relations and signature strength to achieve positive results. Here, the project managers influence the project team through self-talk and influencing their thinking. It involves the establishment of a rich culture where employees pool their resources and unique capacities to maximize project performance. This is in direct contrast to seeking their individual interests on a project. It helps when the vision, goals and milestones of projects are clearly set out.

An instance where leadership competence proved vital was the Thika super highway. This highway was one of Kenya's large-scale projects. It involved transforming the

road stretching from Nairobi to Thika into a super highway (KARA, 2012). The project was executed by Chinese firms and was estimated to be Ksh 27 billion. The completion date was scheduled on 27th July, 2011. However, it was completed in November, 2012 for Ksh 31 billion (Business Review Nov, 2012). This was an increase of 35%. Upon investigations, it was uncovered that inflation, expected increases in material cost, change in design were some of the factors responsible. Regardless, the project was considered a success due to its benefits (AfDB, 2012). This single development made the urban areas accessible, paving way for an explosion in growth (KARA 2012). The road was a political manoeuvre and as such the people around Nairobi benefited from this leadership.

2.5.1.3 Project Monitoring

One of the duties of the project manager is regulating and managing project works to get in line with the project schedule. The aim is to ensure the execution of works according to set plans and reconciling any such deviation or problems that may arise. In that regard, the project manager relies on the Gantt chart and schedule network and continuously updating them to monitor works (PMI 2010, Conchuir 2011). In keeping track of the basic elements of cost, quality and time, performance measurement and competence therein is fundamental (Yang et al 2010). The underlying objective of this is to ensure that projects are completed within the estimated budget, on time without sacrificing the initial specifications and requirements (Pewdum et al, 2009 cited in Narbaey, 2013). In making this possible, much effort must be invested in effectively managing construction projects. However, this wouldn't be possible with an equally effective performance monitoring system. Performance monitoring through routine reviews are indispensable if a project is to progress as planned or if the plans

themselves are to be effectively carried out (Narbaey, 2013). Project monitoring enables project managers to forecast the future or make predictions based on previous performance. These three metrics of cost, time, and scope of works are what the project team monitors. In monitoring works, the actual performance is compared to the planned performance. Preventive and corrective measures are undertaken based on the findings. Delays in making these corrections can lead to overruns in cost and time (Narbaey, 2013).

A potent quantitative technique used to monitor project progress is the Earned Value Management. With this technique, the actual performance can be measured against the agreed plan (PMI, 2005). Projects that are characterized by significant time overrun are those that miss the steps at the early stages of implementing the project plans. The project manager is often oblivious to this until when it's too late. When these problems are finally realized, the ability to correct and restore the project back on track is greatly diminished (Alvarado et al, 2004).

2.5.1.4 Timely project Completion

Munano (2012) explained timely project completion as the stated completion time for a project as set out in the contract for that project. The timely delivery of project remains a strong criterion for judging the performance of a project and the efficacy of the organization implementing the project plans. Delivering projects on time is crucial to project stakeholders who may want to make use of the facility or construction at that expected time. These make time project completion a factor in the success of a project. There has been extensive research on project success and what it constitutes. Several definitions have been given over the years. Project success, in the 1960s for instance, was measured from a technical point of view. More advanced definitions later

considered it within these objectives: time, cost and quality (Kerzner, 1998; Gwaya et al., 2014). However, Gwaya et al. (2014) said that these objectives are intrinsic to any project and this may neglect the preferences of the client. In the total quality management of a project, a project must both meet all these three objectives and satisfy the client.

Conchuir (2011) revealed six essential processes in time management. Five out of the six relates to the planning process while the sixth relates to monitoring and controlling (PMI, 2010). First within this process is to identify the project activities and come with up an estimate of the project duration. This process aids effective communications with stakeholders, ensures the incorporation of all activities pertinent to the project and to clarify what will done. The next step in the process is to create of all project activities and establish how these activities relate with one another. This is the sequencing step, which allows the order with which works will be done to be known (PMI, 2010; Conchuir, 2011). Failing to stick to the stated sequence can prove costly. The network diagram, particularly the Critical Path Method (CPM) is one of the tools and technique used for this. Failure to follow the sequence may be too costly.

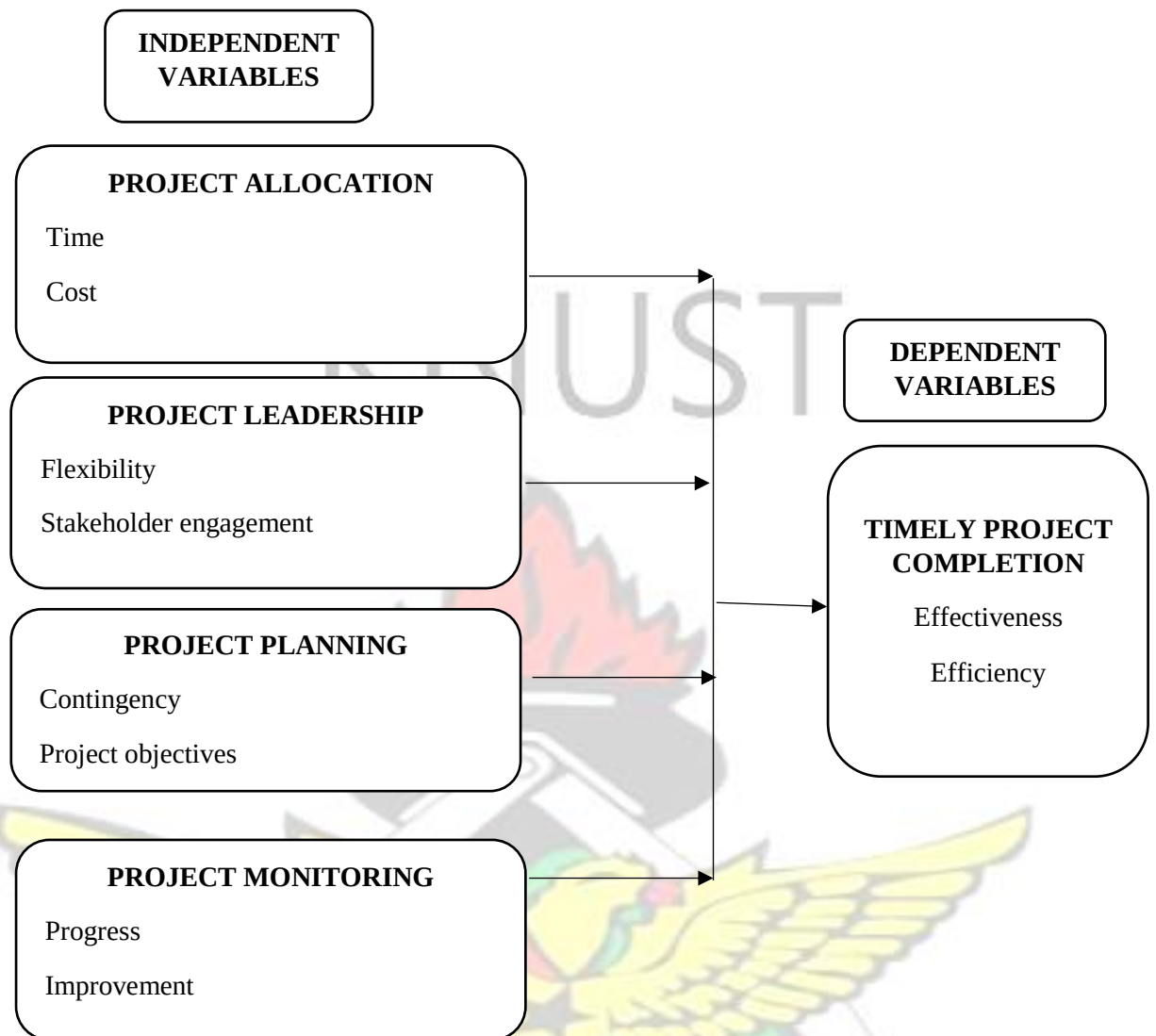


Figure 2.1: The Conceptual Framework Showing the influence of Project allocation, project leadership, project planning and monitoring on timely delivery of project.

Source: (Author's construct, 2019)

2.6 Chapter Summary

This chapter so far has discussed the concept of road construction and the untimely delivery of road construction project, as well as its causes, effects and strategies to help mitigate the canker. To add more, this chapter concluded by identifying the research works done on road construction project, as well as the cause and effect. The next chapter will talk about the research methodology that will be used for this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This section depicts the method used for the research. It includes the research design, research approach, population, the sample size, source of data, how the data is collected and the chapter summary.

3.2 RESEARCH STRATEGY

This study adopted the quantitative research approach. Quantitative research approach was used when the researcher wants to numerically present the findings as well as make meaning through objective measurement of the condition. The quantitative data was derived by administering questionnaire on construction safety to the workers and professionals in the construction industry concerning the construction stage.

3.3 RESEARCH APPROACH

Creswell (2013) defined the research approach as procedure and plans acted upon for research from the assumption stage to the stage of interpreting the data collected. Creswell (2013) further explained that the type of research approach used is determined by the philosophical paradigm of the study. Three main approaches have been identified, namely: deductive reasoning, inductive research reasoning and the mixed or the abductive reasoning approach. The study adopted the deductive reasoning approach. Creswell (2013) again defined the deductive research approach as dealing with what is termed as existing ideas or theories. This is done by identifying the theory and testing via observation to approve the theory. On the contrary, inductive research approach makes use of mainly the study of specific instances of societal issues, via

identifying and developing patterns from the data analysis collected. The study at hand therefore made use of deductive research approach where it employed the use of already existing theories from the literature review.

3.3 RESEARCH DESIGN

Research design is an integral feature of the research methodology. In a bid to solve a research problem, due diligence must be accorded to technically delineating and clarifying the relationship existing between variables or amongst them in any specific situation. Moreover, it also requires critically analyses of this relationship independent any foreign influences. Also, the option to adopt any specific strategy is contingent on the aim of the study, the needed information's type and availability for the research at hand (Naoum, 1998; Baiden, 2006). The main reason of a research design is to enable the researcher come out with relevant evidence with little effort, time and money (Kothari, 2004). Yin (1994) came out that the research tools used for a study mostly dependent on the research purpose that is, exploratory, explanatory or descriptive. This research study adopted the exploratory research design. Exploratory research design has the intention to explore the research questions and does not offer final and conclusive solutions to existing problem (Singh, 2007). Singh (2007) further stated that the exploratory research design explores the topic with a varying level of depth. It is the initial research which forms the basis of more conclusive research. The research study then employed the exploratory research design in line with Singh (2007).

3.4 POPULATON

Population is an important factor in collecting reliable responses from respondents. Population is the aggregate of all the objects, subjects or members that conform to set

of specification (Polit and Hungler, 1999). Again, population is explained simply as complete set of people, cases, observations or data about which information is desired and is also of interest to a researcher (Passer, 2004; Kothari, 2004; Beins and McCarthy, 2011). Taylor-Powell (1998) further explained population as “a group or units of interest located in a geographic area of interest during the time of interest.” From the human resource department and the records department at the Ghana Highway Authority, the population for this study constituted 8 professionals from design and survey department on road construction project in Ghana, Ghana Highways Authority at the Upper West region, as well as 80 registered construction firms. Therefore, the population size to be adopted is 88.

3.5 SAMPLING SIZE

A sample is a selected portion of the population under investigation, and is representative of the population as a whole. This sample of the population is used to make extrapolations and other holistic deductions that reflect on the entire population (Crowman, 2006). According to Naoum (2012), when considering a larger population, the percentage of the sample size needs to be smaller and vice versa, that is, if the entire population is smaller, the sample size should encompass a relatively larger proportion of the population. Polit and Hungler (1999) also added that, in order to attain a valid and accurate conclusion and a more concrete prediction, the researcher should consider using a larger sample than a relatively smaller sample. The study employed a population size of 88 as a sample size due to the small size of the population size, which is actually the total number of workers. Therefore, the whole 88 was used as the sample size for the study.

3.6 SAMPLING TECHNIQUE

One needs to use a sampling technique to help select a sample. Basically, sampling technique can be categorized into two forms; non-probability and probability sampling techniques (Sekaran, 2000). Non-probability sampling methods was used in selecting research participants for this study. This includes collection responses from the professionals at the road construction operatives and workers at the survey and design department, Ghana Highway Authority at the Upper West region in Upper West Region. Black (2010) said that census sampling becomes necessary when the population size seemed to be smaller. Researchers often believe that they can obtain a representative sample by using a sound judgment, which will result in saving time and money.” The census sampling technique is also beneficial in effectively exploring anthropological situations where greater clarity can be achieved from a more intuitive approach (Saunders et al., 2007). Census sampling is susceptible to bias and has been known to record poor levels of reliability. One is also unable to generalize research findings from a census sampling technique study (Saunders et al., 2007). The research study therefore adopted the census sampling technique because the population size of 88 is small to consider, and could be used as the sample size.

3.7 SOURCE OF DATA

Polt and Hungler (1999) defined data as information received in a course of a study. The study mainly used primary data collected from the workers at the Survey and Design department at the Ghana Highway Authority -Upper West region-, and registered construction firms. Primary data is, data originated by the researcher specially to address the research problem (Malhotra and Birks, 2007). According to Walliman (2011), data serves as a raw material to help conclude the event being under

study. There are two main sources of data that researchers depend on, namely secondary and primary sources and the event to be studied under the source to be adopted (Singh, 2007; Walliman, 2011). Primary data are first-hand information gotten for a research. Quantitative data was collected and the administering of a well-structured questionnaire containing open ended questionnaires. The primary data are collected from the construction operatives through the use of questionnaires.

The secondary source of data employed for this study was the relevant literatures done on the timely delivery of road construction project. Secondary data refers to the data from another person's document collected for some different purpose, therefore making it less reliable (Gray, 2004; Saunders et al., 2007; Walliman, 2011). Cohen et al. (2007) added that, secondary data source lacks direct physical relationship to the research problem at hand, the researcher detailing the event which he was not actually present but obtained description from another person or source.

3.8 DATA COLLECTION INSTRUMENT

The study used structured questionnaire for data collection. Sekaran (2000) declares that a questionnaire is employed in the collection of data because it allows the researcher to assemble much information from the respondents within a short period. The first part of the structured questionnaire was based on socio-economic and demographic characteristics. These included sex, age, highest education attained, marital status, income level, and religious status. These variables have been reported in literature to influence demand for the results.

Questionnaires are economical way of gathering the needed data from a possibly large pool of respondents (Fellows and Liu, 2003, Saunders, et. al. 2007). A questionnaire

consists of number of printed or typed questions on a form or set of forms arranged in a definite format (Kothari, 2004). Questionnaire construction deals with framing of questions and asking for self – reported attitudes, knowledge, and statements of behaviour from respondents (Burnham et al., 2008; Beins and McCarthy, 2011).

3.8.1 Questionnaire Format

The questionnaire used for this study is basically in two main forms, namely PART A and PART B. The PART A consisted of background of the respondent, and PART B consists of questions to solve and meet the aim and objectives of the research base on the respondents' perceptions. A five-point Likert scale was adopted in this study to measure the response of each respondent. The type of questions used involves the use of close ended questions. These question formats can lead to a reduction in bias (Walliman, 2011). The research questionnaire used has three pages which made the questions easy to be responded.

3.9 DATA PROCESS AND ANALYSIS

According to Strydom et al. (2007), data analysis refers to the ways by which answers are found by means of interpreting the gathered data. Finding meanings and explanation to the data refers to the interpretation. Processing of data can proceed once the data has been collected and gathered; it involves coding of the collected data for efficient analysis of the results (Burnham et al., 2008). Due to fact that explaining the raw data is either impossible or difficult, the describing and analysing of the data must first be done and then interpreting the analysis results (Strydom et al., 2007). Quantitative data analysis deals with statistics, that is data collected in the numerical

form and their properties can be analysed using mathematical operations (Passer, 2004; Walliman, 2011).

The collected data from the questionnaire concerning the data was coded and analysed using the simple statistical tools such as the Statistical Package for Social Sciences (SPSS) version 20 or current version and Microsoft Excel. Tables used for Interpretation of data to get valid meaning to the responses. The analytical tool would also be used for further meaning include Mean Score Analysis. Mean score Analysis was used to rank the dependent variables obtained to establish how they are prioritized by the construction operatives.

3.10 CHAPTER SUMMARY

This chapter focused on the methodology used to attain the general objective of the study. Firstly, the study used exploratory research design and quantitative research approach to get reliable responses from the respondents. Secondly, the study sampled questionnaires from the Survey and Design department at Ghana Highway Authority at the Upper West region and construction firms using census sampling. Thirdly, the data collected was analysed using Mean score ranking and the variables were graphically displayed using table after data collection.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

4.1 INTRODUCTION

This section discusses the findings using descriptive with the assistance of percentages in addressing the findings of the study.

4.2 DEMOGRAPHIC ANALYSIS OF THE RESPONDENTS

60 out 88 responses were retrieved from the targeted population resulting to 68.18 response rate. According to Baruch (1999), response rate of greater than 35% is appropriate to be analyzed. To ensure trust and worthiness in the findings, the background analysis of respondents is very important. It also adds up to the credibility and the authenticity of result of the study.

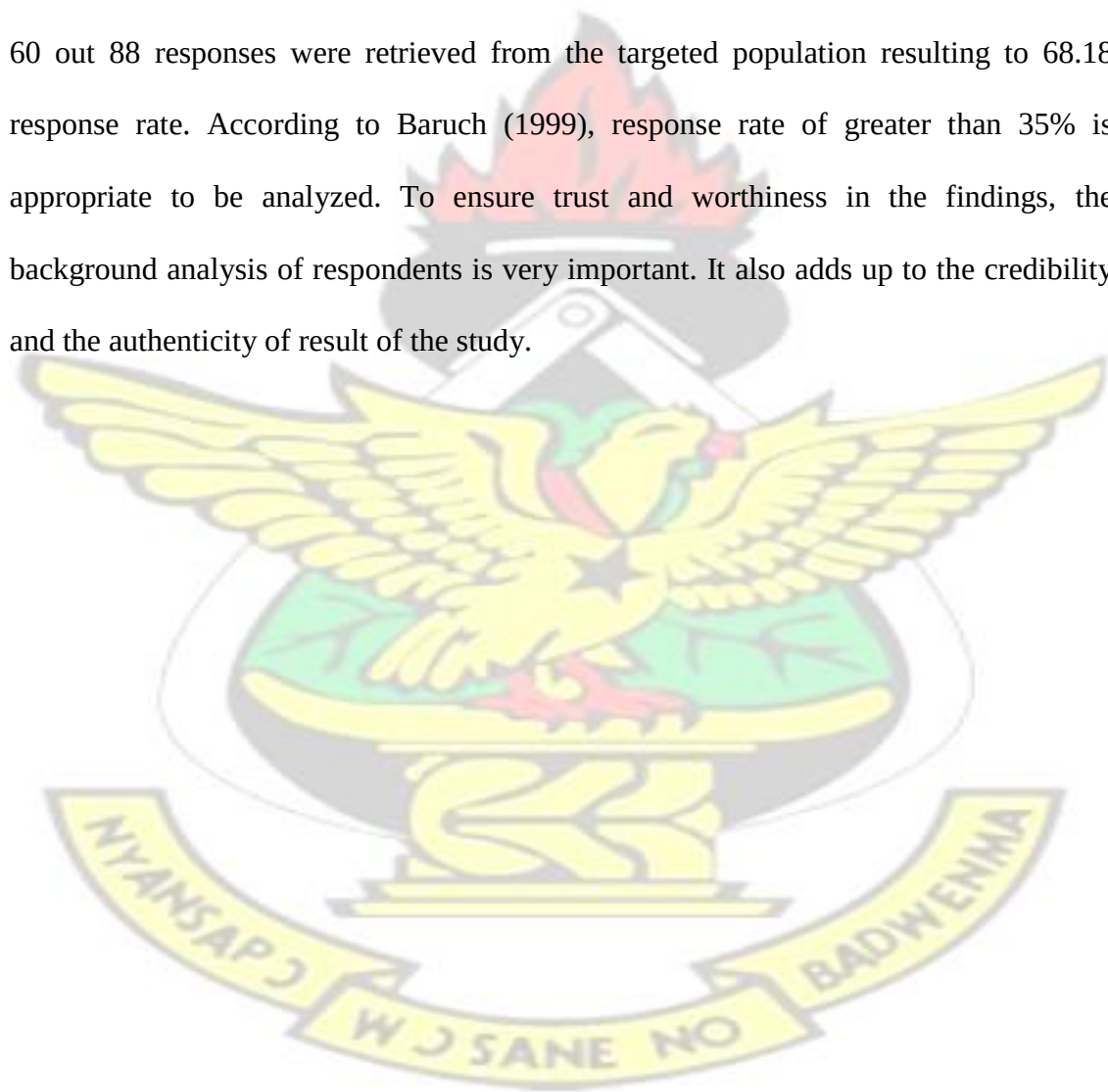


Table 4.1 Background Analysis of Respondents

Variables		Percentage, %	Cumulative percentage, %
Gender	Male	66.7	66.7
	Female	33.3	100.0
	Total	100.0	
Highest Education	Diploma	26.7	26.7
	Bachelor's Degree	45.0	71.7
	Master's degree	6.7	100.0
	Others	21.7	
	Total		
Where do you belong?	Contractor	23.3	23.3
	Worker at the Survey and design department	76.7	100.0
	Total	100.0	
Experience of working staff at the survey and design department	Less than 5 years	55.0	55.0
	5-10 years	33.3	88.3
	11-20 years	10.0	98.3
	Above 20 years	1.7	100.0
	Total	100.0	
Experience of road contractors	Less than 5 years	55.0	55.0
	5-10 years	33.3	88.3
	11-20 years	11.7	100.0
	Above 20 years	0.0	100.0
	Total	100.0	

Source: (Field Survey, 2019)

4.2.1 Gender

The gender reveals the number of males and females who responded to the questionnaire among the participants. Form Table 4.1, among the 60 respondents,

66.7% were males whilst 33.3% were found to be females. The study exhibited male-biased; therefore, more males responded to the questionnaires more than females.

4.2.2 Highest Educational Background

This also contributes to the reliability of the results from this study because it reveals that the respondents know what they responded to, as well as their qualifications. From Table 4.1, 26.7% had diploma, 45.0% had bachelor's degree, 6.7% had master's degree, 21.7% were other qualification including PhD, professional certificate, etc. The result shows that more people with master's qualification background responded to the questionnaire.

4.2.3 Belonginess

The questionnaires were responded by the working staff of the Survey and Design department of Ghana Highway Authority and the road contractors. Table 4.1 shows that, 76.7% who responded to the questionnaire were related to the staff of the Survey and Design department of Ghana Highway Authority, whilst 23.3% who responded were related to the road contractors. This information helps to know how the delays affect the consultant and the contractors.

4.2.4 Experience of working staff at the survey and design department

This also adds authenticity to the findings of the study. From Table 4.1, 55% of the department have less than 5 years of experience, 33.3% had 5-10 years of experience, 10% had 11-20 years of experience and 1.7% had more than 20 years of experience. This shows that the respondents were well-experienced and they know what they were responding.

4.2.5 Experience of road contractors

This helps to ensure authenticity to the findings of the study. From Table 4.1, 55% of the department have less than 5 years of experience, 33% had 5-10 years of experience, 11.7% had 11-20 years of experience and none of the road contractors had more than 20 years of experience. This shows that the respondents were well-experienced and they know what they were responding.

4.3 RELIABILITY TEST

Cronbach's Alpha was adopted to test the reliability and consistency of scale. According to Peterson (1994), an alpha value of 0.7 or greater is accepted and believed to be reliable, as a rule of thumb.

Table 4.2: Reliability Test

Variables	No. of Items	Cronbach's Alpha
Influencing factors	10	0.739
Effects	10	0.856
Roles	10	0.856

Source: (Field Survey, 2019)

From Table 4.2, the alpha values are influencing factors (0.739), effects (0.856) and roles (0.856). The result shows that there is consistency in the scale and further analysis may be done.

4.4 FACTORS THAT AFFECTS THE TIMELY DELIVERY OF ROAD CONSTRUCTION PROJECTS AT AN OPTIMAL COST

The first objective of the study is to identify the factors that affect the timely delivery of road construction projects at an optimal cost. This was planned by using the Likert scale: 1- strongly agree, 2- agree, 3- neutral, 4- disagree, 5- strongly disagree). Means

core Analysis was then adopted to deter the central tendency on the variables, and standard deviation; to determine the degree of variability among the responses on the variables, as shown on Table 4.3. The study employed standard deviation at where the mean score for two variables are the same.

Table 4.3: Causes of Delay

	Factors	Mean	Standard Deviation	Ranking
1	Public interruption	2.6333	1.27514	1
2	Poor project design	2.5500	1.71163	2
3	Exceptionally low bids	2.3333	1.11487	3
4	change orders	2.3333	1.00282	4
5	Change of weather	2.2167	1.07501	5
6	poor site management	2.2000	1.33785	6
7	Improper management	2.1500	1.28650	7
8	unforeseen ground conditions	2.1333	0.98233	8
9	Inadequate contractor experience	1.9500	0.90993	9
10	The financial difficulty of contractors	1.6667	0.85701	10

Source: (Field Survey, 2019)

Form Table 4.3, the following result were found with ranking; Public interruption (1st), Poor project design (2nd), Exceptionally low bids (3rd), change orders(4th), Change of weather (5th), poor site management (6th), Improper management (7th), unforeseen ground conditions (8th), Inadequate contractor experience (9th) and The financial difficulty of contractors (10th). The results revealed that public interruption id the most agreed on factor that affects the timely delivery of road construction projects at an optimal cost. This is consistent with Jagboro and Ogunsemi (2006), when he made mention of public interruption being a cause of construction delay in Malaysia. Okuwoga (2008) also supported this result by listing public delays as part of the factors liable of causing delay on construction project.

4.4.1 Test of Agreement on the Variables

Kendall's Coefficient of Concordance was employed to check the level of agreement of the respondents on the variables relating to the factors causing the untimely delivery of road construction project. This is revealed on Table 4.4.

Table 4.4: Kendall's Coefficient of Concordance

N	60
Kendall's W ^a	0.052
Chi-Square	27.880
df	9
Asymp. Sig.	0.001

a. Kendall's Coefficient of Concordance

Source: (Field Survey, 2019)

The level of agreement on the variable 0.052, which means there was a significant (Sig< 0.05) positives weak agreement from the respondents of the variables in relation to the factors that affects the timely delivery of road construction projects at an optimal cost.

4.5 EFFECTS OF UNTIMELY DELIVERY OF PROJECTS AT AN OPTIMAL COST

The second objective of the study is to identify the effects of untimely delivery of projects at an optimal cost. This was achieved by allowing respondents to assess the effects using the Likert scale: 1- strongly agree, 2- agree, 3- neutral, 4- disagree, 5- strongly disagree). Means core Analysis was then adopted to deter the central tendency on the variables, and standard deviation; to determine the degree of variability among the responses on the variables, as shown on Table 4.3. The study employed standard deviation at where the mean score for two variables are the same.

Table 4.5: The effects of untimely delivery of projects at an optimal cost

No .	Effects	Mean	Standard Deviation	Ranking
1	Arbitration	2.7167	0.76117	1
2	Litigation	2.7167	0.84556	2
3	Dispute	2.6833	1.06551	3
4	Total desertion and slowing down the growth of the construction sector	2.433	1.05485	4
5	Clashes and Claims	2.1500	1.19840	5
6	Total abandonment	2.1500	0.95358	6
7	Decline in quality and rework	2.1000	0.79618	7
8	Cost overrun	1.8667	0.83294	8
9	Time overrun	1.8000	0.79830	9
10	Completion schedule delay	1.733	0.86095	10

Source: (Field Survey, 2019)

Form Table 4.3, the following result were found with ranking; Arbitration (1st), Litigation (2nd)

Dispute (3rd), Total desertion and slowing down the growth of the construction sector (4th), Clashes and Claims (5th), Total abandonment (6th), Decline in quality and rework (7th), Cost overrun (8th), Time overrun (9th) and Completion schedule delay (10th). The study again revealed that calling for arbitration is a major effect of untimely delivery of projects at an optimal cost. This is consistent with Chileshe and Berko (2010), when identifies and evaluate the calling for arbitration as a significant effect of delaying Ghana ground water construction project. Akinsiku and Akinsulire (2012) identified 6 effects of delay on project and on community in Nigeria by listing arbitration as a major effect that need to be considered. Sambasivan and Soon (2007) also studied on the effects of delay on road construction, and pointed out that arbitration is a major effect of delayed project.

4.5.1 Test of Agreement on the Variables

Kendall's Coefficient of Concordance was employed to check the level of agreement of the respondents on the variables relating to the effects of untimely delivery of projects at an optimal cost. This is revealed on Table 4.6.

Table 4.6: Kendall's Coefficient of Concordance

N	60
Kendall's W ^a	0.229
Chi-Square	123.741
df	9
Asymp. Sig.	0.000

b. Kendall's Coefficient of Concordance

Source: (Field Survey, 2019)

The level of agreement on the variable 0.229, which means there was a significant (Sig < 0.05) positives weak agreement from the respondents of the variables in relation to the effects of untimely delivery of projects at an optimal cost.

4.6 THE ROLES OF SURVEY AND DESIGN DEPARTMENT IN ENHANCING THE TIMELY DELIVERY OF ROAD CONSTRUCTION PROJECTS AT OPTIMAL COST

The third objective, which was the last objective was to ascertain the roles of survey and design department in enhancing the timely delivery of road construction projects at optimal cost. The study adopted the Likert scale: 1 = not accepted; 2 = not sure; 3 = accepted, to check the level of acceptance on the steps. Mean score Analysis was

employed to find out the most important step that needs to be adopted among all the variables, as shown on Table 4.5.

Table 4.7: the roles of survey and design department in enhancing the timely delivery of road construction projects at optimal cost

No .	Roles	Mean	Standard Deviation	Ranking
1	Preparation of detailed designs	2.550	0.74618	1
2	Specialists' involvement in design planning	2.5167	0.77002	2
3	Elaboration of project brief	2.4667	0.65008	3
4	Viewing error prevention as a continuous process	2.4500	0.72311	4
5	Day-to-Day management of the project	2.3500	0.75521	5
6	Quality control	2.3333	0.75165	6
7	Proper budgeting allocations	2.3167	0.77002	7
8	Motivation and learning	2.2500	0.81563	8
9	Use of integrated procurement method	2.1833	0.74769	9
10	Establishment of oversight committee	2.1667	0.64221	10

Source: (Field Survey, 2019)

From Table 4.5, the following were obtained; Preparation of detailed designs (1st), Specialists' involvement in design planning (2nd), Elaboration of project brief (3rd), Viewing error prevention as a continuous process (4th), Day-to-Day management of the project (5th), Quality control (6th), Proper budgeting allocations (7th), Motivation and learning (8th), Use of integrated procurement method (9th) and Establishment of oversight committee (10th). The study portrayed that, the major role of survey and design department in mitigating delay on road construction is preparing a detailed design. Asamaoh and Offei-Nyako (2013) was consistent with the fact that drawings must be detailed to help reduce delay unnecessarily. Love et al. (2014) also asserted that design errors and omissions, as well as uncompleted designs have high potentials

of causing delays on construction projects in Ghana. This was also consistent with Ismail et al. (2012), when encouraged the reviewing of detailed drawings continuously and omission of errors. The study therefore revealed that, preparation of detailed drawings is a major role in mitigating the untimely delivery of construction of roads.

4.6.1 Test of Agreement on the Variables

Kendall's Coefficient of Concordance was employed to check the level of agreement of the respondents on the variables relating to the roles to mitigate of delays. This is revealed on Table 4.8.

Table 4.8: Kendall's Coefficient of Concordance

N	60
Kendall's W ^a	0.049
Chi-Square	26.25
df	9
Asymp. Sig.	0.002

c. Kendall's Coefficient of Concordance

Source: (Field Survey, 2019)

The level of agreement on the variable 0.046, which means there was a significant (Sig< 0.05) positives weak agreement from the respondents of the variables in relation to roles of survey and design department in enhancing the timely delivery of road construction projects at optimal cost.

4.7 CHAPTER SUMMARY

The findings and discussion of the study was presented in this chapter as Tables and percentages. The reliability of the scale was tested using Cronbach's Alpha test. The significant level of agreement was also determined using Kendall's Coefficient of

Concordance. Critical discussions were done on the findings to establish consistency with literature using means score analysis.

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CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The aim of the research is to identify the role of Survey and Design department in enhancing the timely delivery of road construction projects at an optimal cost. The chapter one discussed the proposal in achieving the aim with the following objectives: to identify the factors that affects the timely delivery of road construction projects at an optimal cost, to ascertain the effects of untimely delivery of projects at an optimal cost and to identify the roles of Survey and Design department in enhancing the timely delivery of road construction projects at optimal cost. The chapter two considered the previous works that had been done on issues of delay in the construction industry, especially the objectives of the study. The chapter three revealed the methodologies that were adopted in achieving the aim of the research, by involving the use of structured questionnaires. The chapter four discussed the findings and analyse the data that were collected from the targeted respondents. Finally, the chapter summarized the whole work following the following structure: review of objectives, summary of findings, recommendations, limitation, future research directions and conclusions.

5.2 REVIEW OF RESEARCH OBJECTIVES

The research was fulfilled. The objectives of the study were attained in order to accomplish the goal.

5.2.1 The Objective of Identifying the Factors That Affects the Timely Delivery of Road Construction Projects at an Optimal Cost

Identifying the factors that affects the timely delivery of road construction projects at an optimal cost was the first objective. This was planned by using the Likert scale: 1- strongly agree, 2- agree, 3- neutral, 4- disagree, 5- strongly disagree). Comprehensive review was done to identify the causes that are related to causing delay in the construction industry. Means core Analysis was then adopted to deter the central tendency on the variables, and standard deviation; to determine the degree of variability among the responses on the variables. Kendall's Coefficient of Concordance was employed to check the level of agreement of the respondents on the variables relating to the factors causing the untimely delivery of road construction project.

5.2.2 The Objective of Ascertaining the Effects of Untimely Delivery of Projects at An Optimal Cost

The second objective of the study is to identify the effects of untimely delivery of projects at an optimal cost. This was achieved by allowing respondents to assess the effects using the Likert scale: 1- strongly agree, 2- agree, 3- neutral, 4- disagree, 5- strongly disagree). Means core Analysis was then adopted to deter the central tendency on the variables, and standard deviation; to determine the degree of variability among the responses on the variables. The study employed standard deviation at where the mean score for two variables are the same. Kendall's Coefficient of Concordance was employed to check the level of agreement of the respondents on the variables relating to the effects of untimely delivery of projects at an optimal cost.

5.2.3 The Objective of Identify the Roles of Survey and Design Department in Enhancing the Timely Delivery of Road Construction Projects at Optimal Cost

The third, which was the last objective, was to ascertain the roles of Survey and Design department in enhancing the timely delivery of road construction projects at optimal cost. The study adopted the Likert scale: 1 = not accepted; 2 = not sure; 3 = accepted, to check the level of acceptance on the steps. Mean score Analysis was employed to find out the most important step that needs to be adopted among all the variables. Kendall's Coefficient of Concordance was employed to check the level of agreement of the respondents on the variables relating to the roles to mitigate of delays.

5.3 SUMMARY AND CONTRIBUTION OF FINDINGS

Identifying the factors that affects the timely delivery of road construction projects at an optimal cost was the first objective. The results revealed that public interruption is the most agreed on factor that affects the timely delivery of road construction projects at an optimal cost. This is consistent with Jagboro and Ogunsemi (2006), when he made mention of public interruption being a cause of construction delay in Malaysia. Okuwoga (2008) also supported this result by listing public delays as part of the factors liable of causing delay on construction project. The level of agreement on the variable 0.052, which means there was a significant ($\text{Sig} < 0.05$) positives weak agreement from the respondents of the variables in relation to the factors that affects the timely delivery of road construction projects at an optimal cost

The second objective of the study is to identify the effects of untimely delivery of projects at an optimal cost. The study revealed that calling for arbitration is a major effect of untimely delivery of projects at an optimal cost. This is consistent with

Chileshe and Berko (2010), when identifies and evaluate the calling for arbitration as a significant effect of delaying Ghana ground water construction project. Akinsiku and Akinsulire (2012) identified 6 effects of delay on project and on community in Nigeria by listing arbitration as a major effect that need to be considered. Sambasivan and Soon (2007) also studied on the effects of delay on road construction, and pointed out that arbitration is a major effect of delayed project. The level of agreement on the variable 0.229, which means there was a significant ($\text{Sig} < 0.05$) positives weak agreement from the respondents of the variables in relation to the effects of untimely delivery of projects at an optimal cost.

The third objective, which was the last objective, was to ascertain the roles of Survey and Design department in enhancing the timely delivery of road construction projects at optimal cost. The study portrayed that, the major role of Survey and Design department in mitigating delay on road construction is preparing a detailed design. Asamaoh and Offei-Nyako (2013) was consistent with the fact that drawings must be detailed to reduce delay unnecessarily. Love et al. (2014) also asserted that design errors and omissions, as well as uncompleted designs have high potentials of causing delays on construction projects in Ghana. This was also consistent with Ismail et al. (2012), when encouraged the reviewing of detailed drawings continuously and omission of errors. The study therefore revealed that, preparation of detailed drawings is a major role in mitigating the untimely delivery of construction of roads. The level of agreement on the variable 0.046, which means there was a significant ($\text{Sig} < 0.05$) positives weak agreement from the respondents of the variables in relation to roles of survey and design department in enhancing the timely delivery of road construction projects at optimal cost.

5.4 RECOMMENDATIONS

Untimely delivery of road project is an issue that occur frequently in the construction industry, regardless of your location. In view of the result and discussion of this study, the following recommendations are made:

1. The construction industry should be very mindful with the factors that are liable to cause delay in the construction industry and try mitigating them at the early stage of construction.
2. The construction industry, especially the Ghana Highway Authority should make efficient use of the strategies mitigating construction delays.
3. Enough awareness should be created to help know the effects of road construction delays.

5.5 LIMITATIONS

The research study was presented with undeniable constraints in its conduct, as well as the scope of the study. Most of the respondents were busy but the researcher managed to attain an appropriate number that can be analysed for generalization. Also, the study was based on published papers from conference proceedings and journals. The research can therefore be used as bases for a recommendation for future research works.

5.6 FUTURE RESEARCH DIRECTIONS

It is proved that further research is important the following subject:

1. Development of framework policy to help mitigate delay on construction project.
2. Further analytical tools can be used to still analyse the effects of delay on construction projects in Ghana.

5.7 CONCLUSIONS

The aim of the research is to identify the role of Survey and Design department in enhancing the timely delivery of road construction projects at an optimal cost. In so doing the following objectives were achieved: identified the factors that affects the timely delivery of road construction projects at an optimal cost, ascertained the effects of untimely delivery of projects at an optimal cost and identified the roles of Survey and Design department in enhancing the timely delivery of road construction projects at optimal cost. The study adopted the quantitative research strategy, where the targeted respondents were allowed to respond to structured questionnaires. The results revealed that public interruption is the most agreed on factor that affects the timely delivery of road construction projects at an optimal cost. The study revealed that calling for arbitration is a major effect of untimely delivery of projects at an optimal cost. Finally, the study portrayed that, the major role of Survey and Design department in mitigating delay on road construction is preparing a detailed design.

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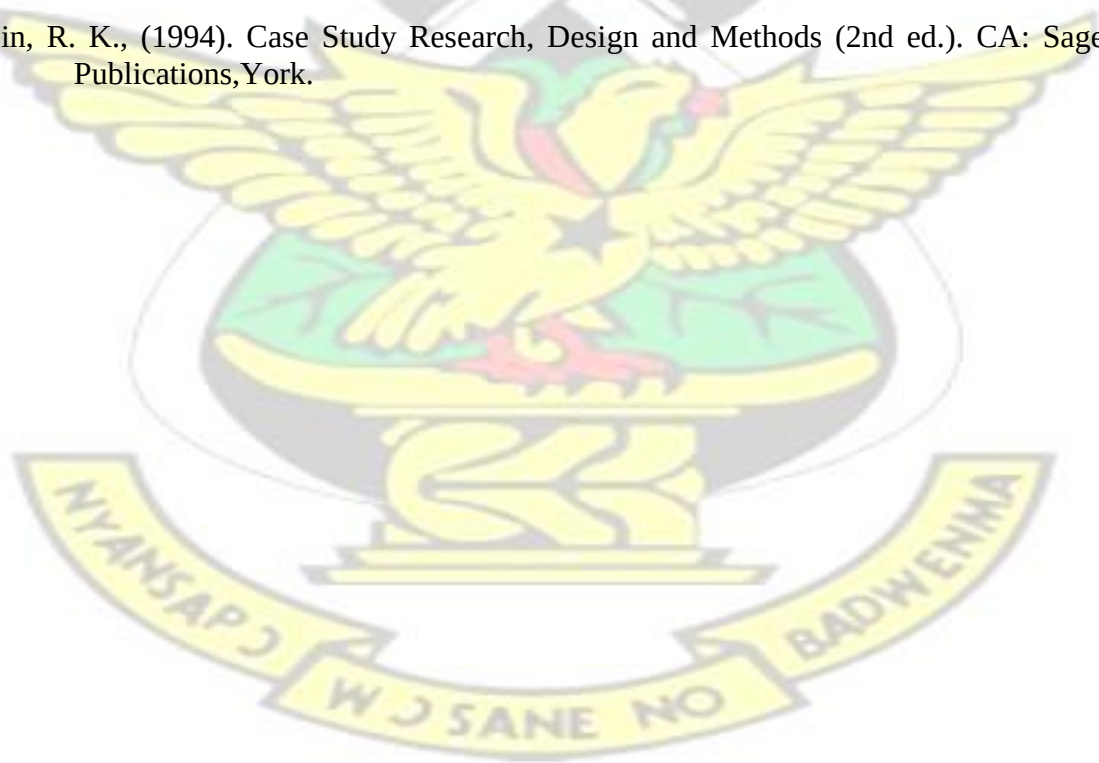
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APENDIX

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

QUESTIONNAIRE

TIMELY DELIVERY OF ROAD CONSTRUCTION PROJECT AT OPTIMAL COST; THE ROLE OF SURVEY AND DESIGN DEPARTMENT

Dear Sir/Madam,

This questionnaire is part of a study being conducted at the KNUST, Kumasi. The aim of the research is to identify the role of survey and design department in enhancing the timely delivery of road construction projects at an optimal cost. **All information collected will be confidential and used only for academic purposes.** Please, we would be grateful if you could answer this questionnaire to aid this study. Thank you for your time and valid contribution in advance.

Yours faithfully,

Prosper Azumah

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Please kindly respond to the questions by ticking (✓) the appropriate box for each item.

Please, not that all information provided will be strictly confidential.

PART A: RESPONDENT PROFILE

1. What is your Gender?
 - a. Male ()
 - b. Female ()
2. What is your highest educational background?
 - a. Diploma ()
 - b. Bachelor's Degree ()
 - c. Master's Degree ()
 - d. Doctor of Philosophy (PhD) ()
 - e. Professional Certificate ()
3. Where do you belong?
 - a. Contractor
 - b. Worker at the Survey and Design Department
4. How long have you been operating at the Survey and Design Department?
 - a. Less than 5 years ()
 - b. 5-10 years ()
 - c. 11-20 years ()
 - d. Above 20 years ()
5. How long have you been operating as a contractor?
 - a. Less than 5 years ()
 - b. 5-10 years ()
 - c. 11-20 years ()
 - d. Above 20 years ()

PART B: (I.) FACTORS AFFECTING THE TIMELY DELIVERY OF ROAD CONSTRUCTION PROJECTS AT AN OPTIMAL COST.

From the available literature review, several forms of challenges were identified. Please in your own opinion, indicate the degree of agreement on the factors by ranking on a Likert scale. (Kindly tick (✓) the appropriate box: 1- strongly agree, 2- agree, 3- neutral, 4- disagree, 5- strongly disagree).

FACTORS	DEGREE OF AGREEMENT				
	1	2	3	4	5
1. Poor project design,					
2. Change orders					
3. Change of weather					
4. Improper planning					
5. Poor site management					
6. Inadequate contractor experience					
7. Unforeseen ground conditions					
8. Exceptionally low bids					
9. Public interruptions					
10. The financial difficulties of contractors					
Please state and rank any other					

(II.) EFFECTS OF UNTIMELY DELIVERY OF PROJECTS AT AN OPTIMAL COST

Below are effects of untimely delivery of projects at an optimal cost. Base on your experience, indicate the degree of agreement on the factors by ranking on a Likert scale: 1- strongly agree, 2- agree, 3- neutral, 4- disagree, 5- strongly disagree).

EFFECTS	DEGREE OF AGREEMENT				
	1	2	3	4	5
1. Time overrun					
2. Cost overrun					
3. Dispute					
4. Arbitration					
5. Litigation					
6. Total abandonment					
7. Total desertion and slowing down the growth of the construction sector					
8. Decline in quality and rework					
9. Completion schedule delay					
10. Clashes and Claims					
Please state and rank any other					

(III.) ROLES OF SURVEY AND DESIGN DEPARTMENT IN ENHANCING THE TIMELY DELIVERY OF ROAD CONSTRUCTION PROJECTS AT OPTIMAL COST

Below are the roles of survey and design department in enhancing the timely delivery of road construction, please rank the roles with level of acceptance using **(1 = not accepted; 2 = not sure; 3 = accepted)**

ROLES	LEVEL OF ACCEPTANCE		
	1	2	3
1. Viewing error prevention as a continuous process			
2. Specialists' involvement in design planning			
3. Preparation of detailed designs			
4. Quality control			
5. Day-to-Day management of the project			
6. Establishment of oversight committee			
7. Proper budgeting allocations			
8. Elaboration of project brief			
9. Use of integrated procurement method			
10. Motivation and learning			
Please state and rank any other			

Any further comments can kindly be indicated below:

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KNUST



Thank you