

**A STUDY OF THE CHALLENGES AND STRATEGIES TO ROAD
CONSTRUCTION CONTRACT CLOSEOUT**

by

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**A Dissertation submitted to the Department of Construction Technology and
Management, College of Art and Built Environment in partial fulfilment of the
requirement for the degree of**

MASTER OF SCIENCE

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DECLARATION

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

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ABSTRACT

The aim of the study was to explore ways of improving the effectiveness of the project closure phase of the road construction sector. With this aim, two objectives were set which were to identify the challenges that impede in the road construction contract closeout and to identify the strategies that can enhance the efficient use in road construction contract closure. An extensive literature review was conducted and based on the review, structured questionnaire was developed and distributed the various respondents. Fifty-three (53) questionnaires were retrieved and analyzed using mean score ranking technique. From the analysis, it was realized that, customer challenges were ranked as the most severe challenge. The sub-variable that was ranked first was unavailability of key personnel followed by change of responsible personnel at critical transition points. The second ranked variable was team challenges. Its sub-variable that was ranked first was fear of no future work followed by attention diverted as members transition into new projects. The third ranked factor was technical challenges. Its first ranked sub-variable was difficulties in securing useful project historical data followed by thorough identification and agreement on all remaining deliverables. With the analysis of the second objective, the most significant strategy was effective communication at the closure phase of a project. The second ranked factor was the continuous monitoring of functionality and quality of deliverables by project manager. The third ranked factor was standardization of the closeout process as much as possible. With these findings, it was recommended that, clients in collaboration with consultants must ensure that, contractors do not approach the project closure phase with lackadaisical attitude by implementing sanctions. Also, construction firms must also ensure that, work personnel needed at the closure phase of a project are readily available and well-motivated to see the work through. Lastly, the project manager must try as much as possible to avoid last minute surprises. Thus, the project manager must continually monitor the functionality and quality of the project deliverables and guide them against damages. Furthermore, the project manager must actively make his visibility greater at the project closure stage. This is because, the project team may begin to disintegrate as a functional unit when the project nears completion. Communication becomes more difficult for the project manager. This study was limited to only road construction firms. Further studies can incorporate building contractors. Also, the study was also limited to road construction firms in the Upper West region. Other geographical areas in Ghana can be included in further studies.

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DEDICATION

This work is dedicated to family

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Construction of roads continue to play an imperative role in road transportation which aids in the movement of people and goods. Road transportation is a significant aspect of the battle to alleviate poverty in developing countries like Ghana (Growth and Poverty Reduction Strategy II, 2005). According to Adu (2009), road construction is categorized under infrastructure development and has been identified as one of the major ways of creating wealth in the country. It provides the opportunity for people to undertake various economic and social activities as it provides service to other sectors in the country like tourism, mining, health, agriculture and so on. Lingaitiene (2006), stipulated that, an effective and efficient transportation system is a major prerequisite for successful development of other sectors of the economy and the quality of life of people in the country. The Government of Ghana for the past years has been implementing road improvement programs as part of its transport policy. The programs have involved periodic and medium term maintenance as well as rehabilitation and reconstruction of rural, trunk and urban infrastructure. The Ministry of Roads and Highways has embarked on numerous road construction projects in the past few years. This includes the Road Infrastructure Project executed by the Ghana Highway Authority for the Western and Eastern regions of Ghana in 2004. Therefore, there is the need to effectively manage these projects throughout the entire phases so as to reap the maximum benefits from them. The phases of a construction project can be broadly categorized in the following stages; (1) starting of the project, (2) organizing and preparing, (3) Carrying out of the work, (4) closing of the project. According to PMI (2008), project management is the planning, organizing, directing and controlling of company resources for a relatively short-term objective that has been established

to complete specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the horizontal hierarchy) (Kerzner, 2009). Project management therefore, controls or manages projects to make them successful. Construction of roads are considered to be projects because projects according to Rosenua and Githens (2011) are unique, temporary and progressively elaborated. It is quite true in the sense that construction of roads is temporary, that is it is just for a particular period of time. It is also unique such that its processes are different from other projects and it is also progressively elaborated in the sense that it requires much technicalities. In order to make projects such as the construction of roads successful, laid down principles in project management should be implemented in the construction of these roads and most especially in its closure.

According to Federal Transition Administration (2006), the commencing of closure of a project and the ending of the closure of the project is when the output of the project is being accepted by the client and when the project is finally commissioned to be used respectively in the construction industry. One of the most serious phase in the lifecycle of a project is the closure of the project's phase which happen to be the last phase of the project. Time and overrun of cost may be experienced as a result of delay due to the inability to manage this stage well. Project closure is also very significant as it is capable to spoil client and contractor's relationship (Rogers, 2012). However, there are numerous challenges involved in effectively executing the project closure stage of a construction project especially in road construction due to the mobile nature of the construction process. Therefore, this study aims at exploring ways of improving the effectiveness of the project closure phase of the road construction sector.

1.2 PROBLEM STATEMENT

Project closeout takes place after all obligations have been fulfilled and the required documents have been completely executed. According to Othman and Zaid (2015), project closure is the most difficult time for the project manager throughout the project life cycle especially in road construction. This because, as the end of the project approaches, the project manager faces a completely new set of challenges in order to bring the project to a successful conclusion. There are numerous challenges associated with construction project closure that inhibits the successful completion of a project. A lot of research has been conducted into the problems in connection with the closure of a project. With the exception of the outlined guidelines in the construction project management manual such as FTA Manual (2006) and management of general project manual such as the ITRM guideline, there is no withstanding evidence of the practices of general project closure.

Procedures for managing punch lists administratively and recommendations are the limitations of a lot of literature on project closure. Furthermore, design-build and construction management which is deemed as another delivery of project systems have been suggested as potential remedies to the construction project closure problem (Molenaar and Saller, 2003). Despite these remedies, the project closure problem continues to persist. According to Ballard and Howell (2003), remedies that are deemed to be mutually exclusive methods and applied separately yielding contending and opposing fixes and in the end becoming a progress barrier. Additionally, the negative effects of the problem are only reduced by these remedies rather than focusing on the root cause of the problems. Therefore, this study aims at exploring ways of improving the effectiveness of the project closure phase of the road construction sector.

1.3 RESEARCH QUESTIONS

In order to be able to achieve the aim of this research, the researcher would endeavor to answer the following research questions:

1. What challenges can be identified in the application of project management principles in road construction closure?
2. What strategies can enhance the use of project management principles in road construction contract closure?

1.4 AIM

The aim of the study is to explore ways of improving the effectiveness of the project closure phase of the road construction sector.

1.5 OBJECTIVES

1. To identify the challenges that impede the road construction contract closeout; and
2. To identify the strategies that can enhance the efficient use of project management principles in road construction contract closure.

1.6 SCOPE OF STUDY

This research is targeted at the Roads and Highways Ministry in Upper West. This was because they are mostly responsible for the management of road constructions in Upper West and its environs. This research is also targeted at consultants and construction companies involved in the construction of roads in Kumasi because they are mostly involved in the contract closure of the construction of these roads.

1.7 METHODOLOGY

The methodology adopted for this research consists of critical review of essential literature in relation to application of project management principles in road construction contract closure. This would help to find the works done previously, contributions that have been made, their reproaches, restrictions, findings that are present and their applications. A questionnaire would be designed from the literature review and this focused on the aim and objectives of the research to collect data from the field. The number of contractors and consultants would be determined

by using the register of those registered at the Registrar General's department. The tools for analyzing data collected consisted of descriptive statistics, one sample t-test and relative importance index for ranking the various phenomena quantified.

1.8 SIGNIFICANCE OF THE STUDY

This research will be of enormous significance to the road construction industry since the importance of road construction contract closure will be identified as an integral part of practice. The study will come out with findings that will enable road contractors to adopt project management principles which would lead to a better road contract closure so that they can effectively deliver satisfactory projects to their clients. Clients will also become knowledgeable through this study about their needs when searching for reputable contractors. In addition, the Ghanaian Government will also benefit from this research as government projects will be executed better with knowledge from the findings. Academia will also benefit since it will provide important knowledge and other people will also be motivated to engage in detailed research on contract closure in the road construction industry.

1.9 STRUCTURE OF THE STUDY

This research would be presented in five chapters. Chapter one would deal with the introduction of the research. The literature review will be chapter two with chapter three and four being methodology and analysis of the data that would be collected respectively. Chapter five would conclude the research with some recommendations that would be realized in the research.

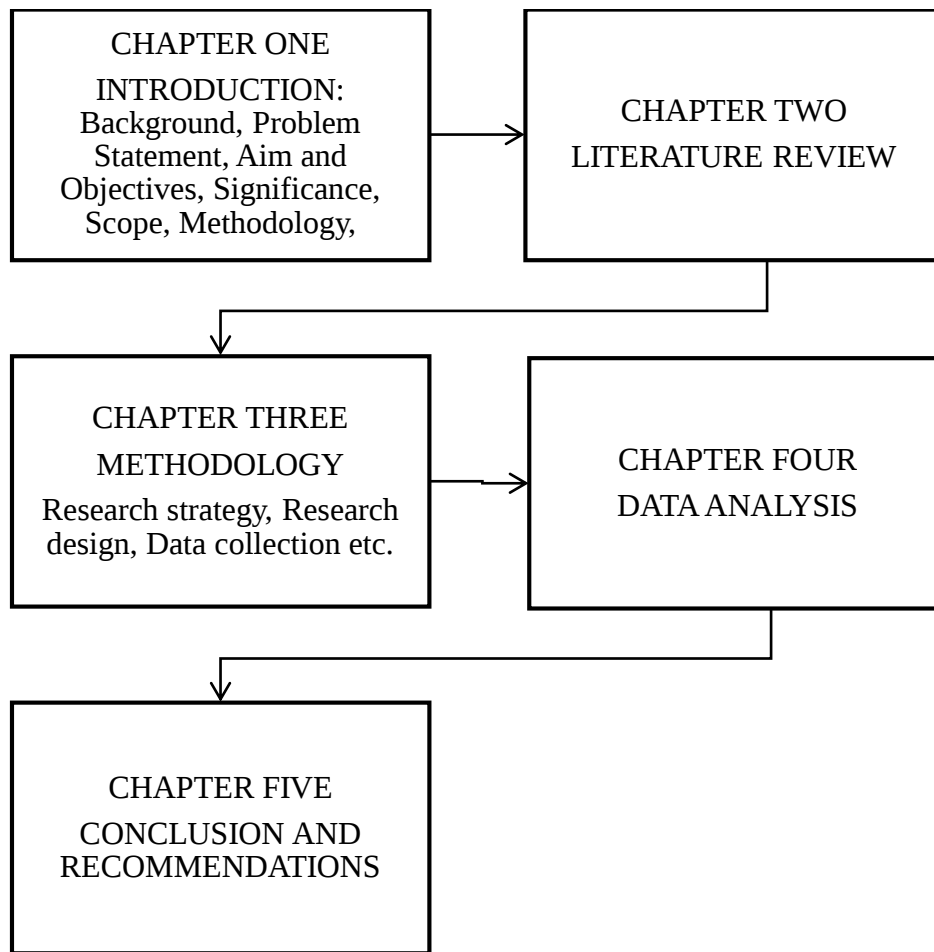


Figure 1.1: Structure of the report

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Literature pertaining to the subject area of this study is basically reviewed under this chapter. The review aids in the development of the questionnaire to be used for the study. The review begins with an overview of the Ghanaian construction industry followed by a discussion on the life-cycle of a construction project. Further on, there is a review of the concept of project closure which discusses administrative closure and contractual closure. The challenges associated with project closure is reviewed and finally the strategies to improve project closure processes.

2.2 OVERVIEW OF THE CONSTRUCTION INDUSTRY

The construction industry is defined to be a group of firms that have the same related activities in the construction of real estate, buildings, private and public infrastructure (Lange and Mills, 1979). According to Tse and Ganesan (1997) and Crosthwaite (2000), the construction industry is a major and integral part of the national output accounting for a sizeable proportion in the Gross Domestic Product of both developed and developing countries such as Ghana. The important role of the construction industry is vital to the achievement of national socio-economic development goals of providing shelter, infrastructure and employment.

The construction industry is one industry that is springing up in every economy especially the Ghanaian economy. The standard of living of citizens are being improved as housing, roads, schools, to mention a few are being provided. This is buttressed by Eyiah and Cook (2004) who clearly stated that the construction industry is important in Ghana because infrastructure facilities is required for improved living conditions that are relatively undersupplied. The construction industry is considered as one of the sectors that are major sources of economic

growth and development. In order for the construction industry to thrive in this global world, there must be improvements in training institutions, the engagement of expatriates and the collaboration of indigenous and foreign entrepreneurs as now practiced in most western countries resource gap, share new innovations for successful projects. The apparent resource gap needed for successful completion of complex projects between local and foreign companies are now closer compared to the pre-independence era (Mbamali and Okotie, 2012). For instance, this is witnessed with how the indigenes in the Ghanaian construction industry are partnering with foreign counterparts like the Italians popularly known as Consar construction limited or De Simone construction limited in constructing complex structures. But for the construction of the complex projects to be undertaken for successful completion, there are project lifecycle phases that see to the successful completion of the project. The series of phases involved in project from start to completion is described as the lifecycle of the project (PMI, 2010).

Every project follows a sequence in order for a successful completion and the project lifecycle is an extremely useful sequential phase in planning for a successful project completion as it provides a baseline for budgeting, manpower and resource allocation and for scheduling project milestones and evaluations. All projects are different in real life so as their lifecycles (Lock, 2003). Nevertheless, according to Field and Keller (2007) models from these lifecycles of projects can be used as guides for these projects from start to finish. According to Nokes (2007), the scope, composition and duration of projects differ but the management of the projects for their delivery have the same traditional process that drives them. All construction projects need some management of some sort. For a project to be successful or a failure, depends on the management and construction of the project. According to Twort and Rees (2014), a person that caters for all the activities during the project and ensures smooth execution of the activities

without any delay so that project can be completed within minimum duration and optimum quality is known as a project manager.

2.3 CONSTRUCTION PROJECT LIFE-CYCLE

According to Archibald (1976), a clearly set start and completion time of project lifecycle is known as the project life span of the project. There are a lot of distinct phases that every project passes through to maturity of the project as illustrated as illustrated in Figure 2.1. All the phases from the start of the project to the completion of the project is described as the lifecycle of the project. The following are the sequential six phases;

1. Concept;
2. Definition;
3. Design;
4. Development/ Manufacture
5. Installation; and
6. Project closure.

The project life cycle has no constant number of phases. Furthermore, there is no general agreement on the number of phases which constitute a project life cycle, neither on the names used to describe these phases. The number of phases in the cycle could differ depending on how and individual decides to view it, but in whichever way the phases are developed or tackled, every stage in the construction system for a particular project must be captured.

The general four broad and generic phases of a project according to PMI (2008) are;

1. Starting the project (concept, authorization, initiation, identification, selection, project charter and business case, planning, scheduling).

2. The Organization and Preparation phase of the projects looks into the definition, achievable, developmental, demonstrational, design prototype and quantification aspects of the project.
3. How the works are being carried out thus how the works are being executed, implemented, realized, produced, deployed, designed or constructed, installed and tested.
4. How the project is being terminated thus how the project is being handed to the user, how the project is being closed and sometimes inclusive of the evaluation at post completion.

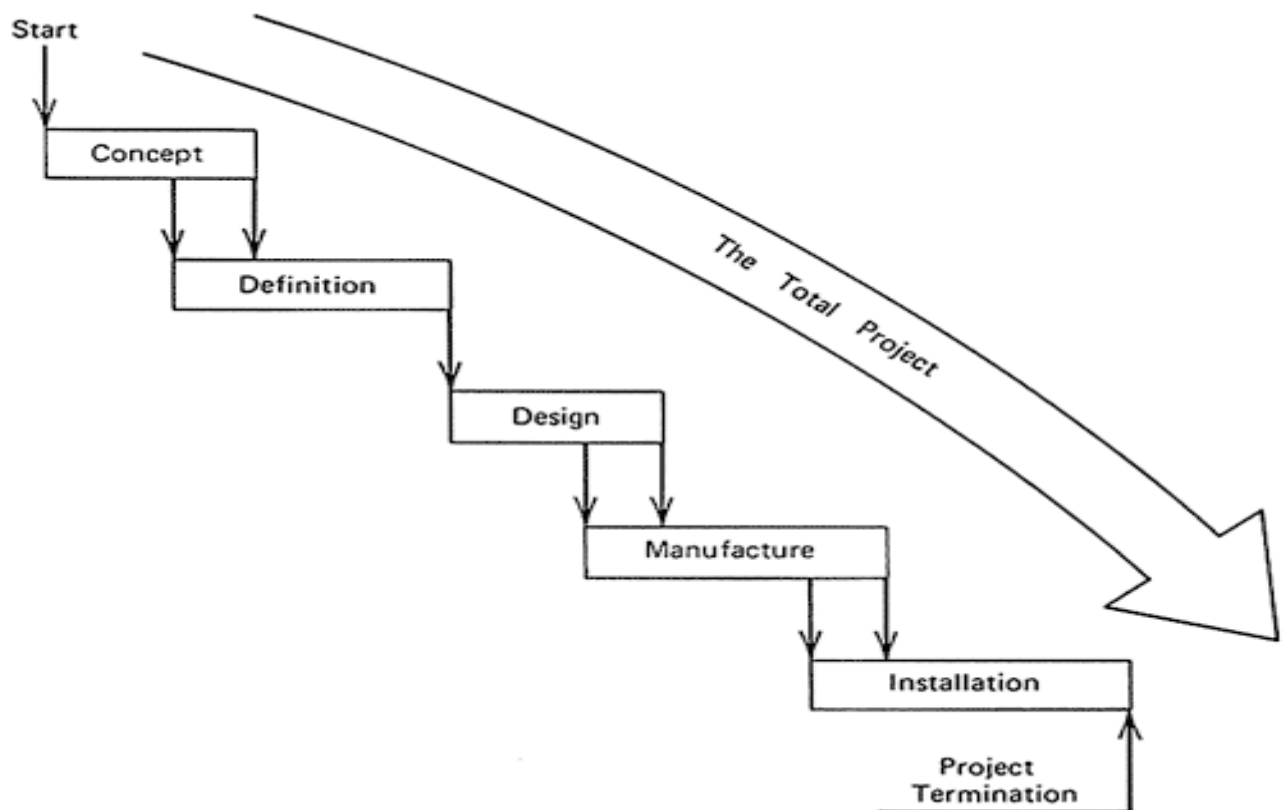


Figure 2.1: Life-Cycle

Source: Archibald, (1976).

2.3.1 Initiation of Project

Projects commence at this phase and the goal of this phase is to give adept definition of the projects. A business case usually commences with this phase. The feasibility of the project is researched into at this stage and it includes the completion of the testing of the feasibility if necessary. Important stakeholders play a massive role in the decision for a project to be undertaken. A project charter or project initiation document that outlines the purpose and requirements of the project is created. This includes business needs, stakeholders, and the business case.

2.3.2 Project planning

This is the phase whereby roadmap is being developed for everyone to follow. For management to be successful, this phase need not to be overlooked. The commencement of goals setting, starts from this phase. Management of the plan as well as the project's scope is developed during this stage. The plans for the project inculcate the identification of the cost, quality, availability of resources, realistic timetable and measurement for performances or baselines. The project plan is being generated with the help of the project's cost and the scope schedule. The track at which a project is being checked is by the usage of baseline. Clearly defined obligations are being set at this time for everyone involve to be accountable for what they do. Below are some documents that the project manager creates at this phase:

1. Scope statement;
2. Works breakdown;
3. Milestones;
4. Gantt chart;
5. Communication plan;
6. Risk management plan;

2.3.3 Project execution

This is the phase where deliverables are developed and completed. During this phase, a lot of activities such as reports on status, meeting, performance, update development is prepared and undertaken. During this phase, a 'kick-off' meeting is held and this commences the execution of the project in which responsibilities of the teams involved are informed. During this phase, completed tasks include:

1. Developing team;
2. Resource assignment;
3. Execution of management project plans;
4. Needed management of procurement;
5. PM directs and manages project execution;
6. Systems for tracking set up;
7. Task assignments are executed;
8. Status meetings;
9. Update project schedule;
10. Modify project plans as needed;

At this phase, the project performance is monitored. This activity runs simultaneously with the project execution process. This is all about measuring project progression and performance and ensuring that everything happening aligns with the project management plan. The project performance could be measured using some key performance indicators (KPI). They are;

1. Project objectives;
2. Quality Deliverables;
3. Effort and Costing Tracking;
4. Project performance;

Two or more of these KPI could be used to measure the project performance. During this time, PMs may need to adjust schedules and resources to ensure the project is on track.

2.4 THE FINAL PHASE OF PROJECT LIFE CYCLE (PROJECT CLOSURE)

The completion of construction contracts that is inclusive of administrative activities, technical activities and contractual activities can be described as Project closure (Mrozowski et al., 2008). These technical activities may include completed items that are punch listed, furnishing, preparation of as-built documents, corrections, concluding inspections, resolution of claims and change orders. Within the contracting scenario, the period of time with which an owner occupies the structure for its planned purpose (significant completion) to the stage when last payment is made to the contractor. Busansky (2003), indicated that, contract closeout is deemed to have ended when all administrative activities have been confirmed, all disagreements settled and last payments made. All the procedures that are executed during a contract closure can be categorized in administrative and contract closure procedures as described by Othman and Zaid (2015).

2.5 CHALLENGES ASSOCIATED WITH EFFECTIVE PROJECT CLOSURE

Heerkens (2001), categorized the challenges faced by construction managers during a contract closure into three distinct parts. These are the technical challenges, project team challenges and customer challenges. These categories are discussed in subsequent sections. The technical challenges that the construction manager may face during project closure are;

1. Difficulties in securing useful project historical data: and
2. Thorough identification and agreement on all remaining deliverables:

Getting to the closure phase of a construction project, the team's output begins to reduce. On completion of the work, some members of the team disappear. The remaining team members are mostly preoccupied or reluctant to dedicate fully to the project. during this time, it is very

challenging for the manager of the project to fight against the team's loss of interest. Othman (2015), identified the following project team challenges that faces the construction manager during project closure;

1. Functionality of the team is mostly lost on completion of their task by the members;
2. Interest in tasks such as documentations are lost;
3. As members move to different or new projects, attention is digressed; and
4. Fear of no future work; hence, foot-dragging.

In order to bring the project to a successful end, the customer should be satisfied, prepared and enthusiastic to receive the deliverables of the project. Towards the end of the project, the following are customer challenges as identified by Othman and Zaid (2015).

1. The existence of any agreed outstanding commitments;
2. Nonappearance of a flawless hand-off tactic;
3. Personnel responsibility changes sensitive points of transition; and
4. Lack of key personnel

2.6 STRATEGIES TO CURB THE CHALLENGES ASSOCIATED WITH PROJECT CLOSURE

A lot of project management attention should be geared towards the project closure phase. Othman (2015), identified a number of factors that enhance the effective execution of the project closure phase in the construction industry. They are discussed below.

The project manager must try as much as possible to avoid last minute surprises. Thus, the project manager must frequently supervise how functional and the level of quality of the project deliverables and guide them against damages. Furthermore, the project manager must actively make his visibility greater at the project closure stage. This is because, the team of the project

may start to split as a functional unit when the completion of the project is near. A difficulty in communication for the project manager emerges.

Mrozowski et al. (2008), also indicated that management from the construction firm must develop and agree on organizational goals for contract closure. This will aid in the establishment of corporate commitment to meeting all the needs during contract closure. Furthermore, the standards of the process involved in the closeout should be worked out by the organization. The use of checklists can aid in the standardization process. Each representative of a project should have an unchanged organizational system which is inclusive of all the phases of contract closure. Mrozowski et al. (2008), further indicated that, owners of construction firms and construction managers must include closeout performance as a line item on each project representative's annual review on evaluation and reward good performance. Monetary or other financial incentives may be regarded as appropriate incentives to motivate operatives during contract closure.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research methodology detail out the approaches and strategies adopted for the research. This chapter discusses the methodology adopted for this study. The outline of this chapter includes, the research strategy, the research design, the research method, the population, sample size and sample technique, questionnaire development, questionnaire distribution, tool for the analysis and finally, a summary of the methodology.

3.2 RESEARCH STRATEGY

Bryman (2009), indicated that, there are six (6) main research strategies. However, Blismas (2001), indicated that, the most suitable research strategies for social science and project management studies are case study research, survey research and experiment. These strategies are discussed below;

The case study research strategy is a system that explores a particular research entity (Yin, 2009). This type of study is very suitable for exploratory research. Neuman (2003), indicated that, the case study research involves an intensive analysis of the research entity on a particular problem or concept. Yin (2009), indicated that, the case study research is very suitable for inductive research approaches.

For the case of survey research strategy, the study normally involves the use of sample to represent a population and is also normally utilized for exploring the relationships between variables (Oppenheim, 2003). The survey research strategy is very suitable and effective for construction management researches.

For experiments, Bryman (2009), described it as a type of research strategy that involves describing the causal relationships between variables by tempering with one variable on the other variable. It is very suitable for phenomenon with known variables or initial hypothesis that aimed at testing or manipulating a theory (Cresswell, 2009).

This study adopted the survey research strategy. This is because, this study involves the use of a sample to represent a population as indicated by Oppenheim (2003).

3.3 RESEARCH METHOD

Research method indicates how the data was collected. In social research, there are three (3) basic research methods. These are quantitative, qualitative and the mixed method. The type of research method adopted depends on the type of data utilized for the study (Carrie, 2007). There are basically, two (2) types of data. These are the numerical data and textual data. The numerical data was utilized for this study.

The quantitative research method utilizes numerical data whiles the qualitative research method utilizes the textual data. The mixed method combines the strengths of both the quantitative and qualitative research method. Therefore, the quantitative research method was the most suitable for this study. The quantitative research method collects information to describe a concept involving a larger number of participants (Fellows and Liu, 2008). This data is normally used to study relationships between facts and how they align to theories and findings of past researches. Also, the quantitative research method aids researchers to translate data to numbers and analyze using mathematical tools.

3.3.1 Population, Sample Size and Sampling Technique

The population for this study is road contractors in the Upper West region. According to the Association of Road Contractors in Ghana, the Upper West Regional secretariat, there are two

hundred and two (202) active road construction firms in the region. Therefore, using the Yamane formula below, the sample size for the study was sixty-seven (67)

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

where;

n is the sample size

N is the population size

e is the level of precision or the confidence level.

$$\text{Therefore, } n = \frac{202}{1 + 202(0.10)^2} = 66.88 \approx 67.$$

Therefore, the sample size is 67.

Therefore, sixty-seven (67) questionnaires were distributed and fifty-three (53) were retrieved for the analysis representing 79.10% response rate.

3.4 QUESTIONNAIRE DEVELOPMENT AND ADMINISTRATION

A structured questionnaire was developed and distributed to the respondents in order to gather information towards the achievement of the aim of the study. The questionnaire was divided in two sections (section A and B). The section A concentrated on the respondent's profile. The respondents were asked to indicate their category in road construction, their number of years of experience, their highest level of education and the number of projects they have handled with their firm.

The section B was concentrated on the objectives of the study. There were therefore two questions in the section B. The first question asked the respondents to rate the challenges associated with project closure. The respondents were asked to indicate the severity of the challenges by rating using the five-point Likert scale of 1 = Not severe 2 = Slightly severe 3 = Moderate 4 = Severe 5 = Very severe.

The second question was concentrated on the strategies for improving stakeholder management. The respondents were asked to indicate the significance of the strategies by rating using the five-point Likert scale of 1 = Not significant 2 = Slightly significant 3 = Moderate 4 = Significant 5 = Very significant.

After the development of the questionnaire, it was distributed to sixty-seven (67) respondents. The respondents were given ample time to respond to the questions. They were retrieved after two-weeks of distribution. However, not all the questionnaires were retrieved while others were not complete hence deemed invalid. Thus, out of the sixty-seven (67) questionnaires distributed, fifty-three (53) were retrieved and used for the analysis. Three (3) questionnaires were not complete hence deemed invalid while the other ten (10) could not be retrieved due to various reasons. However, the rate of response of 79.10% is regarded as substantial.

3.5 TOOLS FOR THE ANALYSIS

The data was coded into SPSS version 20 to enable the analysis to be undertaken. The section A of the questionnaire was analyzed using percentages and text. The other three sections were analyzed by ranking using the mean score ranking.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

This chapter analyzes and discusses the data collected from the respondents. The aim of the study was to explore ways of improving the effectiveness of the project closure phase of the road construction sector. After reviewing literature on the subject matter, questionnaires were developed and distributed to the respondents. The chapter analyzes fifty-three (53) questionnaires collected from the respondents. The section of the questionnaires was analyzed using percentages. The section B of the questionnaire was analyzed using mean score ranking technique.

4.2 BACKGROUND OF THE RESPONDENTS

This section analyzes the background information of the research participants. The respondents were asked to indicate their category in the road construction, their number of years of experience, the highest level of education and the number of projects executed. The results are shown in table 4.1.

4.2.1 Category in the construction industry

In Ghana, road contractors are classified as A1B1, A2B2, A3B3 and A4B4. This indicate their financial class and personnel holdings. The majority of the respondents were under the A2B2 classification. This was followed by A1B1 category which constituted 34.00%. The least among them was A4B4 category.

Table 4.1: Background of the respondents

DESCRIPTION	PERENTAGE
Category	
A1B1	34.00
A2B2	47.20
A3B3	11.30
A4B4	7.50
Experience	
Below 5 years	18.90
6-10 years	26.40
11-15 years	30.20
16-20 years	17.00
Above 20 years	7.50
Level of education	
HND	11.30
BSc	60.40
Post Graduate	28.30
Number of projects	
Below 5 projects	22.60
6-10 projects	34.00
11-15 projects	22.60
16-20 projects	9.40
Above 20 projects	11.30

Source: Field survey, (2018).

4.2.2 Number of years of experience

As part of the background information of the participants, the respondents were asked to indicate their professional experience. This question was posed because, the professional experience of a person can give an indication of his knowledge level in the processes of the firm. Also, it gives an indication of how familiar the respondent is with the systems in the construction industry. High level of experience level is good for any study as it improves on

the reliability of responses given by respondents. Majority of the respondents had 11-15 years of experience. This was followed by respondents who indicated 6-10 years.

4.2.3 Highest level of education

The third question wanted to ascertain the respondent's educational level. The options include HND, BSc and postgraduate. Just like experience level, educational level can give an indication of his knowledge level in the processes of the firm. Inferring from table 4.1, majority of the respondents had Bsc qualification followed by post graduate which comprised of 28.30%.

4.2.4 Number of projects

This question was posed as part of ascertaining the background information of the respondents to give an indication of how active the participants have been for the past decade. If respondents are dormant in the industry, it can deprive them of current trends and knowledge in the construction industry. Therefore, it was deemed a very significant question to explore. The respondent's response showed that, majority of the respondents had been involved in above 10 projects. They formed 75.47% of the respondents which were very significant (see table 4.1).

4.3 CHALLENGES ASSOCIATED WITH PROJECT CLOSURE

The objective one was to identify the challenges that impede in the application of project management principles in road construction contract closeout. An extensive review of literature was conducted on the challenges of project closure. From the review, three (3) variables were identified with ten (10) sub-variables. The respondents were asked to rate the severity of the variables using the five-point Likert scale. They were subsequently ranked using the mean score ranking technique. The means of the main variables were computed as a mean of its sub variables.

From their responses, customer challenges were ranked as the most severe challenge. The sub-variable that was ranked first was unavailability of key personnel followed by change of

accountable personnel at serious transition stages. In order to bring the project to a successful end, the customer should be satisfied, prepared and enthusiastic to receive the project's deliverables. Othman (2015), identified unavailability of key personnel as a significant challenge to project closure.

The second ranked variable was team challenges. Its sub-variable that was ranked first was fear of no future work followed by attention diverted as members transition into new projects. Getting to the closure phase of a construction project, the team's output begins to reduce. Some team members disappear after completing the work. Those that remain may become preoccupied or reluctant to dedicate fully to the project. During this time, it is very challenging for the manager of the project to fight against the team's loss of interest. Othman (2015), identified foot dragging as a severe challenge to project closure.

The third ranked factor was technical challenges. Its first ranked sub-variable was difficulties in securing useful project historical data followed by detailed identification and agreement on all remaining deliverables.

Table 4.2 Challenges associated with project closure

DESCRIPTION	MEAN	RANK
TECHNICAL CHALLENGES	3.07	3RD
Difficulties in securing useful project historical data	3.08	1 ST
Thorough identification and agreement on all remaining deliverables	3.06	2 ND
TEAM CHALLENGES	3.32	2ND
Fear of no future work; hence, foot-dragging.	3.66	1 ST
Attention is diverted as members transition into new projects or other work	3.26	2 ND
Loss of team functionality as some members complete their tasks	3.25	3 RD
Loss of interest in tasks such as documentations	3.11	4 TH
CUSTOMER CHALLENGES	3.47	1ST
Unavailability of key personnel	3.68	1 ST
Change of responsible personnel at critical transition points	3.45	2 ND
Absence of a clear hand-off strategy	3.40	3 RD
Agreement on what outstanding commitments still exist	3.34	4 TH

Source: Field survey, (2018).

4.4 STRATEGIES TO ENHANCE THE EXECUTION OF PROJECT CLOSURE

The objective two was to identify the strategies that can enhance the efficient use of project management principles in road construction contract closure. An extensive review of literature was conducted on the strategies to improve the execution of project closure. From the review, six (6) variables were identified. The respondents were asked to rate the significance of the variables using the five-point Likert scale. They were subsequently ranked using the mean score ranking technique.

From their responses, the most significant strategy was effective communication at the closure phase of a project. The project manager must actively make his visibility greater at the project closure stage. This is because, the project team may begin to disintegrate as a functional unit when the project nears completion. Communication becomes more difficult for the project manager. Therefore, project managers must improve on their communication processes at the latter stages of a project.

The second ranked factor was the continuous monitoring of functionality and quality of deliverables by project manager. Othman (2015), indicated that, the project manager must try as much as possible to avoid last minute surprises. Thus, the project manager must constantly supervise how functional and the level of quality of the deliverables of the project and guide them against damages.

The third ranked factor was standardization of the closeout process as much as possible. Mrozowski et al. (2008), also indicated that management from the construction firm must develop and agree on organizational goals for contract closure. This will aid in the establishment of corporate commitment to meeting all the needs during contract closure. Furthermore, the standard involve in the process of the closeout should be worked out by the organization. The usage of checklists can aid in maintain the standards in the process. The same organizational system should be for each representative which is inclusive of the entire phases of contract closure.

Table 4.3: Strategies to improve closeout

DESCRIPTION	MEAN	RANK
Effective communication at the closure phase of a project	3.96	1 ST
Continuous monitoring of functionality and quality of deliverables by project manager	3.96	2 ND
Construction firm must standardize the closeout process as much as possible	3.92	3 RD
Construction firm must develop and agree on organizational goals for contract closure	3.94	4 TH
Project manager must improve supervision at the latter stages of the project	3.91	5 TH
Provision of incentives and rewards for effective execution of the contract closure phase	3.85	6 TH

Source: Field survey, (2018).

4.5 SUMMARY OF CHAPTER

The aim of the study was to explore ways of improving the effectiveness of the project closure phase of the road construction sector. With the aim, two (2) objectives were set in order to achieve the aim of the study. This led to the review of literature of the subject area and subsequently led to the development of a structured questionnaire. The questionnaire was distributed and fifty-three (53) retrieved to be analyzed and discussed. The mean score ranking technique was used to analyze the collected data. From the analysis, customer challenges were ranked as the most severe challenge. The sub-variable that was ranked first was unavailability of key personnel followed by change of responsible personnel at critical transition points. The second ranked variable was team challenges. Its sub-variable that was ranked first was fear of no future work followed by attention diverted as members transition into new projects. The third ranked factor was technical challenges. Its first ranked sub-variable was difficulties in securing useful project historical data followed by thorough identification and agreement on

all remaining deliverables. With the analysis of the second objective, the most significant strategy was effective communication at the closure phase of a project. The second ranked factor was the continuous monitoring of functionality and quality of deliverables by project manager. The third ranked factor was standardization of the closeout process as much as possible.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter summarizes all the chapters of this study. This study set out two (2) objectives in order to achieve the aim of the study. These were to identify the challenges that impede in the application of project management principles in road construction contract closeout and to identify the strategies that can enhance the efficient use of project management principles in road construction contract closure. An extensive review of literature was conducted and subsequently, a structured questionnaire was developed to collect data from the respondents. Sixty-seven (67) questionnaires were distributed and fifty-three (53) was retrieved for the analysis. The data were analyzed using the mean score ranking technique. The findings of the analysis are discussed in the next section.

5.2 SUMMARY OF FINDINGS

Project closure is the most difficult time for the project manager throughout the project life cycle especially in road construction. This because, as the end of the project approaches, the project manager faces a completely new set of challenges in order to bring the project to a successful conclusion. There are numerous challenges associated with construction project closure that inhibits the effective completion of a project. With this aim, two objectives were set which were to identify the challenges that impede in the road construction contract closeout and to identify the strategies that can enhance the efficient use in road construction contract closure. An extensive literature review was conducted and based on the review, structured questionnaire was developed and distributed the various respondents. Fifty-three (53) questionnaires were retrieved and analyzed using mean score ranking technique. From the analysis, it was realized that, customer challenges were ranked as the most severe challenge.

The sub-variable that was ranked first was unavailability of key personnel followed by change of responsible personnel at critical transition points. The second ranked variable was team challenges. Its sub-variable that was ranked first was fear of no future work followed by attention diverted as members transition into new projects. The third ranked factor was technical challenges. Its first ranked sub-variable was difficulties in securing useful project historical data followed by thorough identification and agreement on all remaining deliverables. With the analysis of the second objective, the most significant strategy was effective communication at the closure phase of a project. The second ranked factor was the continuous monitoring of functionality and quality of deliverables by project manager. The third ranked factor was standardization of the closeout process as much as possible. With these findings, it was recommended that, clients in collaboration with consultants must ensure that, contractors do not approach the project closure phase with lackadaisical attitude by implementing sanctions. Also, construction firms must also ensure that, work personnel needed at the closure phase of a project are readily available and well-motivated to see the work through. Lastly, the project manager must try as much as possible to avoid last minute surprises. Thus, the project manager must frequently supervise how functional and the level of quality of deliverables of the project and guide them against damages. Furthermore, the project manager must actively make his visibility greater at the project closure stage. This is because, the team of the project may start to split as a functional unit when the completion of the project is near. The project manager is faced with the difficulty in communication. This study was limited to only road construction firms. Further studies can incorporate building contractors. Also, the study was also limited to road construction firms in the Upper West region. Other geographical areas in Ghana can be included in further studies.

5.3 LIMITATIONS OF THE STUDY

1. This study was limited to only road construction firms. Further studies can incorporate building contractors.
2. The study was also limited to road construction firms in the Upper West region. Other geographical areas in Ghana can be included in further studies.

5.4 CONCLUSION

This study demonstrated that, project closure is a very significant phase in construction, however, there are numerous challenges in adequately executing this phase. The study identified that, the most severe challenge is the owner related factors. In order to bring the project to a successful end, the customer should be satisfied, prepared and enthusiastic to receive the project's deliverables. The project closure phase is regarded as is the most difficult time for the project manager throughout the project life cycle especially in road construction. This because, as the end of the project approaches, the project manager faces a completely new set of challenges in order to bring the project to a successful conclusion. Therefore, strategic steps must be implemented to improve on the execution of the project closure phase of a project.

5.5 RECOMMENDATIONS

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

1. Clients in collaboration with consultants must ensure that, contractors do not approach the project closure phase with lackadaisical attitude by implementing sanctions.
2. Construction firms must also ensure that, work personnel needed at the closure phase of a project are readily available and well-motivated to see the work through.
3. They project manager must try as much as possible to avoid last minute surprises. Thus, the project manager must continually monitor the functionality and quality of the

project deliverables and guide them against damages. Furthermore, the project manager must actively make his visibility greater at the project closure stage. This is because, the project team may begin to disintegrate as a functional unit when the project nears completion. Communication becomes more difficult for the project manager.

REFERENCES

- Adu J., (2009), Financing and evaluating of investments in road infrastructure development, *unpublished thesis*.
- Eyiah, A.K. and Cook, P., (2004), Financing small and medium-scale contractors in developing countries: a Ghana case study. *Construction management and economics*, 21(4), pp.357-367.
- Twort, A., and Rees, J. (2014), Civil Engineering Project Management. 5th edition. Oxford: Spon Press.
- Archibald, R. D (1976), Managing High-Technology Programs and Projects, R. D. Archibald, Wiley, NY, p19.
- Ballard, G. and Howell, G., (2003), An update on last planner. In *Proc. 11 th Annual Conference. of the International Group for Lean Construction* pp. 22-24.
- Blismas, N. G. (2001), Multi project environments of construction clients, PhD Thesis, Loughborough University
- Bryman, A. (2009), Social Research Methods 4, Oxford: Oxford University Press. *Business Administration*, Vol. 2, pp. 138-145.
- Busansky, Michael D. (2003), Contract Closeout Pathologies and Recovery Strategies, Master's Thesis Report, Naval Postgraduate School, Monterey, California.
- Carrie W., (2007), Research method, "*Journal of Business and Economic research*", Vol 5, pp. 65-71.
- Creswell, J. (2009), Research Design: Qualitative, Quantitative, and Mixed Methods Approaches', 3rd edn., California: SAGE Publications, Inc

- Crosthwaite, D. (2000), The Global Construction Market: A Cross Sectional Analysis, “*Construction and Economics Management*”, Vol 18, pp. 619-627.
- Eyiah, A. and Cook, P. (2003), Financing small and medium scaled contractors in developing countries: a Ghana case study, “*Construction Management and Economics*”, Vol. 21, No. 4, pp. 357–67.
- Federal Transition Administration (FTA) (2006), *Construction Project Management Handbook*.
- Fellows, R., and Liu, A. (2008), Research Methods for Construction. Wiley- Blackwell Ltd, UK.
- Field, M. and Keller, L. (2007), *Project Management*. London: Thomson Learning.
- Growth and Poverty Reduction Strategy (GPRS11), (2005), Policy Framework, Vol. 1.
- Heerkens, G. R. (2001), Project Management. Ohio,USA:McGraw-Hill Trade.
- ITRM Guideline - Project Management Guideline, 2006. Project Close out.
- Kerzner, H. (2009), Project Management—A Systems Approach to Planning, Scheduling and Controlling, 10th edn, John Wiley and Sons Inc.
- Kumar, N. J., (2011), Construction project management: theory and practice, Pearson.
- Lange, J.E. and Mills, D.Q., (1979), The Construction Industry: Balance Wheel of the Economy, pp. 1–10.
- Lingaitiene, O. (2006), The Analysis of Road Infrastructure Development Financing in Lithuania.
- Lock, D. (2003), *Project Management* 8th Edition. Hampshire, UK: Gower Publishing Limited.

- Mbamali, I., and Okotie, A. J. (2012), An assessment of the threats and opportunities of globalization on building practice in Nigeria, “*American International Journal of Contemporary Research*”, pp. 143-150.
- Molenaar, Keith R., and Saller, Brian J. (2003), Educational Needs Assessment for Design/Build Project Delivery, “*Journal of Professional Issues in Engineering Education and Practice*”, ASCE, Vol. 129, No. 2, pp.106-114.
- Mrozowski T., Tariq A., Schafer D., Surabhi R., Singh Y., and Lung S., (2008), Assessment and Improvement of Construction closeout at Michigan State University.
- Neuman, W. L. (2003), Social research methods: qualitative and quantitative approaches, Boston: Pearson Education, Inc.
- Nokes, S. (2007). *The Definitive Guide to Project Management* 2nd Edition. London: Financial Times /Prentice Hall.
- Oppenheim, A. N. (2003), Questionnaire design, interviewing and attitude Measurement London: Continuum. Organisation Performance: in Kenya’s Horticultural Sector.
- Othman A. A. E. and Zaid K.A., (2015), Delivering Successful Construction Projects through Achieving Professional Projects Closeout, Faculty of Engineering, School of Civil Engineering, Surveying and Construction, University of KwaZulu Natal; 2. Khaled Abou Zaid, Abu Dhabi Water and Electricity Authority, United Arab Emirates.
- PMI (2010), *A Guide to the Project Management Body of Knowledge: PMBOK Guide* 4th Edition. Pennsylvania, USA: Project Management Institute, Inc.
- Project Management Institute, (2008), *Guide to the project management body of knowledge (PMBOK® Guide)*, 4th ed. Newtown Square: Project Management Institute.

- Rogers J., (2012), Opportunity Lost: Mismanagement of the Closeout Phase of Construction Projects, College of Technology Masters Theses.
- Rosenau, M.D. and Githens, G.D., (2011), Successful project management: a step-by-step approach with practical examples, John Wiley and Sons.
- Schinnerer and Company Inc., V. O., (2007), Certifying as Built or Record Drawings. *AIA Best Practices*, pp. 1-2.
- Tse, R.Y. and Ganesan IV, S., (1997), Causal relationship between construction flows and GDP: evidence from Hong Kong, “*Construction Management and Economics*”, Vol. 15, No. 4, pp.371-376.
- Yin, R. (2009), Case study research: Design and methods. Thousand Oaks, CA: Sage Publication

APPENDIX

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY COLLEGE OF ART AND BUILT ENVIRONMENT DEPARTMENT OF BUILDING TECHNOLOGY

SURVEY QUESTIONNAIRE SECTION A

RESPONDENT'S PROFILE

1. Please indicate your category in the Road Construction industry?

☐ A1B1

☐ A2B2

☐ A3B3

☐ A4B4

2. Please indicate your years of experience in your profession?

☐ Below 5 years

☐ 6-10 years

☐ 11-15 years

☐ 16-20 years

☐ Above 20 years

3. What is your highest level of education?

☐ HND

☐ BSc

☐ Post Graduate

Other; Please specify.....

4. Please indicate the number of projects you have handled with your firm.

☐ Below 5 projects

☐ 6-10 projects

☐ 11-15 projects

☐ 16-20 projects

☐ Above 20 projects

SECTION B

OBJECTIVE ONE: CHALLENGES ASSOCIATED WITH PROJECT CLOSURE

The following are the challenges that hinders project closure.

Please indicate the **SEVERENESS** of the challenges in the Road construction industry in Ghana.

Please use the response scale below:

1 = Not severe 2 = Slightly severe 3 = Moderate 4 = Severe 5 = Very severe

No.	Variables	1	2	3	4	5
Technical challenges						
1	Difficulties in securing useful project historical data					
2	Thorough identification and agreement on all remaining deliverables					
Team challenges						
3	Loss of team functionality as some members complete their tasks					
4	Loss of interest in tasks such as documentations					
5	Attention is diverted as members transition into new projects or other work					
6	Fear of no future work; hence, foot-dragging.					
Customer challenges						
7	Agreement on what outstanding commitments still exist					
8	Absence of a clear hand-off strategy					
9	Change of responsible personnel at critical transition points					
10	Unavailability of key personnel					
	<i>If other, please specify</i>					

OBJECTIVE TWO: STRATEGIES TO ENHANCE THE EXECUTION OF PROJECT CLOSURE

Please indicate the **SIGNIFICANCE** of the strategies to enhance the execution of project closure phase in Road construction in Ghana.

Please use the response scale below:

1 = Not significant 2 = Slightly significant 3 = Moderate 4 = Significant 5 = Very significant

No.	Variables	1	2	3	4	5
1	Effective communication at the closure phase of a project					
2	Continuous monitoring of functionality and quality of deliverables by project manager					
3	Project manager must Improve on supervision at the latter stages of the project					
4	Construction firm must develop and agree on organizational goals for contract closure					
5	Construction firm must standardize the closeout process as much as possible					
6	Provision of incentives and rewards for effective execution of the contract closure phase					
	<i>If other, please specify</i>					