UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

FACTORS AFFECTING SUCCESS OF PUBLIC SECTOR CONSTRUCTION PROJECT: PERSPECTIVE OF CONTRUCTION FIRMS IN SEKONDI TAKORADI METROPOLIS

FRANKLIN BEKWAW EKPAH

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DECEMBER, 2016

DECLARATION

STUDENT'S DECLARATION

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

Signature: …….....……

Date: …….....……

SUPERVISOR'S DECLARATION

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

Dr. Kheni Nongiba Alkanam

Signature: .....……

Date: …….....

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DEDICATION

This dissertation is first and foremost dedicated to the Almighty God, for protecting me throughout all my years of formal education and for making this Masters programme a reality. I also dedicate this dissertation to my children, Ekpah-Kwasi, Yankey, Ackah-Kpoley and Bonyah.

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ABSTRACT

The successful execution of Construction projects is often undermined by many factors such as poor project team coordination, delays, and cost overruns resulting in diverse effects such as tying down the clients‟ capital, and project abandonment. The aim of this study was to identify factors affecting the success of district assembly construction projects in the Sekondi-Takoradi Metropolis and recommend interventions to enhance the success of assembly projects. The specific objectives of the study included; to identify constraints to the success of construction projects in the Sekondi-Takoradi Metropolitan Assembly, to identify the enabling factors that enhance the success of construction projects in the Sekondi-Takoradi Metropolitan Assembly and to make recommendations for enhancing project success in the Sekondi-Takoradi Metropolis. The study adopted a quantitative approach involving empirical data obtained from the administration of structured questionnaires to a random sample of 56 registered D1K1 and D2K2 construction firms in Sekondi-Takoradi Metropolis-Ghana. The findings of the study suggest that the key constraints to project success could be categorized into five (5) main themes; namely: Financing-related issues, political-related issues, market forces-related issues, project-related issues and bidding-related issues. The study also indicated that the factors that enhance the success of public construction projects of the studied firms are leadership skills of site managers, adoption of motivation system, adequate scheduling and material management, use of competent/skilled and experienced supervisor/workmen and effective collaboration of project participants. It is recommended that contractors take cognizance of these factors to achieve success in construction projects.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Construction project, an element of infrastructure development, is a key driver of economic growth of a country. In countless ways, the pace of economic growth of any nation can be measured by the development of physical infrastructures such as buildings, roads and bridges (Takim & Akintoye, 2002). The construction industry accounts for about 10% of the world‟s gross domestic product and provides 7% of global employment, Fiona (2007). According to Chitkara (2004), the construction industry in many countries accounts for 6-9% of the Gross Domestic Product (GDP); and according to Bhimaraya (2001), it reaches up to 10% of the GDP of most countries. Currently, the construction industry‟s share of GDP and contribution to growth are 8.9% and 1.0% respectively in Ghana (ISSER, 2007). Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion. The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability (ISSER, 2007). The finished product in any industry requires satisfying a certain standard to provide customer satisfaction and value for money. In the construction industry, achieving quality of the finished product is no less than in any other industry (Chan & Tam, 2000).

A number of studies have been conducted to examine factors impacting on project success in developing countries. Faridi and El-Sayegh (2006) reported that shortage of skilled manpower, poor supervision and poor site management, unsuitable leadership, shortage and breakdown of equipment among others contribute to construction delays in the United Arab Emirates. Hanson, Mbachu and Nkando (2003) examined causes of client dissatisfaction in the South African building industry and found conflict, poor workmanship and incompetence of contractors to be among the factors which would negatively impact on project success. Mbachu and Nkando (2007) established that quality and attitude to service is one of the key factors constraining successful project delivery in South Africa. The performance of contractors in Zambia is apparently below expectation; it is not uncommon to learn of local projects that have not been completed or significantly delayed. This poor performance of many local contractors has huge implications in terms of their competitiveness (Zulu & Chileshe, 2008).

The above challenges notwithstanding, the industry has a major prospect since the Government of Ghana has been enjoying some support from donor agencies and developed nations. The oil find in the Western Region of Ghana is also expected to bring improvement in the economy and that is expected to boost construction activities. More roads need to be constructed or rehabilitated. Educational institutions at all levels require improvement in their infrastructural facilities in the form of new construction or maintenance to ensure quality education. It is therefore imperative that government funded construction projects are managed efficiently and effectively in order to reap the desired national benefits. Project managers and all stakeholders must work towards the minimization or avoidance of non-completion on time.

A construction project is acknowledged as successful when it is completed on time, within budget, and in accordance with specification and in accordance to stakeholder‟s satisfaction (Takim & Akintoye, 2002). This dissertation basically looks at factors affecting success of construction projects supervised by the Sekondi-Takoradi Metropolitan Assembly (S.T.M.A).

The success of construction projects has been discussed by many authors, who have not agreed on a single method to measure success in a project. However, Morris and Hough (1987) suggested three different measures to recognize if a project is successful or not. Firstly, they mentioned the project functionality which means that the project should function technically and financially. Secondly, the authors proposed a second measure about the management of the project, which indicates whether the project meets the budget and schedule targets. Finally, the project should be evaluated depending on the performance of the contractors which analyze whether they provide services that benefit the project. On the other hand, many other authors measure the success of a construction project assessing the time performance, cost performance and the final quality of the project, Chan et al. (2004). Therefore, there is not a unique way of determining success in a project; however, project success is a critical issue to be considered since it has either positive or negative impacts on every economy.

1.2 Statement of the Problem

The construction industry is one of the largest job creators in developing countries and has become highly competitive with the advent of globalization (Nguyen, Ogunlana & Lan, 2004). In Ghana, the construction industry, especially government funded projects, are beleaguered with various problems such as delays and cost overruns

resulting in project abandonment (Frimpong, Oluwoye & Crawford, 2003; Addo, 2015). The most serious indication being that it sends wrong signals to foreign donors thereby slowing down the national growth. Some contractors also lose profit and incur debts as a result of increased costs in overheads and tied-up capital. The procurement law passed on 31st December, 2003 (Procurement Act 2003) (Kotoka, 2012) was to guarantee that public procurement is carried out in an unbiased, clear as well as non-discriminatory manner. Tender Committees for various entities are to ensure that the cost of variations on Government Contracts do not exceed 15% of the Original Contract Sum. Monitoring Teams at the Regional, Metropolitan, Municipal and District levels have also been established to ensure that government projects get value for money.

Despite the serious efforts being made by the Government of Ghana to improve upon project success, projects delays and cost overruns still remain endemic in Ghana. According to Frimpong et al. (2003) and Addo (2015), most construction projects in Ghana have been bedeviled by construction delays and subsequent cost overruns. Addo (2015) indicated that these problems have resulted in litigations and payment of huge judgment debts that have serious effects on the construction industry and the nation's economy at large. It is therefore imperative that an investigation is carried out into the factors affecting success of construction projects in the Metropolitan/Municipal/District Assemblies so as to determine an optimal approach to enhance success of construction projects in the country.

1.3 Aim and Objectives of the Study

The aim of this research is to explore the factors affecting the success of district assembly construction projects in the Sekondi-Takoradi Metropolis and recommend interventions to enhance the success of assembly projects.

The specific objectives of the study are to:

- identify constraints to the success of construction projects in the Sekondi-Takoradi Metropolitan Assembly;
- identify the enabling factors that enhance the success of construction projects in the Sekondi-Takoradi Metropolitan Assembly; and
- make recommendations for enhancing project success in the Sekondi-Takoradi Metropolis.

1.4 Research Questions

The following are the questions the researcher intends to find answers to in order to come out with authentic and reliable document for the use of stakeholders in the construction project industry.

- What are the factors constraining the success of public construction projects?
- What are the factors that enhance the success of public construction projects?
- What will be the recommended measures to enhance success of construction projects in Sekondi-Takoradi Metropolis?

1.5 Significance of the Study

The findings and recommendations of the study will be of immense benefit to project stakeholders, especially Consultants, Clients and Contractors and all others who are involved in the implementation of Construction Projects to ascertain the factors that affect success of Construction Projects. It will therefore help the Stakeholders to put in measures that will enhance successful delivery of Construction Projects. The study will serve as reliable information to Government and the Academia. It will help Government in shaping procurement policies to aid smooth completion of projects. This study will also serve as an academic material to Students (Graduates and Undergraduates) and Institutions that study Project/Construction Management. Finally, the study will serve as a source of relevant information for further studies on related topics.

1.6 Scope of the Study

The study focused on the Construction Industry in Ghana and examined the factors affecting public sector construction projects under the care of S.T.M.A. Sekondi-Takoradi Metropolis was chosen because it is one of the major metropolises in Ghana where contractors and construction activities are highly concentrated (Kheni & Ackon, 2015).

1.7 Limitations of the Study

While being focused on specific class of contractors, the research is not able to provide generalization regarding the construction industry as a whole. This is the main limitation of this study since the conclusions cannot be applied to other classes in the Metropolis or provide information concerning success factors of project management.

Even though sample representativeness was addressed in a coherent way by distributing the questionnaires to a wide range of firms within the geographical location, age, and other characteristics it is still possible to question whether this sample can represent the construction industry of Sekondi-Takoradi Metropolis. First of all, any sample cannot precisely describe all the features of entire population. Secondly, there is always a probability to receive „uninformed response" (Saunders, Lewis & Thornhill, 2007), which are questionnaires filled in not by managers themselves but by their assistants or other managers in the company who are not competent in the area.

Quantitative approach in research strategy will not allow the researchers" to explore the area at the same depth as qualitative research techniques (Saunders et al., 2007). Therefore data analysis will not be able to answer certain type of questions, for example those related to the reasons of one factor dominating the other.

1.8 Organisation of the Study

The content of each of the chapters are as follows: **Chapter one** describes the research overview, problem of the study as well as the objectives. It also indicates the assumptions, limitations and the significance of the study. **Chapter two** is the literature review section of the dissertation which tackles general information and ideas that are relevant to the research area from articles and journals. **Chapter three** outlines the research methodology which deals with the study design; data requirement and sources; data collection tools and methods. **Chapter four** covers the discussion and analysis part. It contains data findings and the analysis on causes of project failures and the techniques for improving the project success; the correlation between the responses of respondents

on the rating of the factors affecting completion of STMA construction projects. **Chapter five** contains the conclusion of the study, findings and recommendations. The following page introduces the literature review.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, a search was conducted to review the works of people relevant to the topic under study. The search was done from related journals, books, newspapers, and the internet. The chapter was organized under the following main sections; overview of construction projects, procurement of construction projects, factors affecting the success of construction projects and strategies for ensuring success of construction projects.

2.1 Overview of Construction Projects

There has been a profound change in the construction projects and its practice over the past years. The customer-focused marketplace and fierce competitive service positioning have demanded attention to performance improvement and value addition in delivery. One major method in which contemporary societies produce new value is through project construction which creates bodily assets that can then be used to facilitate the achievement of social and economic ends (Winch, 2002). The creation of such assets which include schools, hospitals, and roads is most of the time undertaken by governments to be able to attain targets set towards the improvements of conditions in various sections of their countries (Ampadu-Asiamah & Ampadu-Asiamah, 2013).

According to Armah (1999), construction is considered unique in Ghana as it is in every country in the world, because it stimulates the development of other sectors of the economy and contributes greatly to the overall growth of gross domestic product. Ampadu-Asiamah and Ampadu-Asiamah (2013) argues that construction has been a key part of administration‟s outlay since Ghana gained independence in 1957. The

government‟s developments plan, vision 2020, spells out plans of making Ghana a middle income country by the year 2020. Provision of infrastructure in the public sectors is prominent in the government‟s plans towards achieving this aim. Public funded construction projects in Ghana are mostly beset with problems like delay, cost overruns, lack of funds in the middle of the project implementation and mismanagement of funds at various stages of the project‟s implementation. These according to Armah (1999), can be attributed to economic difficulties within Ghana, the nature of the construction industry in Ghana and the manner in which construction projects are managed. There is however the need to identify causes of these problems in order to reduce the reoccurrence.

A project is well-defined (Elbeltagi, 2009) whether or not construction, by the succeeding features: A well-defined objective, definite tasks to be done, a well-defined commencement and completion, and resources being expended. Dikmen, Birgonul and Arikan (2004), in their view lined up the goals of a building project as follows: *to accomplish the building within the stated time; to finish within the budget; and to complete in agreement with technical as well as administrative specifications*.

The aim of every building project is to construct something. What distinguish the building industry from other industries is that its schemes are large, constructed on-site, and usually distinctive. Time, money, labor, equipment, as well as materials are all examples of resources that are expended by the project. Elbeltagi (2009) further indicated that, construction projects begin with a specified objective recognised by the client and completed by the project team. As the team instigates to design, estimate, and plan out the project, the members study more about the project than was recognised when the objective was first recognised.

Client‟s budget in construction projects represents the maximum expenditure on the project he is prepared to spend (Maalinyuur, 2010). Preliminary cost which is normally established before the commencement of the construction process is dependent on the amount of money the client has available for spending on the project and the agreed approximate estimate prepared by the design team. It has become a crucial issue which influences the client‟s choice to engage in the project because it establishes the probable financial commitment prior to final designs and documentation. It also provides the design team with early cost information which influences the design solutions in respect of construction, type of specification and finishes (Ibid). Unfortunately, this preliminary estimate is generally prepared on scanty cost information though its accuracy to a large extent depends on the availability of reliable historical cost data.

Maalinyuur (2010) has also stated that the importance of preliminary estimate cannot be overemphasized as wrong estimates give the project a bad start which can lead to shoddy works and abandonment, hence loss of value for money by prospective clients. Most often than not any client who wants a building erected would want to know his financial commitments upon which the feasibility of the project depends. An initial price estimation which is too high may dismay the employer from continuing further with the project and so the possible interest is lost. The accuracy of this initial estimate is important because it serves as the budget limit for the client base on which planning and probably fund sourcing are done.

Dikmen et al. (2004) give the meaning of planning as trying to expect what will occur in addition to developing means of attaining the set of goals and objectives and make clear that in scheduling thought there are goals to attain in future. The authors

define planning as a practice through which exertions as well as decisions are made to attain the aims at the preferred time in the preferred means. Project preparation has been also well-defined as the procedure of choosing the one technique and order of work to be employed on a project from among all the numerous methods as well as orders in which it could be done, (Callahan, Quackenbush & Rowings, 1992). They also noted that this method supplies complete evidence adopted for time approximation as well as plan; also a standard for project control. Mubarak (2005) advocated that project planning works for numerous roles such as: cost estimating, planning, project control plus safety management.

2.2 Procurement of Construction Projects

Many researchers have identified the importance of procurement factors in construction projects, (Pocock, Liu & Kim, 1997; Pocock, Liu & Tang, 1997; Walker, 1997; Kumaraswamy & Chan, 1999; Walker & Vines, 2000). According to Dissanayaka and Kumaraswamy (1999), the scope of procurement is the framework within which construction is brought about, acquired or obtained. They came out that, two attributes are used to measure this factor; they are procurement method (selection of the organization for the design and construction of the project) and tendering method (procedures adopted for the selection of the project team and in particular the main contractor). Mastermann (1994) classifies project procurement systems into several categories based on the relationship and critical interaction between design and construction responsibilities. The categorization of the various procurement systems are as follows (refer Figure 2.1):

- Separated and Cooperative System
- Integrated System
- Management Oriented System

The different category and sub-classification of construction project procurement systems can be shown in Figure 2.1 below:

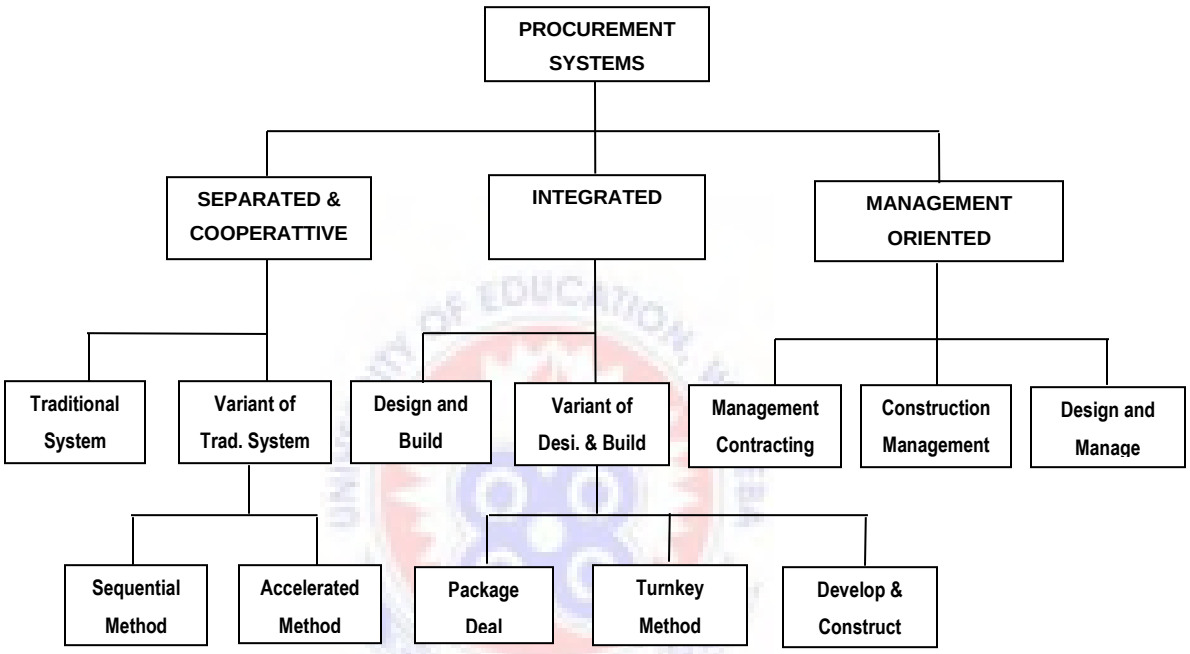

Figure 2.1: Category of Building Procurement Systems

Source: Masterman J. W. E. (1996) Building Procurement Systems: An Introduction

2.2.1 Separated and Cooperative Procurement Systems

Under this system, the responsibilities of designing and construction of the project are separated and are carried out by different independent organizations namely the designers and contractors. It is sometimes called linear or sequential contracting system or multiple responsibilities contracting approach. It is a system where the project development activities that start from feasibility study, preliminary design, documentation to construction and handover, are carried out sequentially one after

another. Traditionally, the complete working drawings or design has to be prepared by the designers before tender and construction activities can take place. It is sub-divided into 2 subcategories– Traditional System and Variants of the Traditional Systems. According to Davis, Love and Baccarini (2008), there are three types of contract under the traditional procurement method. These are:

- *Lump sum contracts* - where the contract sum is determined before construction starts, and the amount is entered in the agreement.
- *Measurement contracts* – where the contract sum is accurately known on completion and after re-measurement to some agreed basis.
- *Cost reimbursement* – where the contract sum is arrived at on the basis of the actual costs of labour, plant and materials, to which is added a fee to cover overheads and profit.

The Variant System, according to Mastermann (1994) is further sub-divided into Sequential Method, and Accelerated Method. Under the sequential method or a single stage tendering approach, the building owner will appoint a team of consultants to act on his behalf to produce construction drawings, specification and tender document and to administer the tendering processes to select a contractor. Once selected and awarded the contract, the contractor will carry out based on the drawings and specification prepared by the client‟s consultants. The accelerated method can be considered as an innovative approach to speed up the selection of contractor and the commencement of construction. The method can be divided into 2 sub-categories i.e. two-stage and negotiated tendering methods. Both methods involve preliminary discussion with selected few contractors, submission of fixed tender and/or cost negotiation.

2.2.2 Integrated Procurement Systems

This system, as the name implies, integrates or combines the responsibilities of design and construction of the project (Ashworth, 2001). Both responsibilities are contracted out to a single contracting organisation. It is also called a parallel or single responsibility procurement system whereby the client will only need to deal with a single organisation for both the designing and constructing the proposed project. In this case, the contractor will have to engage and be responsible for design and construction teams. *Design and build system* falls under this category of project procurement system. Under this system, the client together with his/her consultants will prepare a tender or bidding document that include the project brief and client"s requirements and invite a number of contractors to bid. For the purpose of submitting tenders, the invited contractors will produce their own design, construction and cost proposal. Very often the successful contractor will enter into a contract based on lump sum price and a fixed duration (Ashworth, 2001). The variation or innovation to this mode of project delivery systems includes *Package deal*, *Turnkey* and *Develop and construct*. These systems thus entail the contractor to be responsible for both the design and construction of the project, allow for the early start of construction through the reduction of the pre-tender activities as such they reduce process time.

Package deal or commonly called the "all in" contracting is a type of procurement method where a contractor is given the responsibility for everything that is required and necessary for the design, construction and delivery of the project. Under this system, the services of the contractor will include the preparation of project brief, sketch and final working drawings, getting all the approval from authorities, project financing,

construction, furnishing and commissioning of all equipment and accessories and handing over the project to the client (Mastermann, 1994).

Turnkey contract is an American term for "all in" or package contract. Under this arrangement, a contractor is commissioned to undertake the responsibilities for everything necessary and required for the construction, completion, commissioning and hand over the project. The word "turnkey" means that, upon completion, the client is given the key and he can then enter the project by "turning the key". The contractor will have to do everything from preparing project brief, getting approval, designing, financing, construction, furnishing and decorating to commissioning and handing over completed, cleaned and ready for use project (Allen, as cited in Chehrehpak, Alirezaei & Farmani, 2012).

Develop and construct is another form of the integrated procurement approach which is very much similar to design and build. In this case, the contractor is still given the responsibility for both the design and construction of the project. The difference is that, under this method the client"s design consultants prepare the concept sketches or designs and passed them to the contractor who will develop them and produced the detailed working drawings. The contractor will then construct and complete the project based on what it has developed and produced (Mastermann, 1994).

2.2.3 Management Oriented Procurement Systems

It is a system that gives greater emphasis on the management and integration of the design and construction of projects. Under this system, the management of the design and construction a project is contracted out to a contractor who acts as a management consultant on behalf of the client. The construction itself is commissioned to many

"specialist" or sub-contractors who enter into contract with either the management contractor or the client. This procurement approach was introduced based on the conception that a builder or contractor has more expertise to manage the design and construction of a project (Abdul-Rashid et al., 2006). As management consultant, the appointed contractor does not itself, carry out the design or construction of the project. Its main responsibility is to manage the design and construction by the design consultants and the many specialist contractors, respectively.

There are three types of procurement method that fall under the category of Management Oriented Procurement Systems, namely; Management contracting, Construction management, and Design and manage (Davis et al., 2008). *Management contracting* and *construction management* are forms of "fast-tracking" procurement approach whereby a contractor is contracted and paid a fee to manage, procure and supervise the construction of a project rather than to build the project. The actual construction works are contracted out to many package or specialist contractors. Under these arrangements the management contractor is employed as a construction consultant to be part of the client"s team. The main difference between management contracting and construction management is that in the former, the package contractors (specialist sub-contractors) are in contract with the management contractor. In the latter, the package contractors (specialist sub-contractors) are in contract with the client or building owner (Abdul-Rashid et al., 2006).

Under the *design and manage system*, a single organization or firm is commissioned to be responsible for designing the project and managing its construction. The firm does not carry out the work itself, but it is contracted out to a number of

specialist sub-contractors or package contractors, who enter into contract with the client. A design and manage firm or company is engaged as a consultant for the client and become a member of the project team (Ibid).

2.3 Factors Affecting the Success of Construction Projects

Project success has eluded the construction industry to the point where keeping existing clients has become a battle, let alone attracting new clients (Toor & Ogunlana, 2009). An assumption is made that, if a project is completed on time, within the agreed budget and set quality, referred to as the „golden triangle", then the project is deemed successful. Evidence suggests that this is far from the truth. Hence, the construction industry needs to pay special attention to critical success factors, besides the „golden triangle", if it is to survive the challenges posed by globalization (Toor & Ogunlana, 2009).

Zwikael (2009) believes that the work of construction companies is project-oriented, that is, it is unique and has a definite start and finish point. This requires the use of project management tools and techniques as opposed to conventional management techniques. He added that proper usage of project management tools within the project life cycle ensures smooth execution of activities. The project life cycle is the framework upon which the project is carried out. The project manager acts as a single point of contact responsible for harnessing identified critical success factors towards achieving project success.

According to Yang, Shen and Ho (2009), the unique nature of projects dictates that critical success factors identified in one industry cannot be directly transferred to other industries. The similarities found in the construction industry in developing countries such as Ghana would make sharing of knowledge easier.

The construction industry is one of the largest job creators in developing countries and has become highly competitive with the advent of globalization (Nguyen, Ogunlana & Lan, 2004). According to Ojiako, Johansen and Greenwood (2008), project success in the construction industry in most developing countries is measured by the „golden triangle" parameters of time, cost and quality. The high number of project failures suggests the existence of underlying critical success factors which have not been identified. This review, therefore, seeks to identify the critical management factors that lead to project success.

In construction management, delay has been one of the factors that affect the success of the construction project. According to Sweis (2013) delays in construction is considered one of the most recurring problems and also has an adverse effect on project success and delivery in terms of time, cost, quality, and safety. As a result, Nega (2008) indicated that delay of construction projects requires an in-depth examination to advance the productivities of the construction project.

Sanders and Eagles (2001) see construction project delay as happening to all kinds of projects whether small or large leading to prolonged time to accomplish all or part of a project. Aibinu and Jagboro (2002) alluded that non-completion of project to the client means loss of income and to the builder, it creates more costs as a result of lengthier work time, labor cost increase as well as higher construction costs.

2.3.1 Availability and Management of Construction Materials

In construction project management, there are at times problems related to managing the flow of materials which can be found in every organization. The efficient management of materials plays a key role in the successful completion or delivery of construction projects. The control of materials is a very important and vital subject for every company and should be handled effectively for the successful completion of a project. Materials account for a big part of products and construction project costs. The cost represented by materials fluctuates and may comprise between 20-50% of the total project cost and sometimes more. Some studies concluded that materials account for around 50-60% of the project cost (Stukhart, 1995; Bernold &Treseler, 1991).

Materials are critical in the operations in every industry since unavailability of materials can stop production. In addition, unavailability of materials when needed can affect productivity, cause delays and possible suspension of activities until the required material is available. Unavailability of materials is not the only aspect that can cause problems. Excessive quantities of materials could also create serious problems to managers. Storage of materials can increase the costs of production and the total cost of any project. When there are limited areas available for storage, the managers have to find other alternatives to store the materials until they are needed. Some of these alternatives might require re-handling of materials, which will increase the costs associated with them. Provisions should be taken to handle and store the materials adequately when they are received. Special attention should be given to the flow of materials once they are procured from suppliers.

It is obvious that materials should be obtained at the lowest cost possible to provide savings to the company (Damodara, 1999). In the late 1970's, construction companies experienced an increase in costs and a decrease in productivity. Owners of these companies thought that these increases in cost were due to inflation and economic problems. Further research concluded that these companies were not using their resources efficiently and that the decrease in productivity was also attributable to poor management (Stukhart, 1995). Material management has been an issue of concern in the construction industry. 40% of the time lost on site can be attributed to bad management, lack of materials when needed, poor identification of materials and inadequate storage (Baldwin, Thorpe & Alkaabi, 1994).

The need for an effective materials planning system becomes mandatory. Some companies have increased the efficiency of their activities in order to remain competitive and secure future work. Many other firms have reduced overheads and undertaken productivity improvement strategies. Considerable improvement and cost savings would seem possible through enhanced materials management. Timely availability of materials and systems are vital to successful construction. Better material management practices could increase efficiency in operations and reduce overall cost. Top management is paying more attention to material management because of material shortages, high interest rates, rising prices of materials, and competition. There is a growing awareness in the construction industry that material management needs to be addressed as a comprehensive integrated management activity for companies to stay in business.

According to Majid and McCaffer (1998), material management is difficult in urban areas and at sites of restricted surroundings. The overall performance of construction projects in terms triple constraints and productivity are affected by improper handling of construction materials. In most cases subcontractors may be entitled for claims for unavailability of materials required to perform a specific task by the crews. The benefit of successful materials management and control is production improvements and avoiding delay in the construction (Spillane, 2011). Construction professionals have to proactively focus on the materials management process, identifiable reasons that have a significant impact on the project cost. Materials if provided to subcontractors can significantly increase productivity of the project.

The benefits of materials management systems are significant. With the takeoff of material, management process begins to produce materials cost. Material management functions are normally performed on a fragmented basis with proper communication and no clearly established responsibilities are assigned to the client, contractor and engineer (Kasim, Anumba & Dainty, 2005).

2.3.2 Inadequate Planning

Normally, when a project is conceived, the client appoints a consultant to carry out the planning and subsequent supervision of the construction. It is this stage that major problems that lead to project failure are created by lack of experience; acts of omission, pressure form the client to quickly package the deal, deliberate assumption and a host of other extraneous factors. Variation and to some extent fluctuations have their origin from these. In most cases, the project design is not comprehensive and detailed enough to cover all that the client intended for the project. What the consultants present to the client

in term of financial plan is a summary, leaving out important details that will have serious financial implication during construction, and at most time the information may be too late to be accommodated financially. The axiom that when you fail to plan, you plan to fail is true in project planning.

Poor planning for implementation – the consultants of any building project is usually saddled with the responsibility of carrying out proper planning before the execution of the project. Inadequate time plan, resource plan, equipment supply plan, inter – linking not anticipated and poor organization planning can come into the project and cause a setback for the implementation (Al-Nasseri, Widén & Aulin, 2013).

Under estimation of building project quantities and rate is also closely related to poor planning for implementation. That is where the consultant‟s schedule of rates is not current with the dynamics of the market economy; this becomes a major problem for the client and the contractor who is eager to finish the project under the given and approved rates.

Again, lack of co-ordination and directional flow which is sometimes attributed to a lack of team spirit, can usually result into internal conflicts, poor human resources management and labor strikes. The consultant is a coordinator of any project. He plays a critical role and can as well determine its success or failure. The consultant is equally the bridge between the client and the contractor, interpreting the contract conditions and as well giving the client the required professional advice.

Construction projects generally are seen as dynamics, and inevitably changes and problems are bound to be encountered. It is the responsibility of the consultant to deal promptly and effectively with every problem and disagreement between the contactor and

the client that may arise. The over-runs of some conflicts and problems in any project are always as a result of lack of cohesion on the various professionals who constitutes the body of the consultant (Gustavsson, 2013).

2.3.3 Change in Project Design

Designers play a vital role as their work involves from inception to completion on a project. Chan and Kumaraswamy (1997) considered that design team-related factors consist of design team experience, project design complexity, and mistakes/delays in producing design documents. There is a general consensus that one of the major causes of project successful delivery is due to the designers incomplete drawings, particularly inconsistent detailing of drawings. Investigations also revealed several instances of incorrect dimensions of walls, and openings, differences in dimensions between plans and sections, inadequate detailing of difficult locations and inconsistent detailing (Salleh, 2009). This can also affect consistent delivery if designers rush to tender in a short time to meet bid dates, with no proper feasibility studies, and without detailed briefing from clients. This at times results in many contracts being bid with incomplete information and thereby requiring extensive changes during construction. The rush to complete designs also creates problems of coordination between the architectural, structural, mechanical, sanitary, electrical and other factors. Personnel of project teams is another problem that can affect successful construction delivery-this is as a result of inadequate technical staff in the construction industry and a shortage of design professionals some of which are not always involved in the original design works (Salleh, 2009).

2.3.4 Poor Contract Management

Project management has evolved over the past couple decades as researchers and practitioners have attempted to identify the causes of project failure and the various factors that lead to project success. Traditional project management skills were developed from the requirements of construction and defense industries to plan, control and manage large and complex „tangible" projects (Morris, 1994; Bourne & Walker, 2004). From these arose the so-called "hard" concepts of project success criteria in the form of controlling and managing schedule, cost and scope. Project Management can also be seen as being about managing change (Cleland, 1995; Bourne & Walker, 2004) and project managers should consider themselves as change agents adding to the Project Management role an additional focus on so-called „soft" aspects of relationship management (Bourne & Walker, 2004). Moreover, Bourne and Walker (2004) indicated that in most organizations, project managers are accountable for the successful delivery of complete projects. Increasingly, this success depends on project managers" processing and utilizing skills and competencies that may initially appear contradictory.

A successful project manager must demonstrate flexibility and competency in many area, hard and soft skills, introverted and reflective, extroverted and social behavior. Many of the initiatives for improving the practice and profession of project management have been focused on enhancing techniques and method associated with skills that included effective management of time, cost and scope. Hendrickson and Au (1989) pointed out that the management of construction project requires knowledge of modern management as well as an understanding of the design and construction process. Specifically, project management in construction encompasses a set of objectives which may be accomplished by implementing a series of operations subject to resources

constraints. Subsequently, the functions of project management for construction generally include the following:

- Specification of project objectives and plans including delineation of scope, budgeting scheduling, setting performance requirements and selecting project participants.
- Maximization of efficient resource utilization through procurement of labour, materials and equipment according to the prescribed schedule and plan.
- Implementation of various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process, and
- Development of effective communications and mechanisms for resolving conflicts among the various participants.

Jaselskis and Ashley (1991) suggested that by using the management tools, the project managers would be able to plan and execute their construction projects to maximize the project‟s chances of success. Then, the variables in project management include adequate communication, control mechanisms, feedback capabilities, troubleshooting, coordination effectiveness, decision making effectiveness, monitoring, project organization structure, plan and schedule followed, and related previous management experience (Belout 1998; Chua, Kog & Loh, 1999; Walker & Vines 2000).

A number of attributes will affect this factor, including the communication system, control mechanism, feedback capabilities, planning effort, organization structure, safety and quality assurance program, control of subcontractors‟ works, and finally the overall managerial actions.

2.3.5 Breakdown of Plant & Equipment

According to Abdul-Rahman, Memon and Abd-Karim (2013), equipment resources has an advantage over manpower resource as it can work under adverse circumstances continuously, requires less manpower and other facilities. The selection and utilization of equipment in a project must be an integral part of the total plan. The type and number of the equipment required in any project depends on the nature of the project. It affects significantly on construction cost.

2.3.6 Force Majeure

A force majeure can be seen as an event or circumstance which is beyond the control and without the fault or negligence of the party affected and which by the exercise of reasonable diligence the party affected was unable to prevent provided that event or circumstance is limited to the following: (a) riot, war, invasion, act of foreign enemies, hostilities (whether war be declared or not) acts of terrorism, civil war, rebellion, revolution, insurrection of military or usurped power, requisition or compulsory acquisition by any governmental or competent authority; (b) ionising radiation or contamination, radio activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive assembly or nuclear component; (c) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds; (d) earthquakes, flood, fire or other physical natural disaster, but excluding weather conditions regardless of severity; and (e) strikes at national level or industrial disputes at a national level, or strike or industrial disputes by labour not employed by the affected party, its

subcontractors or its suppliers and which affect an essential portion of the works but excluding any industrial dispute which is specific to the performance of the works or this contract (Malbon & Bishop, 2015).

The list of events to be included in this type of definition is a matter for negotiation between the parties. In general, it is preferable for a project company to have a short list of events as the contractor is the party most likely to be affected by force majeure events. This is because in construction project works there are times that the events that trigger the operative clauses are not clearly defined. This then gives the common law meaning of the term force majeure not certain and is open to interpretation of the courts. It is therefore in the interests of both parties in the construction project to ensure that the term force majeure is clearly defined (Chileshe & Danso-Berko, 2010).

Some of the appropriate risk allocation factors under construction project agreements which should be fundamental in the negotiations between the project company and its contractors are categorized as; (a) Risks within the control of the project company, (b) Risks within the control of the contractor and (c) Risks outside the control of both parties. It is much preferred therefore that the project company should define all the force majeure events as can be anticipated as all the events in an exhaustive list set out in the contract. In this manner, both parties would be aware of which events are force majeure events and which are not. Clearly, defined force majeure events make the administration of the contract and, in particular, the mechanism within the contract for dealing with force majeure events and disputes .simpler and more effective to solve (Chileshe & Danso-Berko, 2010).

2.3.7 Poor Communication

Communication in every human setting is so important that it is one of the key and essential issues that must be well handled in executing construction projects. Communication plays an important role in leading, integrating people, and taking decisions to make a project a success. There must be shared project vision, where the project manager identifies the interests of all relevant stakeholders and ensures that there is buy-in to the project (Yang, Shen & Ho, 2009). According to Zwikael (2009), once the project objectives are set and the scope clarified, there must be constant update as the project progresses. Progress on activities assigned to individuals or groups needs to be monitored with a view to achieving overall goals. These updates must be communicated to the relevant parties. Newton (2005) believes that a detailed communication plan is necessary for the effective dissemination of information. To this end, frequent project meetings are necessary.

Apart from consulting with the community, local direct involvement is a key element for project success. Given the relatively high unemployment rates in South Africa, consideration must be given to local residents. This could include sourcing materials from local suppliers and employing local liaison between the project manager and the community (Maalinyuur, 2010). Finally, proper handover procedures need to be developed. This is an important consideration, given that the construction industry is being increasingly viewed as a service industry (Karna, Junnonen & Sorvala, 2009).

2.3.8 Inflation

Adamson (1996) viewed inflation as the frequency of increase in overall price level in a country. This then cause money to lose its value. Inflation therefore can upsurge the costs of construction. This can happen if the degree of inflation increases beyond the anticipated level throughout the period of construction, then the existing cost estimation will be surpassed (Nega, 2008). Clearly, it is one of the factors contributing to the unsuccessful delivery of most construction projects and also contributes to the shooting-up of the cost anticipated earlier. Construction projects estimation of cost are produced at an exact time and the prices employed within are pertinent only for that time as well as for short near future since they are subject to market forces. The influence of inflation can result to loss of profit to contractor or the builder and higher cost overrun to the owner of the building.

2.3.9 Site Ground Conditions

Griffith and Watson (2004) indicated that the condition of a construction site is so important because it is a contributing factor that can restrict the inflow of materials, equipment and labourers to site, especially when the ground condition is not good. The overall effect of this is that it affects the speed of construction delivery. Most at times, this is as a result of poor investigation of the site soil conditions. This has to do with either there are standing buildings or not, what the state of the soil beneath is, the control of the soil below ground level and the travel length of the water table to the ground level. In contributing to the site ground condition, the study of Nega (2008) indicated that unforeseen sub-surface situations can, at times, necessitate necessary restructure of

projects at great cost. Variations in surface ground conditions can result to difficulties for moving machinery as well as materials around the site, and in undertaking excavations in addition to laying foundations. It can as well upsurge costs and add to the building time required.

Frimpong, Oluwoye and Crawford (2003) also stated in their study that ground site challenges and unforeseen geological conditions on construction projects result to the non-completion of most construction projects. During periods where there are challenges in arriving at the work site, in the nature of faulty surfacing of roads and thinness of the road negatively affect construction completion, many of which are disregarded by the preliminary assessment.

Wong, Fong and Wong (2006) revealed that the principal contributors to project delay were improper site co-ordination and management of the electrical and mechanical installations, lack of timely decision making of the client, and defects identified during the fire services inspection by local authorities, site management and supervision, workload of the project staff, the procedures for equipment approval and working experience of the parties.

2.3.10 Physical Environmental Conditions

Environmental factor or condition as a factor affecting construction project success is well noted by researchers (Chua et al., 1999; Walker & Vines, 2000). Akinsola et al. (1997) further described „„environment““ as all external influences on the construction process, including social, political, and technical systems. The attributes used to measure this factor are economic environment, social environment, political environment, physical environment, industrial relation environment, and level of

technology advanced. The construction environment according to Youker (1992) is the aggregate of surrounding things, conditions or influences. Thus, the environment includes virtually everything outside the project; its technology, the nature of its products, customer and competitors, its geographical setting, and the economic, political and even metrological climate in which it must operate.

The physical environment within which a construction project is sited may impact considerably on its development as construction projects are always affected by physical influences. The geographical location of a project, ground conditions and weather patterns are the most common examples of physical influences. They are unpredictable and as such management actions have not been able to prevent their occurrence. Baiden-Ammissah (2000), argues that managers of construction works will take significant consideration of physical effects when planning the management strategies to avoid extremes which can take advantage of available resources.

A review of the results of hundreds of World Bank projects by Youker (1992) indicated that success or failure of construction projects often depends on factors in the general environment outside the control of the project manager. The review pointed out that in the management of projects, a good understanding of the different features and factors within the environment that can have an effect on the project is essential. This can form a basis for analysis for overcoming or mitigating their effects on project performance. According to Salleh (2009), the environmental related factors in construction projects are inclement weather, or socioeconomic conditions such as materials shortage or late delivery, labour shortage, price fluctuation, inconsistent policies and slow government permits.

2.4 Classification of Factors Affecting the Success of Construction Projects

According to Buertey, Miezah and Kumi (2014), the factors that affects successful delivery of construction projects can be put under three such as; (1) excusable delays with compensation; (2) excusable delays without compensation; (3) non-excusable delays. They indicated that, excusable delays are simply delays at no fault to the contractor; these are delays that are not attributable to the contractor‟s actions or inactions. These delays are caused by unforeseen events and the events are beyond the control of the contractor. Examples of excusable delays are design problems, owner-initiated changes, unusually severe weather, fire, natural disasters and other force majeure conditions.

Excusable delays justify an extension of a contract‟s deadline, and mostly classified as compensation events (Baram & George, 2000). With the event of excusable delays, time extension is owed to the contractor where time extension is required as a result of affected scheduled time and an owner cannot recover liquidated or actual damages that may have been sustained because of a delay (MECF, 2016). The excusable delays are further classified into compensable and non-compensable delays.

According to the standard of contract, compensable delays are delays where the contractor is owed money to compensate for the loss due to the delay. Excusable delays with compensation are caused by the client‟s actions or inactions. Examples of excusable delays with compensation are as directed changes, changed conditions, failure to fulfill contractual responsibilities or conditions constituting constructive changes by the client. Non-compensable delays are delays where a time extension is owed but no compensation is owed to the contractor. In non-compensable delays neither the client nor the contractor

is deemed responsible (Buertey, Miezah & Kumi, 2014). Concurrent delay typically becomes a much contested issue on those projects that experience more than one of these types of delays. The vast majority of projects that are finished late fall into this category.

Concurrent delay is experienced on a project when two or more separate delay events occur during the same time period and each independently affects the completion date (Baram & George, 2000). In analyzing concurrent delays, each delay is assessed separately and its impact on other activities and the project duration is calculated.

The following are guidelines for classifying these kinds of concurrent delays:

- In the event of excusable and non-excusable delays occurring concurrently, a time extension is granted to the contractor;
- If excusable with compensation and excusable without compensation delays occur concurrently, the contractor is entitled to time extension, but not to damages;
- If two excusable with compensation delays occur concurrently, the contractor is entitled to both time extension and damages (Majid & McCaffer, 1998).

If these basic delay guidelines are not addressed in the contract documents, it is certain that discussions regarding concurrent combinations of these guidelines will be both heated and protracted. In relation to the causes of construction project delay, Odeh and Battaineh (2002) identified the causes of construction delays as owner interference, inadequate contractor experience, financing and payments, labour productivity, slow decision making, and improper planning.

2.5 Failure of Projects in the Construction Industry

In view of the fact that some factors affecting projects may have negative consequences leading to project failure, it is necessary to review literature on project failure.

Pinto and Mantel (1990) indicated that it is difficult to explain exactly what constitutes a failed project, but according to Project Management Institute (2004) it posited that the success or failure of a project is measured by the difference between what is expected of a project both during and after its completion and the actual observed performance of the project when it is put to use. That is to say that, when the expectations of the client and other stakeholders in terms of cost, completion time and quality are not matched by the actual construction by contractors and other project teams, the project is adjudged a failure. The search for factors that can affect the success or failure of an infrastructure project has caught the attention of many scholars and construction practitioners over the years. This is because the ability to develop a set of project failure factors could aid the project team and contractors alike in evaluating their projects, if not objectively at least systematically. Several studies relevant to the identification of factors contributing to project failures for infrastructure projects are found in the literature. The following gives a summary of some of the studies to establish a theoretical framework for testing the theory empirically.

Project success has therefore been defined as the degree to which goals and objectives of a project are met (Frederikslust, 1978). However, the inability of projects to meet these goals and objectives is project failure. A project is adjudged a failure when it fails to meet the tripartite criteria of time, budget and quality, even though recent studies

have added such criteria as sustainability, stakeholder management, communication, and risk management issues (Ikediashi, Ogunlana & Alotaibi, 2014).

In the studies of Kaming et al. (1997), some of the factors responsible for construction project failure for 31 high-rise projects in Indonesia and discovered cost and time overruns are the most critical. However, cost overruns were more severe than time overruns. The study listed material cost increases due to inflation, inaccurate material estimation, and the degree of complexity as the major sub-factors driving cost overruns, while design changes, poor labour productivity, inadequate planning, and resource shortages drive time overruns.

The work of Clough and Sears (2000) carried out a study that discovered the construction/contracting business possesses the second highest failure rate of any business, exceeded only by restaurants. Contributions to construction industry failure include but are not exclusive to the following; lack of engineering skills, lack of a strong financial capacity, inadequate cash flow plan, poor budgetary control system and defective bidding system (Ebeid, 2009).

In a study of large construction projects in developing countries, Nguyen, Ogunlana and Lan (2004) organised the top ranking problems/failure factors into four major categories: incompetent designers and contractors, poor estimation and change management, social and technological issues, and improper techniques and tools. In related research, Sambasivan and Soon (2007) identified 28 delay (project failure) factors and categorised them into client-related, contractor-related, consultant-related, material-related, labour and equipment-related, contract-related, and external factors. However, studies by Alaghbari et al. (2007) and Sweis et al. (2008) found that financial-related

factors are some of the most critical factors that can trigger project failure in terms of delay. This is because incessant increases in construction cost by contractors during construction often lead to delays in payment and subsequent interruption of cash flow mechanisms, thereby subjecting sub-contractors and suppliers to financial difficulties.

Enshassi, Al-Hallaq and Mohamed (2006) studied causes of contractor's business failure in developing countries. Factors were grouped together to only five main groups which are:

- Managerial: managerial factors are mainly related to experience, decisions, procurement, control, productivity, communication and claims factors
- Financial: financial factors are mainly related to loans, cash flow, profit, expenditures, material wastages, equipment cost and usage, and variation order
- Business growth: Business growth factors are mainly related to managerial development, size of projects, type of work and number of projects
- Business environment: Business environment factors are mainly related to regulations, awarding, economy, owner involvement and accounting practices
- Political: Political factors are mainly related to delay, closure, lack of resource, high cost of materials, banks policy and dealing with suppliers.

The results showed that political group is the most important influencing factor on contractor's business failure in Palestine. Otherwise, Business growth and Business environment had been ranked as the lowest influencing factors on failure.

Toor and Ogunlana (2008) examined the problems causing delays and failures in major construction projects in Thailand using a questionnaire survey and interviews. Factors such as a lack of resources, poor contractor management, and a shortage of labour

were the top rated. Other factors, such as design delays, planning and scheduling deficiencies, change orders and a contractor's financial difficulties were also significant, causing project failures in Thailand according to the study.

According to Ebeid (2009), a shortage of professional and adequately skilled personnel at all levels of management and field operations amongst clients, contractors and consultants in the construction industry was identified as a cause of project failures. They reported shortages in the supply of engineers, surveyors, equipment operators, and other skilled workers hamper the ability of project stakeholders to undertake large volumes of work with acceptable standards of quality workmanship (Datta, 2000; Materu, 2000; Belassi & Tukel, 1996).

The study of Kazaz, Ulubeyli and Tuncbilekli (2012) used a questionnaire survey to examine the causes and reasons for delays and failures in construction projects in Turkey, shows that out of 34 factors used for the survey, design and material changes, delay of payments and cash flow difficulties by contractors were found to be the three most significant factors. They however stated that the intrinsic factors are largely perceived to be reasons for project delays and failures, it is apparent from the studies that there is relatively less coverage of factors contributing to project failures.

2.6 Strategies for Ensuring Success of Construction Projects

In their studies on factors influencing the performance of construction projects in Akure, Nigeria, Babalola et al. (2015) indicated that prompt payment of contractors‟ progress payment, and minimization of change orders during construction avoid delays. Also, consultants full commitment to monitoring project progress ensures that the work is delivered according to specifications and satisfactory quality; meeting owner needs and

expectation within the project budget and stipulated time. They further indicated assert that, continuous coordination and relationship between project participants are required through the project life cycle in order to ensure project performance.

Odesola and Idoro (2014) indicate factors for improving construction project delivery to include;

- increased workers' participation in decision making
- improving artisan's skills through on-the job–training
- motivating construction workers
- Improved supervision
- Adequate project planning and scheduling
- Recruiting and engaging competent supervisors
- Improved health and safety policies
- Obtaining workers' assurances before scheduling them for work, especially on weekends
- Promoting good working relationship among workers
- Avoiding the use of over-aged artisans.

Robels (2014) asserted that early involvement of the contractor/ project manager at the design phase, motivation, effective communication, involvement of craftsmen in decision making, training of craftsmen, proper material procurement schedule; clear and daily task assignment and coordination between crews improve labour productivity in the construction industry. Abdul-Kadir et al. (2005) also indicated that construction project improvement techniques include: financial incentives (e.g. bonuses), fringe benefits, employee promotion, job enrichment (e.g. variety in assigning tasks), job enlargement

(e.g. greater scope and responsibility), worker participation, skill enhancement, worker involvement in decision making, communication (consistently, openly and mutual trust), working condition improvement, training of employees, quality of supervision, recognition (award, bonus, pay rise), punishment (e.g. withholding salary increases), zero defects (do it right the first time), and harmonisation.

Lamka et al. (2014) asserted that labour productivity can be improved through the following techniques; motivation, competent supervision, good labour relations, and adequate planning and scheduling of project activities. Kuykendall (2007) and Hickson and Ellis (2014) opined that use of competent supervisors, motivation, and provision of safety environment/amenities influence project success.

Enshassi et al (2007) and Gundecha (2012) indicated the following techniques for improving project performance; motivation, effective supervision, use of skilled /experienced labour, good labour relations, and adequate planning and scheduling of project activities. McCord (2010) also asserts that good relationship among project participants provides harmonious working environment necessary for higher productivity and project success.

Hwang and Lim (2013) carried out a survey questionnaire with the main aim of determining the CSFs of a construction project in Singapore. The authors indicated that Adequacy of funding, Adequacy of plans and specifications, Adequate planning and control techniques, Budget updates, Constructability, Contractual motivation/ incentives, Economic risks, Owner's involvement and frequent feedback, Owner's commitment to established schedules and budget were the most critical success factors that can help prevent cost overruns; in order of significance.

Arcila (2012) postulated that:

- Project manager competency,
- Contractor's competency,
- Client commitment to getting the job done,
- Good relationship between project parties ,
- Accuracy of plans and initial information,
- Adequate specifications ,
- Early involvement of the contractor,
- Accurate selection of form of contract,
- Client's involvement and feedback,
- Availability of funding,
- Initial identification of all the risks,
- Architect's competencies are CSFs that influence cost performance in construction projects in the UK.

Samson and Lema (2002), Cheung, Suen and Cheung (2004) and Iyer and Jha (2005) assert that the use of competent/skilled and experienced workmen influence project success. Iyer and Jha (2005) and Windapo, Odediran and Akintona (2015) studies found that leadership skill is one of the top factors necessary for construction project success. According to Kuykendall (2007), Enshassi et al. (2007), Gundecha (2012), and Mistry and Bhatt (2013), when tools and equipment are properly scheduled for work, project schedule requirement are well communicated to workmen, and also when the essential and desired site materials characteristics of right quality, right quantity, right

time and reasonable cost are effectively implemented on site, greatly influence construction project success.

Enshassi, Mohamed and Abushaban (2009) recommended that project owners must work collaboratively with contractors and facilitate regular payments in order to overcome delays, disputes and claims; they further indicated that project participants should actively have their input in the process of decision-making; also continuous coordination and relationship between project participants are required through the project life cycle in order to solve problems and develop project performance.

Similarly, Iyer and Jha (2005) identified many factors as having influence on project cost performance, these include: project manager's competence, top management support, project manager's coordinating and leadership skills, monitoring and feedback by the participants, decision- making, coordination among project participants, owners' competence, social condition, economic condition, and climatic condition. Coordination among project participants, however, was identified as the most significant of all the factors, having maximum influence on cost performance.

2.7 Conceptual Framework and Hypothesis

Construction Project Improvement Techniques Elements

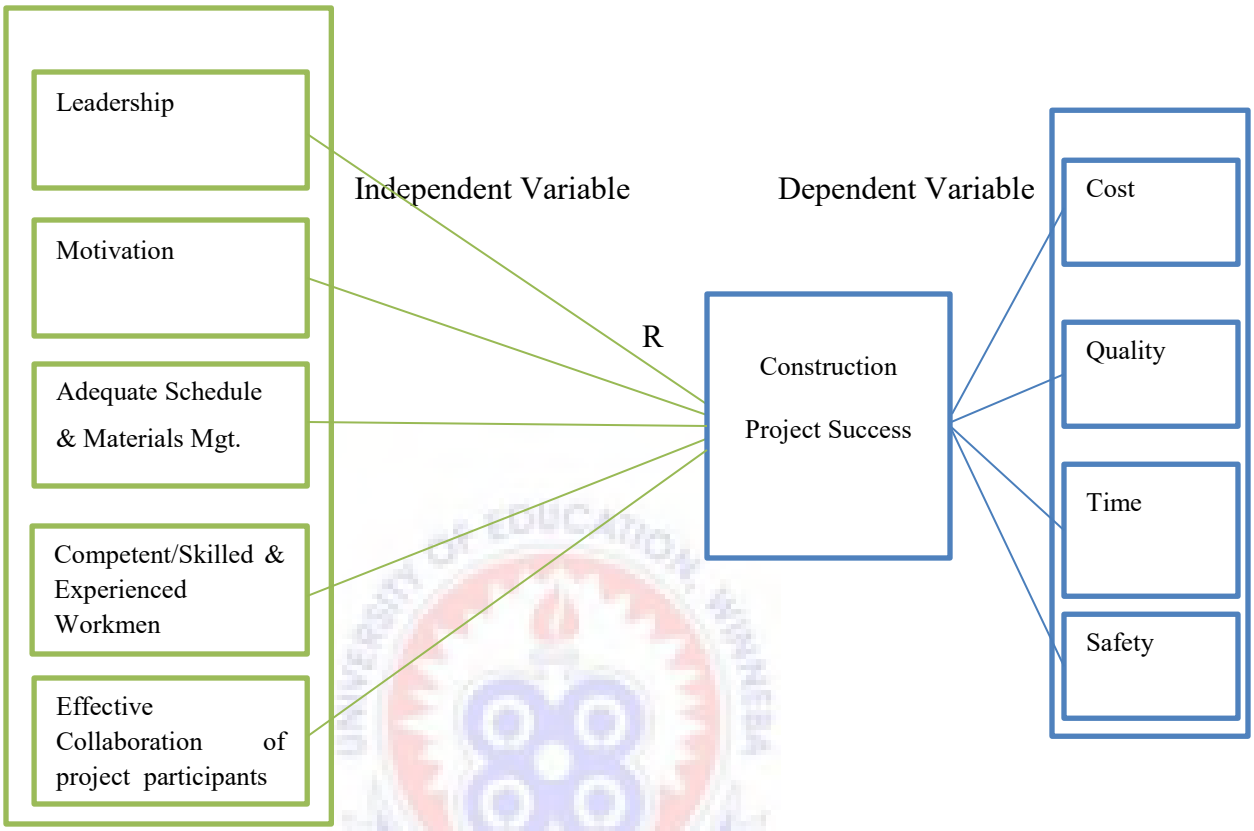

Figure 2.2: Conceptual Framework for the Study

Hypotheses

The following hypotheses will guide the study;

H1. Leadership skills of site managers/supervisors influence construction project success (Iyer & Jha, 2005; Windapo, 2015).

H2. Motivation (Incentives/Bonuses and training) of workmen influences construction project success ((Enshassi et al., 2007; Odesola & Idoro, 2014; Robels, 2014; Lamka et al., 2014; Hickson & Ellis, 2014; Thomas & Sudhakumar, 2014; Babalola et al., 2015)

H3. Adequate schedule and materials management influence construction project success (Kuykendall, 2007; Enshassi et al., 2007; Gundecha, 2012; Mistry et al., 2013; Odesola & Idoro, 2014)

H4. Use of skilled and experienced workmen influence construction project success (Samson & Lema, 2002; Cheung et al., 2004; Iyer & Jha, 2005; Babalola et al., 2015).

H5. Effective collaboration of project participants influences construction project success (Arcila, 2012; McCord, 2010; Babalola et al., 2015)

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter presents the general approach employed in gathering information for the answering of the study questions. It shows the research design of the study, the research population, sampling size and sampling techniques, data collection procedure as well as the validity and reliability of the data collected. The chapter also delves into the data analysis methods and the ethical considerations of the study.

3.1 Research Design

Various researchers view the term research design differently and one classical example is Hellriegel, Jackson and Slocum (2002) who defined research design as a plan, structure and strategy of investigating intended to obtain answers to one or more questions. According to them research design includes everything the researcher will do during the period of project work from data collection through data analysis to report writing and to report preparation and submission.

Again, Collis and Hussey (2003) define research design as, "the science (and art) of planning procedures for conducting studies so as to get the most valid findings". There are two basic approaches to research; quantitative approach and the qualitative approach (Kothari, 2009). Qualitative Research is collecting, analyzing, and interpreting data by observing what people do and say (Anderson, 2006) whereas quantitative research is an inquiry into an identified problem, based on testing a theory composed of variables, measured with numbers, and analyzed using statistical techniques (Creswell, 2009). This study adopts a quantitative approach, as the key information gathering techniques

employed in this study was questionnaires. The questionnaire survey was also used to enable the researcher to ask a set of questions to a large number of respondents concerning pertinent issues under the study.

3.2 Population of the Study

According to Mugenda and Mugenda, (2003) population is the entire group of individuals, events or objects with some common observable characteristics from which information related to a particular study can be obtained. Jacobs (2012) defined a population as the larger group from which individuals are selected to participate in a study. A "population" consists of all the subjects you want to study (Yount, 2006). The population for this study covered D1K1 and D2K2 classifications of contractors registered with the Sekondi-Takoradi Metropolitan Assembly (S.T.M.A"s) development office. The main reason for using this category of construction firms is that they undertake complex and large construction works, in which project success measurement is an integral part for them to achieve the main objective of the project in terms of cost, time and quality (Owusu, 2014). Also, Sekondi-Takoradi Metropolis was selected because it is one of the major metropolis in Ghana where most contractors and construction activities are highly concentrated (Owusuaa, 2012).

3.3 Sampling Technique

Sampling is the process of selecting a group of subjects for a study in such a way that the individuals represent the larger group from which they were selected. According to Yount (2006), the purpose is to gather data about the population in order to make an

inference that can be generalized to the population. This representative portion of a population is called a sample.

The study employed simple random sampling technique. According to Sekaran and Bougie (2013), this sampling method guarantees every member of the population equal chance of being selected into the sample. It has advantage of high generalization of findings, and is the most efficient among all probability designs (Sekaran & Bougie, 2013).

3.4 Sampling Frame

The study drew its sampling frame from the D1K1 and D2K2 construction firms registered with (S.T.M.A, 2015). The sampling frame for the study comprised 65 registered D1K1 and D2K2 construction firms.

3.5 Sample Size Determination

The sample size of the study population was determined using Yamane (1967) formular for finite populations (Odesola & Idoro, 2014).

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

Where N=Population size

n=Sample size

e=Level of precision

A 95% confidence level and P=0.05. The sample size was thus derived as follows:-

Yamane (1967) $n = \frac{N}{\{1+N(e)^2\}}$

$$n = \frac{65}{\{1+65(0.05)^2\}}$$

Sample size = 56 D1K1 and D2K2 construction firms

3.6 Data Collection

Questionnaires were used to solicit primary data from the contractors. Questionnaires were also employed by the following authors (Enshassi et al., 2009; Amade et al., 2015; Babalola et al., 2015) in their studies on factors affecting construction project performance. The questionnaires were divided into four sections (Section A-D). Section A covered the background of the respondents. Section B focused on the factors that militate against the success of construction projects. Section C focused on construction project performance improvement techniques on construction sites. Section D focused on the construction project performance improvement technique outcome of the contractors.

Questionnaires were designed to be answered using a five-point likert scale with responses ranging from „1" to „5". In section B, the respondents were required to indicate the extent of influence of the 21 identified constraining factors on public sector construction projects using the definitions: **1= Very low influence, 2= Low influence, 3=Moderate influence, 4= High influence, and 5= Very High influence.**

In section (C) and (D), the respondents were implored to respond to the techniques for improving public sector construction projects; and the construction project success of the selected firms using the definitions: **5 = Very Strongly, 4 = Strongly, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree.**

3.7 Pre-test

The instruments for data collection were tested in five selected construction firms in Sekondi. This was done to test the research questions for their ability to generate the needed responses for the study (Willar, 2012). The feedback from the respondents indicated that the average time required to complete the questionnaire was appropriate; the statements used were easy to read and understand. Furthermore, accuracy and efficiency in filling out the questionnaire was adequate.

3.8 Content Validity

To ensure that the proposed survey instrument was well worded and understood; thus, content validity, the questionnaire was given to experts on the subject; a lecturer well versed in construction management studies and a project management consultant to check the comprehensiveness of the items under each construct. This helped to improve the content, eliminate ambiguity and ease understanding.

3.9 Reliability

Reliability is the extent to which a measurement procedure yields the same answer whenever it is carried out. The internal consistency of the set of measurement items refers to the degree to which items in the set are homogenous (Badri, 2007).

Cronbach‟s Coefficient (α) was calculated to estimate the internal consistency reliability of the measurement scale. Cronbach‟s alpha is widely used in social science research to estimate the internal consistency of reliability of a measurement scale. The recommended minimum threshold of Cronbach‟s alpha value is 0.7 (Nunnally, 1978 in Pallant, 2007).

3.10 Administration of the Questionnaires

The questionnaire used for the study was personally administered using two trained field assistants. This method, though expensive, was favoured because it afforded the field assistants the opportunity to clarify issues that might arise from the respondents with respect to the contents of the questionnaire.

3.11 Method of Data Analysis

The data was analyzed and interpreted by using Statistical Package for Social Science (SPSS) version 16. In addition to descriptive statistics such as tables and charts, the following inferential statistical tools; Factor Analysis and Multiple Regression technique were employed (Amade et al., 2015).

3.11.1 Factor Analysis

Factor analysis is a method of quantitative multivariate analysis with the main aim of representing the interrelationships between a set of continuously measured variables (usually represented by their interrelationships) by a number of underlying linearly independent reference variables called factors (Hardcastle, Edwards & Akintoye, 2006; Pallant, 2007; Guar & Guar, 2009). The method seeks to collapse various variables into a few dimensions of interrelated attributes called principal components. The Eigenvalue determines the principal components, which are orthogonally varimax, and are rotated to obtain more evenly distributed factor loadings within the components. The factor analytical approach was adopted to assess the most significant constraining factors that affect the success of public sector construction project.

3.12 Correlation Analysis and Multiple Regressions Analysis

3.12.1 Correlation Technique

The major statistical measure of the relationship was the correlation coefficient. Correlation analysis is primarily concerned with finding out whether a relationship exists and determining its magnitude and direction (Saunders et al., 2007; Hair et al., 2006). The Pearson‟s Product Moment Correlation Coefficient was computed to determine the relationship between the five (5) construction project improvement techniques and public sector construction project success.

3.12.2 Multiple Linear Regressions

Multiple linear regressions was applied to find out the effect of relationship between the identified construction project improvement techniques and project success; to predict the relationship between the variables involved in the mediation. Hair et al. (2006); Saunders et al. (2007) and Sekaran (2003) describe the multiple regressions as a statistical technique used to predict the variance in a single dependent variable caused by the effect of more than one independent variable. In other words, correlation indicates the existence of the relationship between the variables while the multiple regressions specify the most crucial variables for the relationship. Stepwise Multiple Regression analysis was used to determine the importance of each independent variable and its contribution to the mathematical equation.

3.13 Ethical Issues

In the data collection, ethical issues were taken into consideration, in that respondents were made fully aware of the purpose of the study and also assured that individual respondents and firms were not going to be identified; all the responses would be analyzed together (Bailey, 2007).

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULTS

This chapter is made up of two sections. These sections have been designed to meet the objective requirements of the study. The section one describes the background of the respondent and the companies surveyed. Constraints to the success of construction projects and the enabling factors that enhance the success of construction projects of the respondents firms are analyzed in the second section of the chapter. The data is analyzed and interpreted by using Statistical Package for Social Science (SPSS) version16. Descriptive statistics, Factor Analysis, Pearson Product Correlation Coefficient and Linear Multiple Regression Analysis were used. All statistical tests were computed at 2-tailed level of significance (Sekaran, 2005). The upper level of statistical significance for hypothesis testing was set at 5%.

4.1 Response Rate

Of the 56 questionnaires distributed, 45 responses were received. Three of these responses were however, ineligible due to inadequate completion of the survey instrument; therefore the responses rate was 42 (74%) as shown in Table 4.1. This high response rate was achieved as a result of frequent visit to the respondents‟ firms. Non-response bias was addressed by carrying out a t-test by comparing the characteristics of early and late respondents (considered as surrogate for non-respondents) (McKeiver & Gadenne, 2005). The characteristics compared included; number of years of experience of respondents, types of works undertaken, age of business, and factors affecting their public sector project delivery. The results of the test indicated no significant differences

between the two groups. The data was therefore considered to have a low non-response bias and was adequate for the purpose of this research.

Table 4.1: Statistical Data of Questionnaires Sent and Received

Response Rate	No.	Percentage
Total Questionnaire Sent	56	100
Total Questionnaires Received	45	81%
Invalid Data	3	7%
Response rate	**42**	**74%**

4.2 Profile of the Respondents

The demographic characteristics of the respondents provided descriptive information on qualification, and designation, number of years of experience of respondents, types of works undertaken, age of business.

4.2.1 Respondents' Designation

Table 4.2 indicates that thirty eight (38) of the respondents representing 90 percent were site managers/supervisors while four (4) of the respondents representing 10 percent were managing directors. This implies that majority of the respondents were site managers/supervisors. This may be attributable to the fact that in most construction businesses in Ghana, it is the site manager/supervisor who has the responsibility to manage the overall performance of the project; hence, have adequate comprehension of the questions.

Table 4.2: Respondents' Designation

Position	Frequency	Percentage
Site Manager/Supervisor	38	90%
Managing Director	4	10%
Total	**42**	**100%**

4.2.2 Respondents' Professional Qualification

Table 4.3 below, provides the professional qualification of the respondents. The results indicate that most of the respondents had Bachelors and HND level of education. Out of the 42 respondents, twenty six (26) representing 62 percent had Bachelors level of education; ten (10) representing 24 percent had HND level of education; while six (6) representing 14 percent had Masters Level of education. This implies that the respondents possess adequate qualification required of the industry. It is also suggestive that their higher educational background helped them had a better understanding of the questions; thus making the data reliable.

Table 4.3: Respondents' Professional Qualification

Educational Qualification	Frequency	Percentage
HND	10	24%
BSC	26	62%
MASTERS	6	14%
Total	**42**	**100%**

4.2.3 Respondents Working Experience

Table 4.4 below indicates that majority of the respondents, thus, thirty (30) accounting for 71percent had experience over 10 years. The responses to the questions could therefore be considered as true and accurate reflections of the state of affairs in the construction businesses in view of the positions and years of experience of the respondents.

Table 4.4: Respondents' Working Experience

Experience	Frequency	Percentage
Under 5years	2	5%
5 – 10 years	10	24%
Above 10 less than15 years	25	59%
15 – 20 years	5	12%
Total	**42**	**100%**

4.2.4 Years of the Construction Businesses of the Respondents

Table 4.5, indicates that majority of the respondents firms, thus, thirty four (34) accounting for 81 percent were beyond the age of 10. Most of the respondent companies were therefore stable businesses with relatively little threat of exit from the sector.

Table 4.5: Age of the Businesses

Age of the Businesses	Frequency	Percentage
Under 5years	2	5%
5 – 10 years	6	14%
Above 10 less than15 years	14	33%
Above 15 years	20	48%
Total	**42**	**100%**

4.2.5 Type of Construction Work Undertaken by Respondents

Fig.4.1 shows that six (6) of the respondents accounting for 14 percent undertake civil works while majority, thus, thirty six (36) of the respondents accounting for 86 percent undertake building works. This implies that the construction businesses mostly undertook building construction.

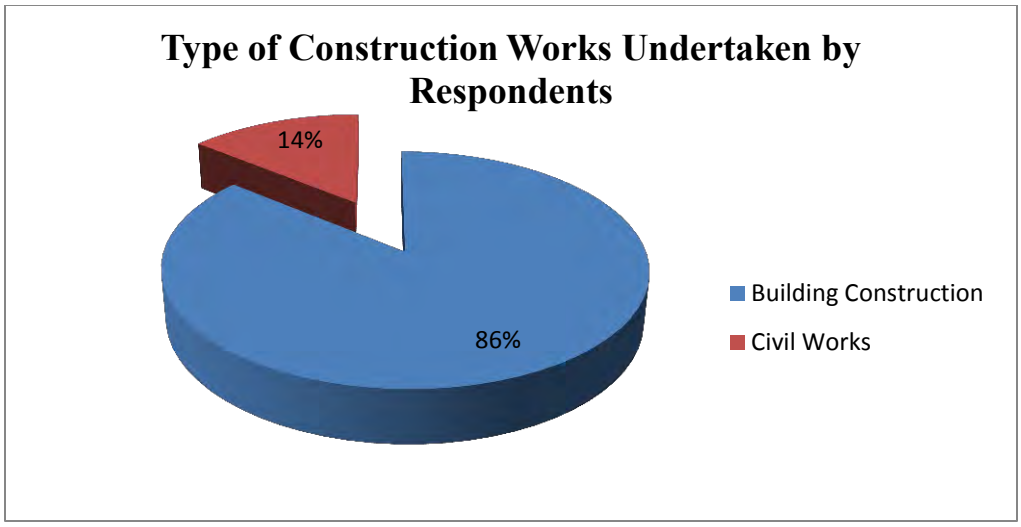

Figure 4.1: Type of Construction Work Undertaken by Respondents

4.2.6 Number of Employees in the Respondents' Firms

Table 4.6 indicates the number of employees in the respondents" respective firms. 57 percent of the respondents indicated that they have 21 up to 40 employees, 14 percent indicated that they have up to 20 employees whereas 29 percent said they have over 40 employees in their respective firms.

Table 4.6: Number of Employees in the Respondents' Firms

Age of the Businesses	Frequency	Percentage
10- 20 employees	6	14%
21 – 40 employees	24	57%
41 – 60 employees	10	24%
Above 60employees	2	5%
Total	**42**	**100%**

4.3 Critical Constraints to Public Sector Project Delivery

Factor analysis was used to establish the underlying interrelations existing among the variables identified from literature and field experts. This makes it possible to reduce the variables to a more meaningful framework to support effective management and policy decisions (Amoah, Ahadzie & Dansoh, 2011).

The rotated component matrix of constraining factors affecting public sector construction project of the surveyed respondents is presented in Table 4.7. In the preliminary analysis, the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy which measures the degree to which variables are measuring a common concept, achieved a high of 0.786. Furthermore, Bartlett‟s test of sphericity, which tests the hypothesis that the variables are collinear, was significant at the $p < 0.01$ level (see Table 4.7). The communalities achieved were also 0.70 or higher (see Table 4.8). Hence, PCA was found to be a suitable data reduction technique. PCA was conducted and five (5) components were extracted using Kaiser‟s criterion, which retains only those components whose variance is greater than 1.0.

A Varimax rotation was applied to the components to ensure the components were uncorrelated. Observation of the correlation matrix of the constraining factors indicate that they all have significant correlation at the 5% level, indicating that the identified factors are highly relevant to the constrains affecting public sector project delivery; hence, there would be no need to eliminate any of the variables for the principal component analysis. These five (5) components explained almost 80.66% of the variation in the data (see Table 4.9). Table 4.9 shows the extracted components and the variables most strongly correlated to each one. With respect to component 1, Delayed payment to

contractor emerged highest with a factor loading of (0.825). This is followed by Weak financial condition of the contractor (0.853); Limited cash flow of the client (government) (0.820); Excessive approval procedures (0.816); delayed payment to labour (0.788); Low labour wage (0.761); as well as Poor budget progress monitoring (0.750) follow in that order. The combined effect of the above constraining variables on public construction project success is 45.38%.

With respect to component 2, Table 4.9 shows that Weak government policy emerged highest with a factor loading of (0.859). This is followed by Economic instability (0.839); Tight project schedule (0.678), Corrupt practices (0.657) while High taxes imposed on imported materials (0.620) follow in that order. The combined effect of the constraining variables on public construction project success is 13.94%.

Table 4.9 further indicates that Escalation of construction materials prices emerged highest in component 3 with a factor loading of (0.938). This is followed by High interest rate charged by banks (0.921); High inflation and price fluctuation (0.871) as well as Increased in labour cost (0.646) follow in that order. The combined effect of the constraining variables on public construction project success is 7.77%.

Table 4.9 shows that Drawings and specifications alteration during execution emerged highest in component 4 with a factor loading of (0.920); this was followed by Quality inspection delay (0.907) as well as Working within a confined space (0.708) follow in that order. The combined effect of the constraining variables on public construction project success is 6.96%.

Table 4.9 indicates that Aggressive competition emerged highest with a factor loading of (0.771) while Government emphasizes on low construction cost rather than quality (0.736) follow in that order. The combined effect of the constraining variables on public construction project success is 6.62%. Given that most of the variables in factor 1 are directly linked to financing- related issues, the researcher decided to name this factor as financing-related. A cursory look at factor 2 shows that the variables are linked to political related issues, hence, the researcher named it political-related. Similarly, the variables in factor 3 are directly linked to market forces- related issues; therefore, this factor is labelled market forces-related. The variables in factor 4 are directly linked to the project related issues, the researcher labelled this component project-related. The variables in factor 5 are directly linked to bidding- related issues, the researcher labelled this component bidding-related issue. The results therefore reveal that the constraining factors affecting the public construction project success in Sekondi-Takoradi could be categorised into five (5) main themes; namely: Financing-related, political-related, market forces-related, and project-related and bidding-related issues.

Table 4.7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.786
Bartlett's Test of Sphericity	Approx. Chi-Square	2.870E3
	Df	210
	Sig.	.000

Table 4.8: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumula-tive %	Total	% of Variance	Cumula-tive %
1	9.529	45.377	45.377	9.529	45.377	45.377	5.776	27.505	27.505
2	2.927	13.939	59.316	2.927	13.939	59.316	3.648	17.371	44.876
3	1.632	7.772	67.088	1.632	7.772	67.088	3.331	15.863	60.739
4	1.462	6.961	74.049	1.462	6.961	74.049	2.665	12.689	73.428
5	1.389	6.616	80.664	1.389	6.616	80.664	1.520	7.237	80.664
6	.743	3.540	84.204						
7	.657	3.127	87.331						
8	.466	2.220	89.551						
9	.455	2.169	91.720						
10	.330	1.573	93.292						
11	.299	1.422	94.715						
12	.278	1.326	96.040						
13	.195	.928	96.968						
14	.168	.798	97.766						
15	.136	.648	98.414						
16	.089	.421	98.835						
17	.077	.365	99.201						
18	.061	.288	99.489						
19	.056	.268	99.757						
20	.035	.168	99.925						
21	.016	.075	100.000						

Table 4.9: Summary of Results of Factor Loading

Constraining Factors Affecting Project Success	Communalities Extracted	Rotated Component Matrix[a] Component 1	2	3	4	5
Delayed Payment to Contractor.	.843	.865				
Weak Financial Condition of the contractor	.767	.853				
Excessive approval procedures	.765	.820				
Delayed payment to labour	.825	.816				
Limited cash flow of the gov.	.653	.788				
Low labour wage	.784	.762				
Poor budget progress monitoring	.848	.750				
Weak government policy	.836		.859			
Economic instability	.842		.839			
Tight project schedule	.840		.678			
Corrupt practices	.633		.657			
High taxes impose on imported mat	.928		.620			
Escalation of const. material prices	.939			.938		
High interest rate charged by banks	.873			.921		
High inflation & price fluctuation	.751			.871		
Increased in labour cost	.937			.646		
Drawings and specifications alteration	.824				.920	
Quality inspection delay	.812				.907	
Working within a confined space	.640				.708	
Aggressive competition	.781					.771
Gov. emphasizes on low const. cost	.768					.736

4.4 Critical Factors for Improving Public Sector Construction Project in Sekondi-Takoradi

4.4.1 Item Analysis of Critical Factors for Improving Public Sector Construction Project

Detailed item analysis evaluates the assignment of items to the scales in an instrument. This is done by correlating each item with each scale. The corrected item-total correlation (i.e., the correlation of each item with the sum of all other items) (Hair et al., 2006) are used to determine if an item belongs to the scale as assigned, belong to another scale, or should be eliminated. If an item does not correlate highly with any of the scales, it is eliminated (Hickson & Ellis, 2014). The value of the item to scale correlations should be greater than 0.50, those lower than 0.50 do not share enough variance with the rest of the items in that scale. For that reason, item(s) should be deleted from the scale (Amade et al., 2015). Imbeah (2012) used this method to evaluate the assignment of items to scale in developing their instrument for measuring the critical factors of quality management.

Table 4.10 shows the correlation matrix for the seven scales or measures of the constructs. All the items had high correlations with the scales to which they were assigned, hence were judged to be appropriately assigned to their scale.

Table 4.10: Detailed Item Analysis (Item to Scale Correlation)

Construct	Item Numbers					
	1	2	3	4	5	6
Leadership	0.874	0.782	0.867	0.718	0.804	------
Motivation	0.854	0.902	0.821	0.822	0.836	0.786
Adequate Scheduling & material management	0.780	0.896	0.728	0.825	0.785	------
Use of Skilled/Experienced workers	0.783	0.852	0.874	0.726	0.852	0.758
Effective Collaboration of project participants	0.878	0.843	0.749	0.694	0.889	-------

Note: Item number in this table is the same as the question number in the instrument;
The symbol "--" means not available

4.5 Construct Validity

A measure has construct validity if it measures the theoretical construct that it was designed to measure. This analysis is done using SPSS.16.0 to perform factor analysis (Principal component analysis) for each construct. In performing factor analysis each measure was assumed to be a separate construct. In this analysis (shown in table 4.11) each factor must be one dimensional that is to say that, all items in each scale should load on to one factor**.** When items in a scale or construct load on more than one factor, the rotated (varimax) solution was examined.

It can be observed from table 4.11 that all the five (5) project improvement factors (PIF) or constructs and the project improvement techniques had one factor component. This means that, the items in the five project improvement constructs and project success outcome factors formed or load unto a single factor. From table 4.11, it is also clear that all the items had high factor loadings greater than the suggested threshold of 0.5. The results of the factor analysis indicate a high level of construct validity of the measure.

Table 4.11: Summary of the factor matrix for each measure

Construct	KMO	Item loading Range	Eigen Value	Percentage of variance Explained	Bartlett's Test of Sphericity	Sig.
Leadership	0.768	0.742 - 0.855	3.518	74.260	238.274	0.00
Motivation	0.788	0.826 - 0.942	2.137	78.426	234.362	0.00
Adequate Scheduling & material management	0.823	0.724 - 0.848	3.424	82.748	167.654	0.00
Use of competent / skilled & experienced workmen	0.850	0.684 - 0.862	3.685	77.001	189.125	0.00
Effective collaboration of project participants	0.729	0.792- 0.914	4.232	76.518	512.345	0.00

4.6 Reliability Analysis

The internal consistency of the set of measurement items refers to the degree to which items in the set are homogenous (Badri, 2007). The scale of Cronbach"s coefficient alpha value is the most widely used statistics to determine the reliability of a measurement; from Table 4.11, the reliability coefficient of the independent variables (PIV) ranges from 0.76 to 0.89. The alpha value of the dependent variable (Project Success Variable) is 0.82. This means that all the Cronbach"s alpha values of the measurement used exceeded the cut-off threshold of 0.7 (Pallant, 2007). Impliedly, all the measurement used has acceptable internal consistency.

Table 4.12: Reliability Analysis

Variable	Cronbach's Alpha	No. of items
Leadership Skills	0.89	5
Motivation	0.82	6
Adequate Scheduling & material management	0.79	5
Use of competent/skilled & experienced workmen	0.87	6
Effective collaboration of project participants	0.82	5

4.7 Relationship between Construction Project Improvement Variables (CPIVS) and Project Success Variable (PSV)

In this section the results of the inferential statistical techniques used in the study are presented. In other to test the research hypotheses, the Pearson Product Moment Correlation Coefficient was calculated as well as Stepwise Multiple Regression.

4.7.1 The Results of Correlation Analysis

Connection between two variables is detected by correlation and it determines the proportionality extent of two variable values (Sekaran, 2005). The results of correlation test between the public construction project improvement variables and project success outcome is presented in Table 4.13. Level of significance to test the relationship was 0.01. The results indicated that all the construction project improvement variables (CPIV) are strongly, positively correlated with the project success variable (PSV). The strongest relationship exists between project success variable and Leadership (**r = 0.868, p < 0.01**), Motivation (**r = 0.824, p < 0.01**), Adequate scheduling/materials management (**r = 0.785, p < 0.01),** Use of Competent/skill and experienced workmen (**r = 0.762, p < 0.01**), followed by Effective collaboration (**r = 0.745, p < 0.01**).

There was a strong criterion-related validity since the bivariate correlations of the construction project improvement variables (CPIV) and project success variable (PSV) were statistically significant. The highest correlation coefficients value is 0.868 (Table 4.13) which is below the cut off threshold of 0.90 for the collinearity problem (Hair et al., 2006).

Table 4.13: Association between Project Improvement Variables and Project Success Variable

	LD	MOT	AS/M	CSW	EC
PSV Pearson Correlation	0.868**	0.824**	0.785**	0.762**	0.745**
Sig (2 – tailed)	0.000	0.000	0.000	0.000	0.000

**Correlation is significant at the 0.01 level (2 – tailed).

PSV: Project success variable; **LD**: Leadership; **MOT**: Motivation: **AS/M**: Adequate scheduling and material management; **CSW**: Competent and skill workmen; **EC**: Effective collaboration

4.7.2 Multiple Regression Analysis

The results of the correlations indicated existence of a relationship between the project improvement variables (PIV) and construction project success variable (CPS) but did not identify the most crucial contributory variables for this relationship. To achieve this objective, Stepwise Multiple Regression technique was used to determine the importance of each independent variable and its contribution to the mathematical equation. The multiple regressions was conducted between project improvement variables namely (leadership, motivation, adequate scheduling/materials management, use of competent/skilled and experienced workmen, and effective collaboration of project participants) as they were the independent variables, and the project success variable (dependent variable).

Table 4.14 displays the results of the multiple linear regression with standardized betas (β) and t – statistics (t) which are both indicative of the relative importance of each variable contained in the model. Multicollinearity was assessed through examining the variance inflation factors (VIFs) of each variable and the Tolerance level. The values of VIF and Tolerance showed no multicollinearity between the variables as their values were less than 10 for VIF and more than 0.10 for tolerance level as suggested by Pallant (2011). Another way to check it is by using the coefficient of correlation; the highest in this research is 0.868, which is below the cut- off threshold of 0.90 for the collinearity problem (Hair et al., 2006). Therefore, multicollinearity was not an issue.

Table 4.14 revealed that the R^2 adjusted value was 0.842. This indicates that the five factors proposed in the framework (leadership, motivation, adequate scheduling/materials management, use of competent/skilled and experienced workmen, and effective collaboration of project participants) together can explain 84.2 percent of the variation in construction project success variable (CPS) as a dependent variable. The F- ratio was 206.720 ($p < 0.01$). This indicates that the regression of project success variable on the constructs assessed, expressed through the adjusted R- squared is statistically significant.

The beta coefficient, which is the standardized regression coefficient, is used as a direct comparison between coefficients as to their relative explanatory power of the dependent variable (Hair et al., 2006). The variable leadership element made the greatest impact towards achieving the project success (dependent variable) with a beta coefficient of **0.326** ($p < 0.05$). The variable use of motivation made the second largest influence of the dependent variable with a beta coefficient of **0.242** ($p < 0.05$). The variable adequate

scheduling/materials management made the third largest contribution to the dependent variable with a beta coefficient of **0.182** ($p < 0.05$). Use of skilled/experienced workmen made the fourth acceptable contribution to the dependent variable with a beta coefficient of **0.174** ($p < 0.05$), while effective collaboration of project participants made the fifth acceptable contribution to the dependent variable with a beta coefficient of **0.124** ($p < 0.05$).

The results further showed that normality was also not a problem as is evident from P-P Plot of regression standardized residual; all points lie in a reasonably straight line from bottom left to top right.

The variables account for 84.2 percent of the variance in project success variable. This implies that other unexplored construction project improvement factors could account for the 15.8 percent of variance in project success.

Table 4.14: Model: Summary of Multiple Regression Analysis between CPIV variables and CPS variable.

Dependent Variable	R	R-Square	Adjusted R Square	Standard Error
Labour Productivity	0.908	0.854	**0.842**	0.964

Analysis of Variance

	Sum of squares	df	Mean square	F	Significance
Regression	229.297	4	78.664	**69.760**	**0.000**
Residual	32.284	38	0.908		
Total	261.581	42			

Standard Coefficients

	Beta	T	Significance	Collinearity Statistics	
				Tolerance	VIF
Leadership	**0.326**	5.394	**0.000**	0.415	3.252
Motivation	**0.242**	4.346	**0.000**	0.332	3.045
Adequate Schedule & Materials Management	**0.182**	3.324	**0.000**	0.360	2.805
Skilled/Experienced workmen	**0.174**	3.315	**0.000**	0.326	2.643
Effective collaboration	**0.124**	2.280	**0.000**	0.278	3.476

4.8 Discussion of Results of the Study

This section presents the discussion of the results of the study. The results are discussed with regard to the objectives of the study and also in the context of the literature reviewed in chapter 2, to further explain the findings of the factors affecting the public sector construction project success, as perceived by contractors in Sekondi-Takoradi; which is regarded to have relevance to other regions in Ghana.

4.9 Critical Constraint Factors Affecting Public Construction Project Success

It is clear from the factor analysis that the underlying construct of the critical constraints affecting public construction project success are directly linked to five (5) main themes; namely: Financing-related issues, political-related, market forces-related, project-related, and bidding-related issues.

4.9.1 Financing-related Issues

The result of the study indicated that in the opinion of the respondents; financing related issues is the most important factor affecting the success of public construction project of the respondents. This is attributable to delayed payment to contractors, weak financial condition of the contractor, excessive approval procedures, delayed payment to labour, and limited cash flow of the government, low labour wages, and poor budget progress monitoring.

This finding is in line with similar studies in Ghana and other developing countries. According to Frimpong et al. (2003), financial problems are the main factors that cause delay and cost overruns in the construction of groundwater projects in Ghana. Amoa-Abban and Allotey (2014) also indicated that delayed or non-payment of certified certificates by funding agencies, and limited cash flow of the client were among the factors that inhibit project success of public building projects in Greater Accra. Babalola et al. (2015) and Alinaitwe, Apolot and Tindiwensi (2013) found that financing and delay of progress payment to contractors were among the critical factors affecting the success of public sector construction projects in Nigeria and Uganda respectively.

Public sector projects in developing countries including Ghana are mostly financed either through domestic savings or foreign funding. Studies indicate that the delay in payment for completed work in public sector projects is mostly due to bureaucracy in governments departments, lack of proper documentation, and corruption (Frimpong et al. 2003; Ebeid, 2009; Alinaitwe et al., 2013; CDD-Ghana, 2000; Kenny, 2007; Amoa-Abban & Allotey, 2014).

Amoa-Abban and Allotey (2014) opined that most contractors in Ghana go through a lot of difficulties before they receive payment for work done. This complex bureaucratic process involves checks and re-checking of all certified certificates for completed projects by the various departments so as to avoid financial loss to the state tend to have negative effect on the contractor‟s cash flow. In effect the contractor has no further option than to abandon the site and move in and out of offices in an attempt to get his certificate honoured. This ultimately has a negative effect on the completion time of the project. Failure to provide adequate funding resources to contractors for the job done will make it difficult for the contractors to meet project objectives. According to Alinaitwe et al. (2013) delayed payment to contractors has knock on effects on many activities of the contractors, subcontractors and suppliers.

This finding is further supported by Alaghbari et al. (2007) and Sweis et al. (2008) that financial-related factors are some of the most critical factors that can trigger project failure in terms of delay. This is because incessant delays of progress payment to contractors during construction often lead to delays in payment of labour and subsequent interruption of cash flow mechanisms, thereby subjecting sub-contractors and suppliers to financial difficulties. Regular payment to contractors for work done could go a long way

to influence project success. Also, contractors should manage their financial resources and plan cash flow by utilizing progress payment (Babalola et al., 2015).

4.9.2 Political-related Issues

The result of the study further revealed that in the opinion of the respondents, political-related issues is the second most significant factor negatively affecting public sector construction projects of the respondents. This finding implies that weak government policy, economic instability, fraudulent (corrupt) practices, tight project schedule, and high taxes imposed on imported materials significantly, negatively affect public sector construction projects. This finding is consistent with similar studies in Ghana and other developing countries (Ijigah et al., 2013; Azhar, Farooqui & Ahmed, 2008; Al-Najjar, 2008; Tipli & Ilyasu, 2014; UNRWA, 2006).

In Ghana, if the government/party changes, the policy will therefore change and many of the construction projects will be abandoned. Abandonment of project by government is always present in most developing economies; especially in Africa (Ijigah et al., 2013). Also some of the government officers deliberately delay the approval of interim valuation by the contractors to delay projects that are not beneficial to them (Ijigah et al., 2013).

According to the respondents tight project schedule is one of the factors in the political –related category that negatively affects their project success. This is not surprising because as the country‟s election is approaching there is urgency of the government to execute all projects being undertaking before the election in order to secure political advantage. Also some contractors may have multiple projects at hand with very limited resources to perform them successfully. Tight project schedule without

arranging inputs and proper planning, can lead to hasty and unsystematic work towards the end of the project resulting in the project‟s quality being compromised (Iyer & Jha, 2005). All this haste also leads to a relaxation in quality specification from the government consultants, as they tend to overlook the deviation by the contractor from the agreed technical specification. The contractor on his part tries to save time by adopting shortcuts and bad technical practices (Iyer & Jha, 2005). All these lead to poor quality. This implies that contractors should not increase the number of projects that cannot be performed successfully. In addition, consultants are urged to facilitate and expedite orders delivered to contractors to obtain better time and quality performance and to minimize disputes. Continuation of policies and projects, of past government and transparency in the award of construction contracts should be encouraged in the construction industry.

A more stability in the exchange rate is required to lower the import prices and the production cost of building materials. This requires strengthening of the existing financial policies and regulatory framework. Also, in procurement of a project, segregation of duties and multiple signatories to expenditures will reduce the risk of embezzlement (Mumtaz, Hugh & Hana, 2011).

4.9.3 Market Forces-related Issues

The result of the study revealed that in the opinion of the respondents, market-related issues is the third most significant constraining factors affecting public sector construction projects of the respondents. This finding implies that escalation/inflation of construction materials prices, high interest rate charged by banks, high inflation and price fluctuation and increased in labour cost significantly, negatively affects public sector

construction projects. This finding also agrees with similar studies in Ghana and other developing countries (Frimpong et al., 2003; Ijigah et al., 2013; Tipli & Ilyasu, 2014; Azhar et al., 2008; Al-Najjar, 2008). For example, Frimpong et al. (2003) found that escalation of material prices was the fifth most important factors that cause delay and cost overruns in the construction of groundwater projects in Ghana.

Adamson (2006) viewed inflation as the frequency of increase in overall price level in a country. This then cause money to lose its value. Inflation therefore upsurges the costs of construction. This happens if the degree of inflation increases beyond the anticipated level throughout the period of construction, then the existing cost estimation is surpassed (Nega, 2008). Clearly, it is one of the factors contributing to the unsuccessful delivery of most construction projects and also contributes to the shooting-up of the cost anticipated earlier. Construction projects estimation of cost are produced at an exact time and the prices employed within are pertinent only for that time as well as for short near future since they are subject to market forces. The influence of inflation also results in increased in labour cost and subsequent loss of profit to contractor or the builder and higher cost overrun to the client of the building (government).

The escalation of material prices may be attributable principally to the high and unstable inflationary trend in Ghana. According to Ghana Statistical Service (2015), the inflation rate in Ghana averaged 17.12% from 1998 – 2015. GSS further indicated that the inflation rate has been in the upward trend for the last 3 years due to demand exceeding supply, which creates scarcity of goods and fiscal crises which has led to a sharp drop in the Cedi against the US dollar raising import prices. The high inflation rate and interest rate in Ghana makes borrowing for construction projects very difficult. It is

therefore clear that the construction industry which invests mostly in long term investment is faced with a lot of financial challenges.

It is also evident in the GSS report that the upward pressure on materials is partly fuelled by frequent rise in utility prices. It is estimated by Achuenu and Ujene (2006) that Material constitutes (42% and 79%) of total cost of projects for private and public projects respectively. This implies that any increase in price of material, and shortage of construction materials have a high impact on public construction project delivery. The implication of this finding is that the government should vigorously regulate and monitor the prices of essential construction materials like (cement) and make it available and affordable to the users. This can be done by creating enabling environment conducive for the producers of building materials. Also, there should be adequate contingency allowance in order to cover increase in material cost due to inflation. More so, strong fiscal policies are required to support the construction industry. This could be achieved by strengthening of the existing financial policies and regulatory framework. Also, price fluctuations and inflation may be reduced by saving the project funds in a more stable currency (Lukas, 2004).

4.9.4 Project-related Issues

The result of the study further revealed that in the opinion of the respondents, project-related issues is the fourth most severe constraint experience by the respondents surveyed. This finding implies that drawings and specifications alteration during execution, quality inspection delay, and working within a confined space negatively affects project success. This finding is consistent with past studies; Thomas, Riley and

Sanvido (1999) stated that there is a 30% loss of efficiency when work changes are being performed. This result can be interpreted as changes to specifications and drawings that require additional time for adjustments of resources and manpower so that the change can be met. Also workers‟ morale is highly affected by extensive numbers of changes (Gundecha, 2012).

Olomolaiye, Jayawardane and Harris, (1996) prove that quality inspection delays are critical constraint for example, because contractors cannot cast concrete before inspection of formwork and steel work, the inspection delay contributes to delays in work activities. It completely stops the task that requires the presence of supervisors, such as casting concrete and backfilling. Additionally, it delays the inspection of completed work which, in turn, leads to a delay in the commencement of new work.

The results of the study also illustrate that working within a confined space negatively affect productivity. This result is supported by (Enshassi et al., 2007; Gundecha, 2012; Babalola et al., 2015) in which it was reported that one of the common reasons for low productivity on construction site is working within a confined space. This result is justified, as confined spaces reduce free movement of workmen, and consequently reduce productivity. Consultants should minimize change orders during construction, and also should give full cooperation to contractors or clients when their expertise is needed to avoid delays.

4.9.5 Bidding-related Issues

The result of the study further revealed that in the opinion of the respondents, bidding -related issues is the fifth most severe constraint experience by the respondents surveyed. This is attributable to aggressive competition during tendering, and government emphasizes on low construction cost rather than quality.

Aggressive competition sometimes forces bidders to quote low for public construction projects (Iyer & Jha, 2005; Amoa-Abban & Allotey, 2014). Once awarded the project they are not motivated enough to do a quality job. To make some profit out of the project they sometime try to use inferior materials and bad technical practices, leading to poor quality. The problem of a low bid is quiet common in cases of government-owned projects. In Ghana, some contractors and suppliers purposely underestimate the cost of public construction projects in other to be selected because of the aggressive competition (Amoa-Abban & Allotey, 2014).While it is perfectly logical for the government, being the guardian of public funds, to accept low bids, selection of a low bidder more often than not causes problems to the project. In addition, the low bidder sometimes resorts to subcontracting the entire project to unqualified contractors, leading to poor quality (Iyer & Jha, 2005). This finding implies that the practice of given contract to low bidders should be discouraged; rather contracts should be awarded to proven contractors with resources and skill. This requires good procurement laws and regulations for a sound public procurement system (Thai, 2008).

4.10 Critical Factors Influencing Public Construction Project Success in Sekondi-Takoradi

The study indicated that the effective techniques influencing public construction project success in Sekondi-Takoradi of Ghana included; leadership skills of site managers, adoption of motivation system, adequate scheduling and material management, use of competent/skilled and experienced supervisor/workmen, effective collaboration of project participants.

4.10.1 Leadership Skills of Site Managers/Supervisors

Leadership skills and its effect on project success have been measured. Findings of the results indicated that a site manager‟s/supervisor's leadership ability is the most important to project success according to the respondents. Skills and quality of leadership of a site manager affects strongly and directly the contractor's performance throughout the project. This is mainly because if the project manager/supervisor has strong leadership skills, then the project performance can be monitored, controlled and managed with high quality. This implies that if the site manager/supervisor has the ability to influence, take into consideration of individual differences in motivation and skills, express confidence and trust in team members, and provide coaching and advice as and when needed such that the group collectively agrees to and accomplishes a common goal throughout the lifecycle of the project, the outcome results would be team effectiveness and ultimately project success. This result is in line with Iyer and Jha (2005), Odusami (2002), and Windapo et al. (2015) studies who found that leadership skill is one of the top factors necessary for construction project success.

4.10.2 Motivation

Motivation and its effect on public construction project success have been measured. Findings of the results indicated that motivation has the second greatest influence on public construction project success of the respondents firms. This implies that prompt payment to contractors and workmen, provision of acceptable incentives to workmen such as medical insurances/overtime bonuses, regular training of workmen which teach them something new, and also given better recognition and acceptance to workmen; for instance involving the workmen in planning and decision-making, as well as provision of safety environment/amenities to employees, not only ensure their cooperation but also influence the construction project success.

This result corroborates with the thoughts of (Enshassi et al., 2007; Kuykendall, 2007; Mistry & Bhatt, 2013; Odesola & Idoro, 2014; Robels , 2014; Lamka et al., 2014; Hickson & Ellis, 2014; Thomas & Sudhakumar, 2014; Babalola et al., 2015) who put forth that workmen motivation is not only important but one of the most important technique for project success.

4.10.3 Adequate Scheduling and Material Management

Adequate scheduling and material management and its influence on project success have been measured. The results indicate that adequate scheduling and material management influences construction project success. This implies that if there is no time for idleness on site; materials, tools and equipment are properly scheduled for work, project schedule requirement are well communicated to workmen, and also when the essential and desired site materials characteristics of right quality, right quantity, right time and

reasonable cost are effectively implemented on site, greatly influence construction project success.

Materials are critical in the operations in every industry since unavailability of materials can stop production. In addition, unavailability of materials when needed can affect productivity, cause delays and possible suspension of activities until the required material is available. Unavailability of materials is not the only aspect that can cause problems. Excessive quantities of materials could also create serious problems to managers. Storage of materials can increase the costs of production and the total cost of any project. When there are limited areas available for storage, the managers have to find other alternatives to store the materials until they are needed. Some of these alternatives might require re-handling of materials, which will increase the costs associated with them. Provisions should be taken to handle and store the materials adequately when they are received. Special attention should be given to the flow of materials once they are procured from suppliers. It is obvious that materials should be obtained at the lowest cost possible to provide savings to the company; but this should be done without compromising the quality of the materials. Thus, leadership on-site must possess adequate skill to handle these techniques. This finding is in agreement with Kuykendall (2007), Enshassi et al. (2007), Gundecha (2012), Mistry and Bhatt (2013), Odesola and Idoro (2014).

4.10.4 Use of Competent/Skilled and Experienced Workmen

Use of competent/skilled and experienced workmen and its influence on project success has been measured. This result indicates that use of competent/skilled and experienced workmen impact on project success. This implies that use of a competent and experience supervisor with effective leadership skills who is able to take charge,

expresses confidence and trust in team members, and able to help or direct the workers on site greatly contribute to project success. Also, the use of skilled and experience craftsmen has influence on project success. Evidently, a more skilled and experienced workforce would require less instruction. Moreover, experience improves both the intellectual and physical abilities of workers which increase productivity and reduces rework. Impliedly, availability of personnel with high experience and qualification lead to better performance of quality, time, cost, productivity and safety of projects.

This finding also implies that, use of competent contractors/subcontractors greatly influence project success. It is therefore, important that selection of contractors for construction project be based on competence and experience and not by low bid mindset. However, in Ghana, projects are awarded to the lowest bidder. Some of the lowest bidders may lack management skills; also less attention is paid to contractor's plan, cost control, overall site management and resource allocation. This finding supports the assertion of (Samson & Lema, 2002; Cheung et al., 2004; Iyer & Jha, 2005; Babalola et al., 2015).

4.10.5 Effective Collaboration

Effective collaboration and its influence on public construction project success has been measured. The result indicated that effective collaboration of construction project participants has strong influence on construction project success. This finding implies that good project team relations, prompt feedback/action when matters are raised by one of the project participants, effective interaction between project participants and trust among team members significantly influence construction project success. This finding is consistent

with (Arcila, 2012; McCord, 2010; Babalola et al., 2015) assertions that good relationship among project participants provides harmonious working environment necessary for higher productivity and project success.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary, conclusion and recommendations of the study. The first section presents the summary of the study; the second section presents the conclusion of the study based on the study‟s findings followed by sections that present the recommendations for improving factors affecting public sector construction project in Sekondi-Takoradi- Ghana, and recommendations for future research.

5.1 Summary of the Findings of the Study

Construction projects located in the Sekondi-Takoradi Metropolis, Ghana suffer from many problems such as delays, and cost overruns; with its diverse effects such as tying down the clients‟ capital, and project abandonment. This study has been conducted to identify the factors affecting public construction project success. Using empirical data obtained from the administration of structured questionnaires to 42 registered construction firms in Sekondi-Takoradi Metropolis-Ghana; the factors affecting public sector project delivery were analysed using principal component factor analysis, correlation coefficient, and multiple regression technique: The following were the major findings from the empirical data:

- The results of the study revealed that the underlying construct of the numerous critical constraints affecting construction project success are:
  - undue delay in payments of Contractors‟ payment certificates and claims,
  - Government agencies (clients) mostly award contracts to lowest bidders, though most of these bidders do not have the competencies to deliver,

- Contractors do not factor the effects of political market forces risks in their Bill of Quantities, and
- most contractors do not employ experienced and qualified site managers to manage construction projects.

- The study also revealed the following as the factors that enhance the success of public construction projects:
  - better leadership skills of site managers,
  - use of competent/skilled and experienced supervisor/workmen
  - adoption of motivation system,
  - adequate scheduling and material management, and
  - effective collaboration of project participants.

5.2 Conclusion

In conclusion, contractors should be more interested about the leadership skills of site managers, motivation of their employees, adequate scheduling and material management, use of competent and experienced supervisor/workmen, effective collaboration of project participants, and project-related issues on site in order to enhance project success.

Government (client) should be more concerned and expedite action to address the financing-related (delay in progress payments), political-related, market forces-related, and bidding-related issues affecting public construction project delivery in order to enhance project success.

5.3 Recommendations

The findings of this research are expected to contribute to public construction project success. To achieve this objective, this study proposes a set of recommendations to the construction industry with regards to their practices:

- Government (client) is encouraged to facilitate payment to contractors in order to overcome delay, disputes, and claims.
- Government should discourage awarding contracts to lowest bidders
- Contractors should consider political and market forces risks in their cost estimation for overcoming delay and cost overrun.
- Contractors should make effort to appoint experienced and qualified site managers with adequate leadership skills to manage construction projects.
- Site managers/supervisors of construction firms should increase their leadership skill and labour skill in project by appropriate training program.
- Contractors should increase workers satisfaction by ensuring prompt payment of salaries, developing financial reward or recognition program and improving the living condition on site. Management of construction firms should provide a safe and productive environment, including provision of safety amenities such as personal protective equipment (PPE).
- It is necessary to use project scheduling techniques (such as computer-aided construction project management) in each project to improve material arrangement, tools and equipment management, so as to reduce idleness of workers to a minimum.

- Effective collaboration between project participants is required throughout project life cycle for solving problems and developing project performance.

5.4 Future Research

The current research study was limited to the perception of only D1K1 and D2K2 site managers in the construction industry in Sekondi-Takoradi metropolis of Ghana. Future study could be done using the perception of craftsmen and different category of construction firms (i.e. D3K3) since they are the major contributors of the construction industry in Ghana. Similar studies could also be conducted in different geographical regions in Ghana.

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APPENDIX

QUESTIONNAIRE TO CONSTRUCTION FIRMS

The purpose of this questionnaire is to identify the factors affecting the success of public sector construction project in Sekondi-Takoradi metropolis of Ghana

SECTION A: (TO BE COMPLETED BY OWNER-MANAGER/SITE MANAGER)

Background of Respondents

Q1. What is your Designation?

[a] Site Manager/Supervisor [b] Managing Director [c] Site Engineer

Q2. How many years have you spent in the company?

[a] under 5 yrs [b] 5 –10 yrs [c] above 10 less than 15 yrs [d] 15 –20 yrs (e)21yrs and above

Q3. What is your highest level of education?

[a] CTC [b] HND [c] BSC/B-TECH [d] MASTERS

Q4. How old is your construction business?

[a] under 5 yrs [b] 5 –10 yrs [c] above 10 less than 15 yrs [d] above 15 years

Q5. What type of construction business does your company undertake?

[a] Building Construction [b] Civil Works

Q6. What is the number of workers in your company?

[a] 10-20 [b] 21-40 [c] 41-60 [d] Above 60

SECTION B

Constraining Factors Affecting Success of Public Sector Construction Project

Based on your overall experience in public sector construction project in Ghana, please indicate the extent to which the following factors negatively influence project success by ticking (√) the scales corresponding to the following variables.

1= Very low influence, 2= Low influence, 3=Moderate influence, 4= High influence, and 5= Very High influence

No	**Constraining Factors that Affect Public Sector Construction Project**	1	2	3	4	5
1	Escalation of const. material prices					
2	Weak Financial Condition of the contractor					
3	Drawings and specifications alteration					
4	Weak government policy					
5	High interest rate charged by banks					
6	Aggressive competition during tendering					
7	Working within a confined space					
8	Government emphasizes on low construction cost					
9	High taxes imposed on imported mat					
10	Inflation & Price fluctuation					
11	Tight project schedule					
12	Quality inspection delay					
13	Corrupt practices					
14	Excessive approval procedures					
15	Economic Instability					
16	Limited cash flow of the government					
17	Delayed payment to labour					
18	Low labour wage					
19	Delayed Payment to Contractor					
20	Increased in labour cost					
21	Poor budget progress monitoring					

SECTION C

Public Sector Construction Project Improvement Techniques

Please indicate the extent to which you agree to the following statement:

5 = Very Strongly, 4 = Strongly, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree

Statement	1	2	3	4	5
Leadership	1	2	3	4	5
My manager is a motivator					
I help or guide my workers if there are problems					
My manager is a warm–hearted person					
I have confidence and trust in my team members					
I am approachable and accessible to others.					
Motivation	1	2	3	4	5
Our workers are paid promptly					
Incentives/ overtime bonuses are acceptable					
Workers are promoted in a fair and honest way					
Workers/Staff get credit for what they do					
Workers are involved in decisions that affect their job					
I am paid according to the job I do					
Effective collaboration	1	2	3	4	5
I am able to communicate clearly and convey enriched task information to the team members.					
I actively listen to others in my team					
I inform project team about project plans for the future					
There is a high level of trust among team members					
"All-foreman meetings" are held regularly which help to identify overlapping activities and address potential problems on the job site					

Used of Competent and Experienced Workers	1	2	3	4	5
I know exactly what my mistakes are					
I have a certain a certain degree of command in my work					
Job description of workers is in accordance with qualification and skills					
I am interested in my work					
My company has experienced team leaders					
Frequent training is offered to workers to improve their skills					
Adequate Project Planning and Scheduling/Material Management	1	2	3	4	5
There is no time for idleness on our site					
My work consist of variety of work					
My working hours are reasonable					
I am never overworked					
My site is often overcrowded					

Section D

Public Sector Project Improvement Techniques Outcome

Please, answer the following questions within a scale from 1 to 5, the public sector project improvement technique outcome of your company

I = Strongly Disagree, 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Statement	1	2	3	4	5
My company has a harmonious team					
My company does not experience rework					
My company achieves minimal non-conformance					
My company completes tasks on time					
My company experiences minimal defects					
The rate of accidents in my company has reduced.					

Thank You.