ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

FACTORS AFFECTING THE PERFORMANCE OF CONSTRUCTION PROJECTS: THE CASE OF DEFENSE CONSTRUCTION ENTERPRISE

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GEBREMEDHIN SEBSIBE

SGS/0112/2009B

JANUARY, 2019

ADDIS ABABA, ETHIOPIA

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A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN PROJECT MANAGEMENT

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ST. MARY'S UNIVERSITY
SCHOOL OF GRADUTE STUDIES
FACULTY OF BUISNESS

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APPROVED BY BOARD OF EXAMINERS

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Internal Examiner	**Signature**

Dedication

This research work is dedicated to the followings:

My daughter, **Wintana,**

My loving wife, **Sintayehu**

My father, **Mr Sebsibe**

My Mother, **Yeshi**

My sister **Yeshiberget,**

and my **Brothers** for their support, patience, encouragement and prayers towards my successful completion of this course during the entire period of my study.

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Acknowledgements

List of Abbreviations and Acronyms

DCE	Defense Construction Enterprise
KPIs	Key Performance Indicators
GDP	Growth Domestic Product
IBM	International Business Management
SPSS	Statistical Package for Social Science
TQM	Total Quality Management
ETB	Ethiopian Birr

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Abstract

The construction industry plays an indispensable role in the Ethiopian economy, and is a significant contributor to economic growth. However, several challenges have been recognized as confronting and influencing the performance, development and growth of Ethiopian construction industry. Construction projects in the Defense Construction Enterprise suffer from many problems and complex issues in performance such as cost, time and quality. The objective of the study was to assess the influence of resource management related factors, stakeholder management related factors, procurement management related factors, and quality management related factors on project performance in Defense Construction Enterprise as a case study. The research was primarily based on primary data collected through a structured questionnaire. To this respect, a total of 89 questionnaires were distributed to purposively selected employee of defense construction enterprise, which constituted response rate of (77) or 87% and this was adequate for statistical generalization of the study findings. The information was displayed by use of charts and tables. The major resource management related factors that affect the performance of the projects are cash flow and financial difficulties, price escalation of construction material in the market, material wastage on projects, breakdown and failure of construction equipment in the enterprise, changes in material types and specifications during construction, and unavailability of construction material in the market. The major procurement management related factors that affect the performance of the projects are lack of an effective and efficient Procurement planning, procurement control mechanism, and contract management in the enterprise. the major stakeholder management related factors that affect the performance of the project are lack of stakeholder attribute assessment, lack of Stakeholders involvement in decision making process, lack of stakeholder identification, and lack of stakeholder communication and engagement. Among quality management related factor that affect the performance of projects, lack of quality management system and lack of management commitment and leadership towards quality were the two most important factors that affect the performance of projects. The researcher further employed a multiple linear regression model to analyze the relationship between factors affecting the performance of projects and project performance. The regression result reveals resource, stakeholder, and procurement related factors are positively and significantly influence the project cost performance but quality management related factors were found positive but not significant factor influencing the cost performance of project. Also, regression result reveals resource and stakeholder management factors are positively and significantly influence the project time performance but quality and procurement management related factors were found positive but not significant factor influencing the time performance of project. On other hand, resource, stakeholder, and quality related factors are positively and significantly influence the project quality performance but procurement management related factors was found positive but not significant factor influencing the quality performance of project. The results of the study may suggest that the enterprise need to give more emphasis on resource and stakeholder management to enhance project performance.

Key Words: *Project, Project Performance, Construction Industry, Ethiopia*

CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Construction industry has complexity in its nature because it contains a large number of parties such as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction industry makes significant contributions to the socio-economic development process of a country. Its importance emanates largely from the direct and indirect impact it has on all economic activities. It contributes to the national output and stimulates the growth of other sectors through a complex system of linkages. It is noted that about one-tenth of the global economy is dedicated to constructing and operating homes and offices (UNEP, 1996). UNEP further observes that the industry consumes one sixth to one half of the world's wood, minerals, water and energy. It contributes to employment and creates income for the population and has multiplier effects on the economy.

The construction industry has important contributions to the Ethiopian economy, as demonstrated by its share in the GDP. The sector has registered relatively higher growth as compared to the growth of GDP during this period. Over this period, there has been increased investment on the development and expansion of various infrastructure projects like roads, airports and residential and non-residential housing units. Every government has a vision to improve the living standards and conditions of its citizen and, generally, this is achieved through development programs. It is an accepted assumption that a development program can be broken down into well-organized development projects and that if project activities are planned and implemented effectively the overall intended objectives and purpose of program will be achieved.

Maintaining steady cost projection on construction projects had been until recently an issue of serious concern, both to the client and project contractors. Cost deviation from initial cot plan, had been prevalent on construction sites Amusan (2011). Every year, large companies spend large sums on the research and development about the most optimum combination of production or the most optimum function and feature of their products and services. The impact of poor quality on the price of products,

organization earnings and the amount of and improvement and so forth (Amin, 2011).cost should be paid for high quality has raised many important issues affecting cost accounting, quality control, repairs and maintenance, supply chain, production management, stores, safety and health, education.

Time and cost overruns on infrastructure development projects during implementation continue to pose great challenges to developing countries Kigari and wainaina (2010). Ideally, projects designed and managed by highly trained construction professionals and executed by qualified contractors selected on the basis of their capability should meet the project performance goals. These goals are in terms of the contract period, budget, quality, and client satisfaction. However, there is evidence that despite trained of professionals in DCE construction projects do not always meet their goals. This is manifested in road and building projects undertaken by the enterprise that have cost overrun, delayed completion period and poor quality resulting in reworks in various projects, high maintenance costs, dissatisfied clients.

Defense Construction Enterprise was established in 2010 by Ethiopian Ministry of Council regulation NO 185/2010 as public enterprise and Ministry of National Defense as supervising authority of the enterprise. It is registered as grade one contractor that is qualified to undertake construction of building, roads, railway, bridge, airport, dam, and other related works.

The purpose for which the enterprise is established is to engage in any construction activity mainly to satisfy the national defense construction and infrastructural development needs. Besides, to engage in the construction of roads, dams, irrigation infrastructure, buildings and other construction related works in the country.

Henceforth its establishment, the enterprise had completed 18 roads, dam, irrigation, building and real estate projects which worth around birr 4.7 billion ETB in the last seven years. Currently, there are 23 construction projects under construction which worth around 14.7 ETB billion. The enterprise annual income turnover is around 1.7 billion ETB on average for the last eight years.

1.2. Statement of the problem

Ethiopia as a country has witnessed a substantial increase in the number of stalled projects due to in appropriate project organization structures and ineffective leadership Abera and Fekadu (2016). It is shown from previous studies (Samson and Lema, 2002; Abera and Fekadu, 2016; Kuprenas, 2003; Cheung, 2004; Iyer and Jha, 2005) that the failure of any project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such this problem. In Defense Construction Enterprise, there are many construction projects fail in performance. In addition, performance measurement systems are not effective or efficient to overcome such this problem.

There is evidence that the performance of the construction project in DCE is poor in terms of time, cost and quality performance. There was an average of 78% and 10% time and cost overrun rate respectively in the 18 completed building and road projects. Likewise, 23 ongoing road and building projects have had an average of 8% and 21% time and cost overrun rate respectively Defense Construction Enterprise Financial and Physical Performance Report (2011 - 2018). There was rework and maintenance due to poor quality of constructions once the provisional acceptance had been undertaken. This is manifested by high maintenance costs, dissatisfied clients and even projects which are not functional (see annex $1 - 4$).

Among the main causes of poor performance of construction projects are ineffective resource managements, lack of stakeholder management mechanism, lack of effective and efficient procurement management, and inappropriate quality management. There are various resource, stakeholder, procurement, and quality management related factors which lead to failure of construction project performance in terms of time overrun, cost overrun, and quality problem. Hence, this study was aimed at investigating construction resources, stakeholder, procurement, and quality management related factors that cause construction cost overrun, time overrun and quality problem in Defense Construction Enterprise.

1.3. Research Question

➢ What are the resources, procurement, stakeholder, and quality management related factors that affect the time, cost and, quality performance of projects in DCE?

1.4. Objective of the Study

1.4.1. General objective

- To investigate and rank the factors affecting the performance of construction projects at defense construction enterprise.

1.4.2. Specific Objectives

- To examine and rank the resource management related factors affect project performance in DCE.
- To determine and rank procurement management related factors that influence project performance in DCE.
- To assess and rank quality management related factors that affect project performance in DCE.
- To look at and rank stakeholder management related factors that affect project performance in DCE.

1.5. Research Hypothesis

- H1: There is significant and positive relationship between resource management related factors and project performance in Defense Construction Enterprise.
- H2: There is significant and positive relationship between procurement management related and project performance in Defense Construction Enterprise.
- H3: There is significant and positive relationship between stakeholder management related and project performance in Defense Construction Enterprise.
- H4: There is significant and positive relationship between quality management related factors and project performance in Defense Construction Enterprise.

1.6. Significance of the study

Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction projects in DCE suffer from many problems and complex issues in performance because of many reasons and factors. This work is very important to identify and to evaluate the resource management, procurement management, stakeholder management, and quality management related factors affecting the performance of construction projects in the DCE. The practices concerning with the KPIs such as time, cost, and quality in construction project checklists was analyzed in order to know the main practical problems of projects performance regarding factors affecting construction project in DCE and then to formulate recommendations to improve performance of building construction projects.

1.7. Scope of the study

The research study attempted to identify and rank factors affecting the performance of construction project from contractor's perspective. In addition, this research was limited to resource management, procurement management, stakeholder management and quality management related factors affecting the performance of 41 road and building construction projects. The target respondents were top, middle, and lower level managers, project manager and, and senior site and office engineers who work at the head office and projects that are involved in building and road construction projects management process.

1.8. Limitations of the study

The study was envisaged from the contractor's perspective towards factor affecting the construction project and clients and consultant views were not considered in the study. If the view of consultants and clients had been considered in the study there might be a better perspective and results. Since the study takes in to account the influence of resource management, procurement management, stakeholder management and quality management related factors to the project performance, the influence of other factors such as organizational capability, leadership, etc. which

may have significant influence in the project management process and thus was not considered in the study.

1.9. Organization of the Study

This study was organized in five chapters. Chapter One discussed the background of the study, the objective of the study which was to assess the factors that influences project performance a case of the DCE, the statement of the problem, research questions, significance of the study, limitation of the study, delimitations of the study, and the organization of the study.

Chapter Two covered the literature review which includes theoretical and empirical review of related literature. It has also described the conceptual framework and the knowledge gaps.

Chapter Three consisted of the research methodology that was used for the study. It consisted of the research design, the target population, the sample size and sampling procedures, research instruments, data collection procedures and data analysis methods. Chapter Four covered data analysis, presentation and interpretation. Chapter Five comprised of the summary of findings, conclusion and recommendations and suggestions for further research.

CHAPTER TWO: REVIEWS OF LITERATURE

2.1. Theoretical Framework

2.1.1. Project and Construction projects

A project is a temporary endeavor undertaken to create a unique product, service or result Project Management institute (2008). According to Hillson D. (2009), all projects are risky and there are three separate reasons for that. The first reason is that all projects share common characteristics which inevitably introduce uncertainty. Some of this common characteristic are projects are unique, complex, involve assumptions and constraints, performed by people and involve change from a known present to an unknown future. The second reason is that all projects are undertaken to achieve some specific objectives. The final reason is that all projects are affected by the external environment they exist in.

A construction project in simple words is a process of constructing something by human for one purpose or another. It may be a road, bridge, a dam, a private residence, an airport, a commercial building, office and etc. Construction is the recruitment and utilization of capital, specialized personnel, materials, and equipment on a specific site in accordance with drawings, specifications, and contract documents prepared to serve the purposes of a client. According to Moavenzdadeh F. (1976), construction contributes to the economic development of any country by satisfying some of the basic objectives of development including output generation, employment creation and income generation and re distribution; it also plays a major role in satisfying basic physical and social needs, including the production of shelter, infrastructure and consumer goods.

2.1.2. Critical Chain Project Management Theory

Critical Chain Project Management is an extension of Theory of Constraints, which is based on the premise that every repetitive production systems have constraints and if the repetitive production system is to improve its performance, it should improve constraining factors .It is named after the essential element; the longest chain of dependent resourced tasks in the project. The aim of the solution is to protect the

duration of the project, and therefore completion date, against the effects of individual task structural and resource dependency, variation, and uncertainty. The outcome is a robust and dependable approach that will allow us to complete projects on-time, every time, and most importantly within at most 75% of the current duration for single projects and considerably less for individual projects within multi-project environments. The shorter duration provides a sterling opportunity in the marketplace to differentiate ourselves from our competitors who deliver poorer outcomes, and late at that, via other project management methods. It also offers the opportunity to deliver more projects over all, in the same amount of time, and at no increase in operating expense, thus significantly improving the bottom line Youngman (2009).

2.1.3. Performance Measurement Theory

Mbugua et al., (1999) and Love et al (2000) have identified a distinction between performance indicators, performance measures and performance measurement. According to Mbugua et al. (1999), performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. In other words, when indicators can be measured with some degree of precision and without ambiguity they are called measures. However, when it is not possible to obtain a precise measurement, it is usual to refer to performance indicators. Performance measures are the numerical or quantitative indicators Sinclair and Zairi, (1995). On the other hand, performance measurement is a systematic way of evaluating the inputs and outputs in manufacturing operations or construction activity and acts as a tool for continuous improvements Sinclair and Zairi, 1995; Mbugua et al. (1999). In response to calls for continuous improvement in performance, many performance measurements have emerged in management literature. The methods of measurement of performance can be in terms of the technical performance, the commercial performance and the overall performance. The areas of measurement are at the planning & design level, the marketing level and manufacturing level etc., and for the overall performance are at the level of a firm or strategic business unit. Furthermore, he proposes a model of performance measurements in terms of outputs and resources to be measured at different levels. Outputs are measured to determine whether they help to accomplish

objectives (effectiveness) and resources are measured to determine whether a minimum amount of resources is used in the production of outputs (efficiency). However, in his model, Cordero (1990) failed to reflect the interests of stakeholders, their needs and expectations. If construction organizations are to remain competitive in the long run, they need to develop and better understand their relations with their customers, suppliers, employees, lenders and the wider community, as suggested by Love et al. (2000). Hence, performance measurement has to incorporate the interest of the stakeholders, both economically and morally.

2.1.4. Stakeholder Theory

In the stakeholder theory, the idea is that stakeholders" who have stakes" interact with the organization and thus make its operation possible Blair (1998) et al. It's a theory that explains how organizations function with respect to various constituencies with whom they are inextricably embedded. Stakeholder theory development has centered on defining the stakeholder concept and classifying stakeholders into categories that provide an understanding of individual stakeholder relationships.

Freeman define stakeholder as any group or individual who can affect or who is affected by the achievement of the firm's objectives and continues to provide the boundaries of what constitutes a stake. He argues that a stakeholder has some form of capital, either financial or human, at risk and, therefore, has something to lose or gain depending on a firm's behavior. To these elements, Waddock (2002) adds a tie or tether that creates a bond of some sort. A stakeholder theory of the organization requires an understanding of the types of stakeholder influence but also how organizations respond to those influences. Each firm faces a different set of stakeholders, which aggregate into unique patterns of influence. Ambler and Wilson (1995) demonstrate that firms do not simply respond to each stakeholder individually; they respond, rather, to the interaction of multiple influences from the entire stakeholder set.

2.1.5. Implication of Time and Cost Overrun

Time and cost overrun have an implication and affection to the construction project performance and to the client or project owner. Time and cost certainty is known to be

the top priorities of construction clients Davenport (1997). Although affected by many internal and external factors, construction time and cost are considered a good and measurable indicator of project performance. However, low cost and speedy project are not always the main concern of clients today; instead time and cost certainty are becoming increasingly important Flanagan et al. (1998) and it is one of the most important contractor performance criteria for clients" satisfaction Soetanto et al.(2001) and Construction Industry Board (1996).

Client satisfaction is an important determinant of contractor performance evaluation and comparison Sidwel (1988) and it is the driving force for continuous improvement of contractor performance Ahmed and Kangari (1995). Companies differentiate themselves from competitors and maintain a competitive edge by providing and keeping clients satisfied Torbica and Stroh (2001). Client long term interest to the performance of contractor is in the work performed. It must conform to the specifications established for the project. Low cost and speedy construction should be achieved because it has significant implication to the client's interest about the way of contractor work in the project performance Xiao and Proverbs (2001). Besides that, delays (time overrun) and cost overrun are costly and often result in disputes and claims, impair the feasibility for project owners, and retard the development of the construction industry Odeh, A. M and Battaineh, H. T (2002). Fetene (2008) categorized some of the major causes of cost overrun under faults of the clients, consultants, contractors, government and others. Morris (1990) considered inadequate project preparation as the most important factor that underlie cost overrun, which often lead to scope changes during implementation. The inadequacies cover deficiencies in demand forecasts, ground surveys and technology choice. Murali and Yau (2006) in their research identified contract- related factors such as change orders, mistakes and discrepancies in the contract document as the major causes of cost overrun. Doloi and Young (2009) reported among these three categories, the five most significant sources of cost overruns as perceived by the consultants, clients and contractors which are extent of completion of pre-contract design, escalation of material prices, mistakes and discrepancies in contract documentation, client-initiated variations and shortage of materials.

2.2. Empirical Review

2.2.1. Construction Projects and Performance

Success of construction projects depends mainly on success of performance. Many previous researches had been studied performance of construction projects. Dissanayaka and Kumaraswamy (1999) remarked that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Reichelt and Lyneis (1999) remarked three important structures underlying the dynamic of a project performance which are: the work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases. Thomas (2002) identified the main performance criteria of construction projects as financial stability, progress of work, standard of quality, health and safety, resources, relationship with clients, relationship with consultants, management capabilities, claim and contractual disputes, relationship with subcontractors, reputation and amount of subcontracting.

Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. It is obtained by Navon (2005) that a control system is an important element to identify factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) is needed. Pheng and Chuan (2006) obtained that human factors played an important role in determining the performance of a project. Ugwu and Haupt (2007) remarked that both early contractor involvement and early supplier involvement would minimize constructability-related performance problems including costs associated with delays, claims, wastages and rework, etc. Ling et al (2007) obtained that the most important of practices relating to scope management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract. It was recommended for foreign firms to adopt some of the project management practices highlighted to help them to achieve better project performance in China.

2.2.2. Factors Affecting Project Performance

Chan and Kumaraswamy (2002) remarked that studies in various countries appear to have contributed significantly to the body of knowledge relating to time performance in construction projects. Iyer and Jha (2005) remarked that project performance in term of cost is studied since 1960s. These studies range from theoretical work based on experience of researcher on one end to structured research work on the other end. Moreover, Pheng and Chuan (2006) stated that there have been many past studies on project performance according to cost and time factors. Chan and Kumaraswamy (1996) stated that a number of unexpected problems and changes from original design arise during the construction phase, leading to problems in cost and time performance. It is found that poor site management, unforeseen ground conditions and low speed of decision making involving all project teams are the three most significant factors causing delays and problems of time performance in local building works. Okuwoga (1998) stated that cost and time performance has been identified as general problems in the construction industry worldwide. Dissanayaka and Kumaraswamy (1999) remarked that project complexity, client type, experience of team and communication are highly correlated with the time performance; whilst project complexity, client characteristics and contractor characteristics are highly correlated with the cost performance. Reichelt and Lyneis (1999) obtained that project schedule and budget performance are controlled by the dynamic feedback process.

2.2.2.1. Resource Management Related Factors

Completion of any project within the estimated cost is the basic criteria for the success of any construction project. Primary target of practitioners involved in construction projects is to complete the project within budgeted cost regardless of size and complexity of project. However, completion of any project highly depends on the construction resources. Project resources provide the means for accomplishing the work objectives Padila and Car (1991). Construction resources management is the most important factor contributing to cost success Meepol and Ogunlana (2006).

Construction resources management has a high and significant relationship with cost performance for successful projects Meepol and Ogunlana (2006). As cited by

Zujo,Pusic and Vejzovic (2010) in a multiannual research conducted in Croatia from 1996 till 1998 as part of the scientific project Construction Project Risk and Resource Management, the occurrence of price overrun was observed in no less than 81% of the projects. Previous studies reveal that there are various construction resource related factors which significantly influence construction cost. Enshassi, Al-Najjar, and Kumaraswamy (2009) found that increment of construction materials prices due to continuous border closures, delay in construction and supply of raw materials and equipment by contractors, fluctuations in the cost of building materials, and resources constraint of funds and the associated auxiliaries not ready, were among the top ten factors affecting construction cost. Financial difficulties of owner and contractor were ranked as the first problems affecting construction cost in Vietnam Le-Hoai, Lee, & Lee (2008). If the contractor can minimize problems such as inefficient use and lack of construction equipment and shortage of quality material, the construction budget can be reduced Meepol and Ogunlana (2006).

In any project, various types of resources are essentially required be managed for the success of the project. The most important resources for any construction project are:

A. **Machines or Equipment Resources:** This type of resource 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

B. **Manpower Resource**: Manpower or human resource labor is very significant resources which play important role in success of any project. Good results certainly cannot be achieved without the adequate availability of skilled and unskilled manpower, most suitable allocation and management of human or manpower resource. Expected construction progress can be achieved only through the attainment of effective man-hour effort and the meeting of scheduled mile stone dates. Effective manpower management can reduce labor costs and

thereby increase profits for company. In developing countries, poor labor productivity is a severe problem Kaming, Olomolaiye, Holt, and Harris (1997). Hence, effective manpower management and improvement in labor productivity is critical need for reducing labor costs and thereby increase profits for company.

C. **Money or Finance:** Money or finance is the first and foremost resource required for any construction work. The design and specifications of a project depend upon it, and without sufficient fund, any project cannot be completed. Hence, availability of sufficient funds and effective financial management are very important aspects in any project. Financial management is the use of financial or accounting information at all levels to assist in planning, making decisions and controlling the activities of an enterprise Lock (1993). Without proper management of the money or finance, the management of other resource becomes useless.

Financial management is the use of financial or accounting information at all levels to assist in planning, making decisions and controlling the activities of an enterprise Lock (1993). Money has great importance in the construction industry. It is the first and foremost resource or item required for any construction work. The design and specifications of a project depend upon it, and without sufficient fund, any project cannot be completed. Cash flow affects the progress of construction. A project cannot be completed in the absence of fund and it will be entirely wastage of time and energy in designing the project. Therefore, it is absolutely necessary to manage the fund of a project. Without proper management of the money or finance, the management of other resource becomes useless. Resources are organizational assets. Resource planning should take into consideration not only what is best for an individual project, but also what is best for the organization as whole. Effective resource planning is also important when considering the impact of changes on the project schedule. Unanticipated overtime, schedule delays, and the resulting cost overruns can all be symptomatic of ineffective resource management.

D. **Machines or Equipment Resources:** 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.

Based on previous studies, the most frequent and important factors related to construction resource which affect construction cost were identified. Rahman, Memon, and Karim et al, (2012) identified a total of 16 factors were that were grouped in four categories, i.e. material, manpower, machinery and money as shown in the following table.

2.1: Factors Causing Construction Cost Overrun

Category	Resource related factors
Material	Price escalation of construction material
	Shortage of material
	Changes in material and specification type
	Delay in delivery of material
Manpower	High cost of labor
	Relationship between management and labor
	Labor productivity
	Shortage of site workers
Money	Financial difficulty of owner
	Cash flow and financial difficulties faced by contractor
	Mode of financing, bond and payment
	Poor financial control on site
Machinery	Equipment availability and failure
	Insufficient numbers of equipment
	Increase cost of machinery and its maintenance

Source: Rahman, Memon, and Karim et al (2012)

2.2.2.2. Procurement Management Related Factors

1. Procurement Planning and Project performance

Procurement planning plays a major role in successful project implementation Frese (2013) contends that procurement planning requires excellent forward planning, which includes detailed planning of the process implementation stages and milestones, task timeliness, fallback positions and re-planning. What this means is that initial planning

is not enough. Projects often take wrong turns, or initial solutions prove unfounded thereby necessitating re-planning and going back to the drawing board. A procurement plan may thus be subjected to review from time to time as and when necessary.

Frese (2013) emphasizes that planning requires an interactive process that requires agile re-thinking as the known environment shifts. According to Brown and Hyer (2010), planning also encompasses the aspects of forecasting techniques to help in the process of predicting costs and cash flows (financial disbursements). The other critical element of procurement project planning is deciding on the organization structure and the way it relates to project implementation. The structure will normally be affected by the strategic choices in relation to competitive advantage and the competitive scope which affects project implementation. Aspects of functional specialization and the balance between centralization and decentralization of procurement activities need to be reflected in decisions to improve project implementation. Attention may also be on the development of coordinating mechanisms such as matrix structures, multifunctional teams and committees. In some cases, procurement project teams or task forces may be formed for specific projects to improve project implementation.

Of major significance is the requirement for the procurement plan to implement projects and contain, among other things, a detailed breakdown of goods, works, or services required; a schedule of the planned delivery, implementation or completion dates for all goods, works, or services required; an indication and justification for whether it shall be procurement within a single year period or under a multi-year arrangement, an estimate of the value of each package of goods, works or services required, an indication of the budget available, sources of funding and an indication of the appropriate procurement method for each procurement requirement.

2. Contract Management and Project Performance

Cleland and Bidanda (2009) have stated that in a highly connected and competitive world, most projects must function in an environment that interacts with joint ventures, alliances, multinational sourcing, sub-contractors, and intricate vendor relations. Relationships with external organizations are managed through contracts. In general, companies provide services or products based on the results of direct contract

negotiations with the client. One of the most important factors in preparing a proposal and estimating the cost and profit of a project is the type of contract expected.

The confidence by which a bid is prepared is usually dependent on how much risk the contractor will incur through the contract. Certain types of contracts provide relief for the contractor since onerous risks exist Kerzner (2009). He further states that the size and experience of staff, urgency of completion, availability of qualified contractors, and other factors must be evaluated carefully during contract negotiations. The advantages and disadvantages of all basic contractual arrangements must be recognized to select the optimum arrangement for a particular project.

According to Project Management Institute (2013), all legal contractual relationships generally fall into one of two broad families: either fixed-price or cost reimbursable. There is a third hybrid type commonly in use called time and materials contract. The fixed-price contract type is recommended, although some projects also prepare team contracts to define ground rules for the project. However, in practice it is not unusual to combine one or more types into a single contract document. Once the contract has been signed, both parties must meet their obligations under the contract. The contract administrator is responsible for compliance by the contractor to the buyer's contractual terms and conditions and to make sure that the final product of the project meets requirements. Project Management Institute (2013) further states that under fixed-price arrangement, buyers need to precisely specify the product or service being procured since changes in scope may only be accepted with an increase in contract price. Kerzner (2009) argues that although a contract administrator is a member of the project team for reporting purposes, the contractor administrator could report to a line function such as legal department and may even be an attorney. In later stages of the project, a contract administrator is responsible for verification that all the work performed and deliverables produced are acceptable to the buyer. Contractual closure is then followed up with administrative project closure of the project or phase.

Important work by Pryke (2006) treated projects as a network of relationships that need managing to achieve project success. In the construction sector, a number of studies have identified the importance of managing the interrelationships between

parties within a project. Studies focusing on organizing projects as temporary multiparty organizations in the 1980s came from Bresnen (1988) in the United Kingdom, and from Packendorff (1995) in Europe. Brensen and Marshall (2000) further looked at partnering within the construction industry. A key issue remained of how to embed partnering relationship into the contract. The use of the contract form to govern the relationship and resolve conflicts among the contracting parties has been explored by various parties such as Lazar (2000), and Cicmil and Marshall (2005) but with no specific contractual devices developed.

3. Contract Monitoring and Evaluation and Project Performance

Contract monitoring and evaluation system is the structure, policies, and procedures used to ensure that the objectives of a contract are accomplished and vendors meet their responsibilities and implement project. The procurement unit is charged with the responsibility to monitor contract management by user departments to ensure implementation of projects contracts in accordance with the terms and conditions of the contracts Wafula, (2014). The unit is also required to report any significant departures from the terms and conditions of the contract to the head of the procuring entity and to coordinate internal monitoring and evaluation of the supply chain function in respect of the projects being implemented.

Contract evaluation is critical to implementation success in so far as it compels regular comparison of performance against targets, a search for the causes of deviation, a commitment to check adverse variances. Monitoring triggers off an effort to search for solutions to the identified threats to the project success. Chandra (2008), has identified one significant factor, among others, that undermines effective project monitoring and evaluation which tends to ultimately impact on the level of implementation success. The key factor is project characteristics which encompass the project's large size, complex undertakings involving many organizations and people rendering it difficult to keep truck of physical performance and expenditure on hundreds or even thousands of activities relating to the project. This also poses the challenge of coordination and communication difficulties where several organizations and people are involved in the same project.

The key things to be planned, monitored and evaluated are time (schedule), cost (budget) and scope (performance) to ensure project implementation. The prescribed public sector procurement plan format as already discussed above exhibits the first two as very prominent features. It is useful to perceive the control process as a closed-loop system, with revised plans and schedules following corrective actions. This helps in project implementation in organization. The planning-monitoring-controlling cycle is continuously in process until the project is implemented and completed Meredith and Mantel (2012). Monitoring tracks system from a simple checklist to sophisticated dashboard style approaches for identifying variances from the original plan which helps in project implementation. They advance the argument that as part of the planning process, a project team should agree on the appropriate approach for monitoring key performance indicators (KPIs) during the life of the project

2.2.2.3. Stakeholder Management Related Factors

Construction projects have many Stakeholders whose composition is often large and include: the owners and users of facilities, project managers, project architects and engineers, designers, shareholders, local authorities, legal authorities, employees, subcontractors, suppliers, process and service providers, competitors, banks, insurance companies, media, community representatives, neighbors, general public, government establishments, visitors, customers, regional development agencies, the natural environment, the press, pressure groups, civic institutions, and the list is almost endless Newcombe (2003). According to Newcome, project stakeholders are groups or individuals who have a stake in, or expectation of, the project's performance. The number of stakeholders involved or interested in the project normally increases the complexity and uncertainty of the situation. Each stakeholder usually has different interests and priorities that can create conflict or disagreements with the project Karlsen (2008). Their influence may have an impact on the course of a project at some stage and some of stakeholders´ influence may impact the project more often than others. Thus, when diverse stakeholders are present in a construction, the project must to set up a plan for managing them in order to succeed.

A. Classification of stakeholder

Internal and external stakeholder: Stakeholders can be divided into internal and external, internal stakeholders being those directly involved in an organization's decision-making process (e.g. owners, customers, suppliers, employees) and external stakeholders being those affected by the organization's activities in a significant way (e.g. neighbors, local community, general public, local authorities). In construction, there has been a strong emphasis on the internal stakeholder relationship such as procurement and site management, while the external stakeholder relationships to some extent have been considered a task for public officials via the rules and legislation that concern facility development Atkin and Skitmore (2008). Newcombe (2003), and Smith and Love (2004) used a similar classification of inside and outside stakeholders and direct and indirect stakeholders.

Primary and secondary stakeholder: Carroll and Buchholtz, (2006) classify stakeholders as primary and secondary and state that primary stakeholders are a group of people whose continued participation in the project is important for the survival of the project organization in that the organization cannot survive when they do not participate in the project work whereas secondary stakeholders are those who influence or are influenced by the organization. This class of stakeholders may be able to influence the organization or the organization may influence them. Primary stakeholders could be contractors who provide services (e.g. contractors, subcontractors, consultants) or those in direct relationship with an organization; as opposed to secondary stakeholders who have no contracted responsibility or formal involvement in the organization but are in an indirect or secondary relationship with an organization (Smith and Love, 2004; Carroll and Buchholtz, 2006). Mitchell et al. (1997) proposed an approach for classifying stakeholder's concern by combining various attributes such as power, legitimacy and urgency. They categorize organization stakeholders as internal and external and their relationship with the organization. Stakeholders and their levels of influence vary according to the nature of the project, their investments and interests in the project. One of the common negative effects is when Stakeholders form a coalition to try to stop a

project and important for project team to be aware of what are the essentials for managing them.

B. Classification of Project Stakeholder

There are a number of reasons why it is necessary to classify stakeholders: namely, to provides a strong sense of stakeholder impact on projects when considering the other alternative concurrence of attributes, to determine the silence of stakeholders, to develop appropriate responses to manage them Nguyen, et al. (2009) and Newcombe, (2003), to assess how each stakeholder group is likely to enforce its expectation on the project; whether these groups have the means to do so based on the power they possess; and the likely impact of stakeholder expectations on project strategy.

The classification is done by analyzing who external and internal stakeholders are and dividing them into public, private, supply side and demand side as shown on figure 2. On the public side of External Stakeholders are the regulatory agencies, local governments, and national government and public agencies. While on the private side are the external stakeholders includes local residents, local landowners, environmentalists, conservationists, archeologists, and other external stakeholders. Internal stakeholders are mainly those who are working in directly with the project and are divided into supply side and demand side. On the supply side are those who are directly involved in the execution of the project and include architects, engineers, principle contractors, trade contractors, materials and suppliers. On the demand side are the client for whom the project is being constructed, client's employees, line managers, organization's customers and suppliers.

Table 2.2: Grouping of Stakeholders: External and Internal

External		Internal	
Public	**Private**	**Supply side**	**Demand side**
Regulatory Agencies	Local Resident	Architect	Client
Local Government	Local Land Owner	Engineer	Financer
National Government	Environmentalist	Principle Contractors	Client's Employees
Public Agencies	Conservationist	Trade Contractor	Client's Customer
	Archeologist	Material	Client's Suppliers
	Other Stakeholder Categories	Suppliers	

Source: Adopted from Winch's Framework (2000)

Construction Project Stakeholders are part of organization stakeholders. Figure 2 shows the different stakeholders in construction project and their roles. The consultants and contractors fall under the internal stakeholders and are part of the "suppliers" as well as "funding bodies and sponsors". Municipalities (land owners), surrounding communities, politicians and governments, regulatory bodies and in the external side and they have important roles in the construction project organizations.

The Client is the sponsor of the project, consultant who may be the project manager; contractors/sub-contractors performs the construction works. Funding bodies such as financial institutions, municipalities whose land the construction site is placed, the surrounding communities whose influence and interest may affect the project positively or negatively, the politicians and the government whose support is needed in the project.

Table 2.3: Roles of Project Stakeholders

Stakeholder Group	Roles
Client	The client can be public or private .the main difference between private construction project and public project is that the client and beneficiary are the same in private construction project and in the construction housing project the main initiator is the beneficiary and benefit accrues to the communities affected
Consultant	Provide the consultancy advice for the project on designing, evaluating the cost technical issues
Contractor/Sub contractor	Engage in actual construction according to the design , specification, contract document communicated by the relevant parties
Funding Body/Sponsor	Ensure that the fund are utilized for the purpose and the sponsor make sure that used according to the planned budget and time schedule .ensure that deliverable are delivered on time at specified and approved cost
Municipalities	Provide the land on which construction is carried out, their support is important for the timely purchase ,planning, excitation and completion of the construction project
Surrounding Communities	Their support, influence, interest in the project is important and must be assessed
Politicians	The support of the politician is important in project constructions they are the leaders of the communities surrounding the project. They influence and have power
Government and Other Authorities	Ensure that the construction project is carried out according to laid down regulation and requirement

Source: Madhov and Rathod et al (2015)

C. The Critical Success Factors (CSFs) Approach to stakeholder management

Attempts to find the most effective methods for managing stakeholders by various researchers have identified sets of Critical Success Factors (SCFs). Yang, J. et al. (2009) identified 15 CSFs and stressed the need to apply them in order to effectively manage project stakeholders. CSFs are defined as areas in which satisfactory results will ensure successful competitive performance for the organization or project Rockart (1979) in Yang et al. (2009). Similar definition is given by Saraph et al. (1989) who views CSFs as those critical areas of managerial planning and action that must be practiced in order to achieve effectiveness and success. CSFs are therefore methods that contribute to

effective management of project stakeholders. These are those activities and practices that should be addressed in order to ensure successful management of stakeholders in construction project. Rockart developed the Critical Success Factors approach as a useful method for identifying the essentials of stakeholder management. He defined the Critical success factors approach as areas in which satisfactory results ensures successful competitive performance for the organization.

According to Carroll's (1979) definition, "managing with social responsibilities" encompasses the economic, legal, environment and ethical issues. A detailed review of Yang, et al. (2009) 15 critical factors are as follows:

1. Managing with Social Responsibility: Although managing Stakeholders with social responsibility is one of the Critical Success Factors a number of researchers regard it as a Pre-condition. Othman and Abdellatif (2011) stated that stakeholder management must have social responsibilities towards supporting effective management of the stakeholder in the construction project. Yang et al. (2009b) clarified that "managing with Social responsibilities" is not the same as corporate social responsibility. Rather, the later considers economic, legal, ethical, environmental, and cultural responsibilities as the precondition step for stakeholder management AlWaer et al. 2008; Prager and Freese (2009). The environmental elements are air, flora/fauna, dust, water, and noise, and the need to protect these and provide healthy living conditions is inevitable.

2. Formulating a clear statement or project missions: Formulating clear statement involves identification of clear mission for the project at different stages and a better understanding of the tasks and objectives at a particular stage of the project lifecycle including issues of cost, schedule and budget. The complex client organizations and the social economic and regulatory environment in which the projects operate means that politics is inevitable in the definition of the project mission (Winch, 2000). The mission includes setting of common goals, objectives and project priorities in order to improve stakeholder management (Jergeas et al 2000).

3. Identifying Stakeholders: This factor has been considered as important by several researchers who have pointed out the necessity of identifying project stakeholders Karlsen (2002); Olander (2006); Walker, et al. (2008). Identifying stakeholders should

answer the question "who are stakeholders" and their classification in order to manage them accordingly.

4. Understanding the areas of stakeholders' interests: Due to the complexity of construction projects, there are various stakeholders with different interests and researchers like Cleland, (1999) and Freeman et al. (2007) believe that identifying stakeholders' interests is important for assessing stakeholders. The interests include product services, and financial returns. Karlsen also presents a possible consideration to evaluate stakeholder's interest in the project.

5. Exploring stakeholders' needs and constraints in projects: Exploring stakeholders' needs and constraints means atomizing the areas of stakeholders' concern and the detailed list of issues Freeman, et al. (2007). This mean that during the project process, all stakeholders needs should be assessed in order to obtain realistic solutions of the issues. Stakeholders can provide an indication of the stakeholder groups' concerns, the problems the project team faces, and stakeholders' requirements of the projects. This has been confirmed by Olander and Landin (2008) by a case study in Sweden.

6. Assessing stakeholders' behavior: This relates to the capacity and willingness of stakeholders to threaten or cooperate with project teams. Freeman, et al. (2007) sorts out stakeholders into 3 categories: observed behavior, cooperative potential, and competitive threat.

7. Predicting the influence of Stakeholders: According to Olander and Landing (2005), recognizing the stakeholders' influence is important for planning and executing a sufficiently rigorous stakeholder management process. Olander (2007) further developed the stakeholder impact index and considered that analyzing the potential impact determines the nature and impact of stakeholder influence in relations to the project.

8. Assessing Stakeholders Attributes: The power, urgency, legitimacy and proximity of stakeholders need to be assessed in order to enhance the understanding of their needs. It is important to know the ability of stakeholders to control resources, create dependencies and support the interest of project or oppose it is. Thus, a successful project manager needs to understand the "invisible" stakeholders' powers. Also, it is important to know how urgent stakeholders' claims call for attention. The assumptions by stakeholders that the actions of a project are desirable, proper or appropriate within their own norms, values and beliefs need to be known, and the proximity of stakeholders

which can be rated as directly working in the project or remote from the project should be known (Mitchell, et al 1997; Bourne and Walker (2005); Schuman (1995).

9. Analyzing conflicts and coalitions among stakeholders: Analyzing conflicts and coalition among stakeholders is an important step for managing stakeholders and project managers should also search for possible coalition. Freeman (1984) states that the groups who share objectives about the project can more likely form coalitions.

10. Compromising conflicts: As there are various conflicts among stakeholders, it is important for project manager to make decisions on how to compromise them as there can be a positive relationship between conflict resolution and satisfaction of stakeholders Leung, et al (2005). It is necessary for projects organization to be able to make a "win" compromise solution.

11. Promoting a good relationship: In order to deliver a project successfully and meet stakeholders' expectations, it is important to promote good relationship between stakeholders and the project (Jergeas et al, (2000). Trust and commitment among stakeholders can be built and maintained by an efficient relationships management Pinto (1998); Bourne (2005); Karlsen et al,and (2008).

12. Formulating appropriate strategies: The important question is what kind of strategies a project has for stakeholder management. According to Karlsen (2002), stakeholder management strategy is the attitude of project management team and how they treat different stakeholders. Having strategies for responses to the demands presented by the stakeholders are important for successful management of stakeholders.

13. Predicting stakeholders' reactions: When project managers make decisions about strategies to deal with stakeholders it is important to consider their reactions to the strategies. Paying attention to stakeholders' response helps to predict their behavior and this is important in implementing strategy Cleland and Ireland (2002).

14. Analyzing the change of stakeholders: According to Freeman (1984) stakeholders and their influence change over time depending on strategic issue under consideration. The uncertainty caused by stakeholders may include who they are, their influence, their needs and the implications of relationships among them Ward and Chapman (2008).

15. Ensuring effective communication: This is a very important critical success factor as communication is essential for maintaining the support and commitment of all stakeholders Briner et al. (1996). Communication needs to be effective, regular and well planned. According to Weaver (2007), project managers should be highly skilled

negotiators and communicators capable of managing individual stakeholder's expectations and creating a positive culture change within the overall organization.

2.2.2.4. Quality Management Related Factors

1. Definition of quality

Quality can be defined as meeting the legal, aesthetic and functional requirements of a project. Requirements may be simple or complex, or they may be stated in terms of the end result required or as a detailed description of what is to be done. But, however expressed, quality is obtained if the stated requirements are adequate, and if the completed project conforms to the requirements Ardit and Gunayadin (1997). In the construction industry, quality can be defined as meeting the requirements of the designer, constructor and regulatory agencies as well as the owner. According to an American Society of Civil Engineers study Ferguson and Clayto (1998) quality can be characterized as follows.

- Meeting the requirements of the owner as to functional adequacy; completion on time and within budget; lifecycle costs; and operation and maintenance.
- Meeting the requirements of the design professional as to provision of well-defined scope of work; budget to assemble and use a qualified, trained and experienced staff; budget to obtain adequate field information prior to design; provisions for timely decisions by owner and design professional; and contract to perform necessary work at a fair fee with adequate time allowance.
- Meeting the requirements of the constructor as to provision of contract plans, specifications, and other documents prepared in sufficient detail to permit the constructor to prepare priced proposal or competitive bid; timely decisions by the owner and design professional on authorization and processing of change orders; fair and timely interpretation of contract requirements from field design and inspection staff; and contract for performance of work on a reasonable schedule which permits a reasonable profit.
- Meeting the requirements of regulatory agencies (the public) as to public safety and health; environmental considerations; protection of public property including utilities; and conformance with applicable laws, regulations, codes and policies.

2. Quality Planning Process in Construction Projects

Many organizations currently invest in quality improvement programmes. However, the literature has revealed that many companies felt that the quality improvement programmes had fallen short of their expectations and that these programmes were not generating the anticipated improvements Lam (1997). The key reason for this gap between quality improvement expectations and the realization of benefits is the absence of an effective quality planning process before its implementation Juran and Godfrey (2000). Thus, quality planning is identified as the most significant phase in a corporate quality management process requiring more attention.

Quality planning is a disciplined process to ensure that a structured sequence of activities is completed. These activities will ensure that an organization can provide a quality product on time, at the lowest cost and to the customer's specific specifications. Juran (1988) sees quality planning as part of the quality trilogy of quality planning, control and improvement. Juran (1988) pointed out that quality planning as road map, the key elements of implementing company-wide strategic quality planning are identifying the customers and their needs, establishing optimal quality goals, creating measurements of quality, planning processes capable of meeting quality goals under operating conditions and producing continuing results in an improved market share.

Many other quality planning methodologies have been developed. In particular, the quality planning process is emphasized in quality management approaches, such as total quality management (TQM) and the International Standardization of Organizations (ISO). However, Srinidhi (1998) argued that many firms that independently practice various quality management methods fail because these methods are not aligned with the strategic planning of the organization. According to Ford and Evans (2000), the initial emphasis of strategic quality planning on planning for quality through projects resembled the approach of Juran (1988). Leonard and McAdam (2002) further emphasize that organizations need to integrate quality planning and strategic planning to avoid conflict between the two plans because the quality plan will likely to lose out and could result in several disruptive effects, such as a further emphasis on quality measurements, tension between financial and quality

goals and non-involvement of employees and customers in strategic planning Farhan (1999). Thus, the current research on quality planning highlights the importance of strategic quality planning.

The construction industry is viewed as industry with a poor emphasis on quality compared to other sectors, such as the manufacturing and service sectors. In addition to criticisms of the final product, the industry's processes, people and materials are under tremendous pressure to provide a higher quality of construction, as described in the previous section. Despite the perceived importance of the topic and the value of the quality planning process, very little empirical research has been undertaken on quality planning, and the Strategic Quality Process (SQP) in particular, in the construction sector Lam (1997). Studies that directly focus on the quality planning process of Sri Lankan contractors were not found. An undergraduate study by Kumara (1997) has explored the suitability of ISO for Sri Lankan contractors, but information on current practices is still unavailable. This research gap triggered this study, and the next section sets forth the research method adopted for the empirical investigation.

3. Quality Assurance in Construction Projects

According to the American Manual of Professional Practice for Quality (AMPPQ) in the Constructed Project, "Quality Assurance (QA) is a program covering activities necessary to provide quality in the work to meet the project requirements. QA involves establishing project related policies, procedures, standards, training, guidelines, and system necessary to produce quality. The design professional and constructor are responsible for developing an appropriate program for each project. QA provides protection against quality problems through early warnings of trouble ahead. Such early warnings play an important role in the prevention of both internal and external problems". On the other hand, Quality Control (QC) is the specific implementation of the QA program and related activities. Effective QC reduces the possibility of changes, mistakes and omissions, which in turn result in fewer conflicts and disputes.

According to O'Brien (1989) one way in which more attention will be given to quality control is development of a project quality control plan. Presently, testing and inspection requirements are scattered throughout the contract specifications. To

develop a firm plan, the testing and inspection requirements can be combined into a new division of the specifications. This would emphasize quality control and provide an organized location in which all quality control issues are identified to the bidders. As a part of a quality control plan, the manner in which the construction manager will apply quality control procedures should be described to the bidders. This will permit them to assign appropriate costs to the testing procedures.

4. Quality Control in Construction Projects

Quality control is a process by which entities review the quality of all factors involved in production. ISO 9000 defines quality control as "A part of quality management focused on fulfilling quality requirements". Controls include product inspection, where every product is examined visually, and often using a stereo microscope for fine detail before the product is sold into the external market. Inspectors will be provided with lists and descriptions of unacceptable product defects such as cracks or surface blemishes for example. Quality control emphasizes testing of products to uncover defects and reporting to management who make the decision to allow or deny product release, whereas quality assurance attempts to improve and stabilize production (and associated processes) to avoid, or at least minimize, issues which led to the defect(s) in the first place Liang Shilian (2004). Quality Control of Production factors was divided as the following:

- The contents of human control include the overall quality of organization and individual's knowledge, ability, physical condition, psychological state, quality consciousness, behavior, concept of organizational discipline, and professional ethics.
- Materials (including raw materials, finished products, semi-finished products, components and parts) are material conditions of construction, and material quality is one of necessary conditions to ensure construction quality.
- Construction machinery and equipment are essential facilities for the modern construction, reflecting the construction power of the enterprise, and having a direct impact on the project progress and quality.

Actually, the quality control is to make the type and performance parameters of construction machinery and equipment match the conditions, technology and other factors of the construction site. Construction methods are reflected in the concentration of technical solution, process, testing methods, and arrangements of construction procedures for construction adopted by construction contractors. Creating a good environment will play an important role in guaranteeing the quality and safety of construction projects, achieving civilized construction, and setting social image of Construction Corporation. Control of construction environment includes not only the understanding, restriction, transformation and usage of natural environment, but also activities of creating working environment and environment management Cheng Hu (2004). Liang Shilian (2004) had adopted a kind of scientific management procedure and method to do quality control of construction, named PDCA Cycle, which is composed of 4 stages of P (plan), D (do), C (check), A (action). PDCA Cycle is ongoing. The quality goals can be realized and some problems can be solved in each cycle, so that the quality can be improved.

5. Construction Quality Problems

Construction quality problems are generally divided into defects, common problems, and quality accidents. Construction quality defects refer to the phenomenon that technical indicators of construction fall short of the allowance of technical standards. Quality accidents refer to the quality damage with larger loss and influence of the safety of construction structures, functions and form, in the procedure of construction or after delivery for use Phillips (2008). The forms of construction quality problems were different and varied, but the reasons can be mainly summarized in the following aspects: (1) Problems concerning the construction procedures and regulations (2) Problems of design and calculation. (3) Substandard materials and products. (4) Out of control of construction and management. (5) The influence of natural conditions and, (6) Improper use of facilities.

6. Quality and Management (Leadership) commitment

The Business Roundtable construction industry cost effectiveness study concluded that the primary causes for the decline of construction productivity directly or indirectly involved poor management practices The Business Roundtable (1983). Since quality is part of productivity, the first step for management is to recognize that there is a problem.

The success of a TQM program first of all depends on management practices. TQM is a culture and philosophy that must permeate an organization as the method of management Burati (1992). It can thrive only under a senior management that establishes TQM as a top priority. This commitment must be coupled with a thorough understanding of TQM. Only if supported by this commitment and understanding, can senior management lead the company toward the realization of higher quality in its undertakings.

The prominent method of management practiced in the United States today, including the construction industry, is management by control, not by participation. Forced by international competitive pressures and increasing demands for quality products and services, industries are reevaluating the effectiveness of management by control. According to Joiner and Scholtes (1986), in this style of management, the emphasis is on the organizational chart and the key control points within the structure. All managers, beginning at the top, are given certain goals for the next year. They, in turn, set goals and impose controls on each of their subordinates. In construction terms, cost, schedule, and possibly quality goals are established for each project. Project managers are rewarded on the basis of meeting these goals. This method has been somewhat successful. It is simple, logical, and consistent but there are problems when the work gets displaced by the controls themselves Burati (1992). Also, competition to meet short-term goals can lead to internal conflict, adversarial relationships, reduced communication, and accusations

7. Supplier Involvement and Quality

The ability to produce a quality product largely depends on the relationship among the parties involved in the process; the supplier, the processor, and the customer. The quality of any stage in a process is contingent upon the quality of the previous stages. The quality of the project built by the constructor is directly related to the quality of the plans and the specifications prepared by the designer, the quality of the equipment and materials supplied by the vendors, and the quality of work performed by the subcontractors. Close and long-term relationships with these suppliers to the construction process are required if the constructor is to achieve the best economy and quality Oberlender (1993).

Traditionally, in the construction industry, contractors, subcontractors, and vendors are all pitted against one another to compete on the basis of low-bid contracts. Yet, the fourth of Deming (1986) recommendations for reaching a high level of quality stresses those companies must end the practice of awarding business on the basis of price tag alone. According to Peters (1987) successful projects in the future are likely to be decided based on quality, life-cycle costs (not initial cost), and supplier responsiveness, which can only be achieved through partnership relationships; these relationships will involve fewer suppliers, and they are expected to be based on mutual trust. This is already being proven true in certain areas of the industrial construction market. Long-term partnering agreements have been formed between a number of owners and contractors. Some owners are requiring their contractors to have formal TQM programs, and both owners and contractors are requiring their vendors to implement TQM if they wish to be considered for future work Joiner (1986).

8. Quality and Employee Training

The importance is recognized by every quality expert. Under TQM, quality becomes everyone's responsibility and the training must be targeted for every level of the company. There should be customized training plans for management, engineers, technicians, home and field office staff, support personnel and field labor Smith (1988). It can be argued that the transient construction work force is quite different from the relatively stable manufacturing work force. This transient nature may make

it more difficult to train workers, particularly craft labor, for the construction industry Burati et al. (1992). However, there are many aspects, such as training and awareness that are similar between the safety consciousness of construction firms and the implementation of TQM concepts. Many US construction companies that had safety forced upon them with the formation of the Occupational Safety and Health Administration have proven the cost effectiveness of their safety programs and now use their safety records as a marketing tool. Some of the same techniques used to install safety awareness in craft labor may be adaptable to instill similar quality awareness. It is easy to envision using a good quality performance record as a strong marketing tool. If TQM concepts become widely accepted throughout the construction Oberlender (1993) industry, workers switching from one company to another should require less TQM training since all workers would have received basic quality awareness in their previous employment Burati et al., (1992). The training effort may include instruction in the basics of TQM, cause-and-effect analysis, team problem solving, interpersonal communication and interaction, rudimentary statistical methods and cost of quality measurement. A study of TQM in more than 200 companies found that skills in human interaction, leadership, and initiative are instrumental to the success of any quality improvement effort.

The demands on these interpersonal skills increase as the complexity and sophistication of the technical systems increase. The training effort follows a specific plan, and its implementation and effectiveness are carefully tracked. It is initiated in a limited number of pilot teams. The success stories of the pilot teams are then used to fuel the training effort. Follow-up training is essential, and is part of the overall training plan and a job requirement for each individual. The training of employees in the design phase was found to be not very important, in the construction phase moderately important, and in the operation phase very important by the respondents in Gunaydin's (1997) study of TQM in US construction projects Gunaydin (1997). It follows that operation and maintenance crews working in constructed facilities should be the main recipient of training efforts, Findings are parallel to ISO 9001 which emphasizes the importance of training and underlines that activities

demanding acquired skills should be identified and the necessary training provided Doyle (1994).

2.2.3. Project Success and Project Performance

Al-Momani (2000) stated that the success of any project is related to two important features, which are service quality in construction delivered by contractors and the project owner's expectations. Managing the construction so that all the participants perceive equity of benefits can be crucial to project success. It is obtained that the complete lack of attention devoted to owner's satisfaction contributes to poor performance. Declining market shares, low efficiency and productivity, and the rapid construction cost escalation also lead to poor performance.

2.2.4. Performance of Construction Projects

To perform is to take a complex series of actions that integrate skills and knowledge to produce a valuable result Elger (2008). Project performance has been defined as the degree of achievement of certain effort or undertaking which relates to the prescribed goals or objectives that form the project parameters Ahmad, Ismail, Nasid, Rosli, Wan and Zainab (2009). The key requirements of suitable performance measures and measurement frameworks are identified as including, having a few but relevant measures, being linked with critical project objectives, providing accurate information, and comprising financial and non- financial measures Ankrah and Proverbs (2005). There are many potential measures of performance for evaluating the success of a construction project. All address performance in three key areas: scope, schedule and budget Alvarado, Silverman and Wilson (2005). Akintoye and Takim (2002) discovered seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service and three company performance indicators. Namely: safety, profitability and productivity.

2.2.5. Performance Indicators

The UK working groups on Key Performance Indicators (KPIs) have identified 10 parameters for benchmarking projects in order to achieve a good performance in

response to Egan's report (1998). However, most of these indicators, such as construction cost, construction time, defects, client satisfaction with the product and service, profitability and productivity, promote result-orientated thinking, whereas predictability of design cost and time, and predictability of construction cost and time, and safety can be regarded as process-orientated thinking. There are no suggestions for performance indicators in benchmarking projects at the project selection phase i.e., analysis stage, when the client and end-user's requirements need statements and the delivery strategy are determined. According to Dvir et al., (unpublished paper, 2002), the output of the requirements at the analysis stage will most likely determine the output of the entire development process. They indicate that the origination and initiation phase, in which major decisions are made, such as decisions on the project's objectives and planning the project's execution, has the most influence on the project's success. The issue is much more serious when the kind of activities that should be undertaken depends on the outcome of earlier activities. It is therefore important to identify parameters (performance indicators) for benchmarking projects at the project selection phase in order to achieve good project performance. Posten (1985), who found that 55% of all defects in research and development projects occur during requirement analysis and specification, earlier documented this position, whereas 43% of all defects are not found until after the testing stage. It is not surprising that the same situation is applicable to construction projects.

2.2.6. Research Gaps

Biyadglign (2017) studied assessment of construction performance challenges in selected university building construction projects located in southern Ethiopia. Mekdes (2017) studied factors affecting road project implementation. Ephrem, Tabish and Kumar (2017) studied Ephrem, Tabish and Kumar (2017) studied critical factors affecting no dispute performance of Ethiopia public construction projects. Abera and Fekadu (2016) assessed also factors affecting the performance of construction projects in oromia region. Finally, Samson and Lema (2002) investigated the development of construction contractors' performance measurement framework.

According to previous studies, it can be said that the performance measurement is a process include factors as Key Performance Indicators (KPIs) such as time, cost, quality, client satisfaction; productivity and safety in order to enable measurement of current organizational project performance and to achieve significant performance improvements of future projects.

It was obtained that there were many fields and topics which are related to performance such as, construction project and performance, factors affecting performance of construction projects such as resource, stakeholder, quality and procurement management related factors. It was also able to review measurement of project performance and key performance indicator

The key performance indicators are used to evaluate performance of construction projects. These indicators can then be used for benchmarking purposes, and would be used be as a key component of any organization to move towards achieving best practice and to overcome performance problem in defense construction. Based on previous studies and literature review, the most important indicators which were studied in this research are time performance, cost performance, and quality performance (measured in construction defect and client satisfaction). Furthermore, this paper made an attempt to identify factors that affect the performance of construction projects from resource, stakeholder, procurement, and quality management perspectives.

2.2.7. Conceptual Framework

The conceptual framework in this study was used to show various variables that affect the performance of construction projects.
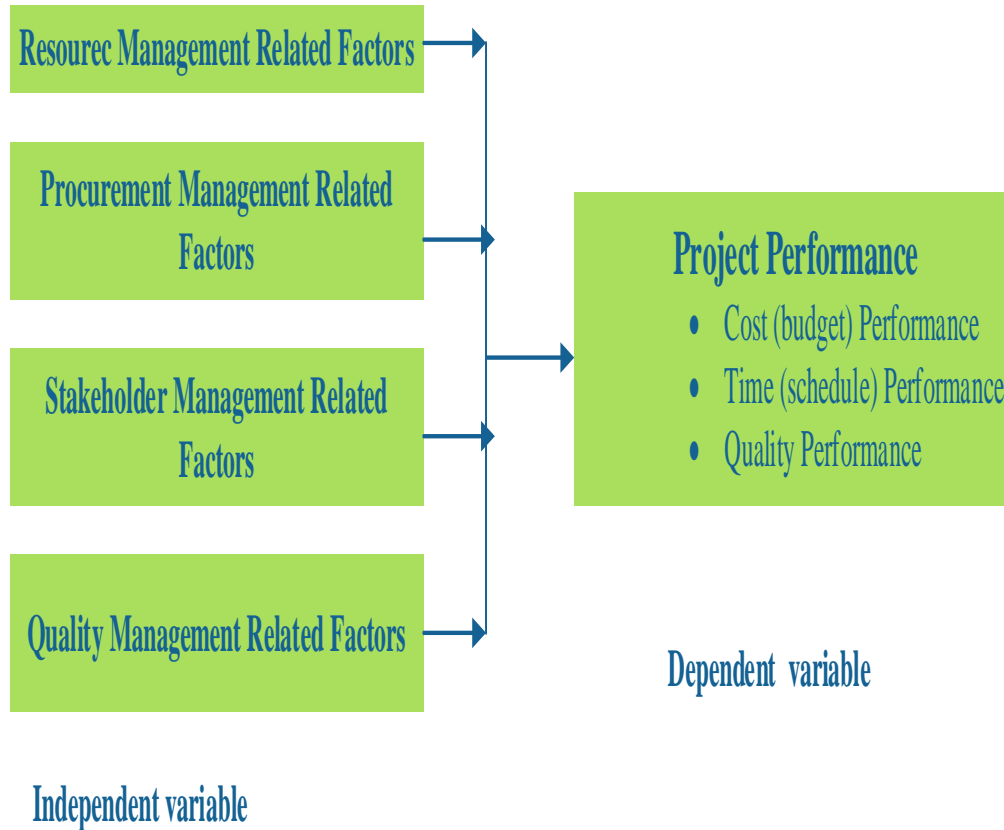
Source: own construction (2018)

Figure 2.1.Conceptual framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter outlines the methodology used in the research study. It describes the type of research design that was used, target population, sample size and sampling procedure, Research instruments, a description of tools used in collecting the data, the measurement of variables and the techniques used in analyzing the collected data reliability of data collection instruments, data analysis techniques and ethical considerations.

3.2. Research Design and Approach

3.2.1. Research Approach

The researcher adopted quantitative approach to research. Quantitative research involves the collection of data so that information can be quantified and subjected to statistical treatment in order to support or refute "alternate knowledge claims" Creswell (2003). Creswell (2002) asserts that quantitative research originated in the physical sciences. The researcher uses mathematical models as the methodology of data analysis. Three historical trends pertaining to quantitative research include research design, test and measurement procedures, and statistical analysis. Quantitative research also involves data collection that is typically numeric and the researcher tends to use mathematical models as the methodology of data analysis.

3.2.2. Research Design

The researcher used descriptive and explanatory type of research method. These types of research method help the researcher describe and explain the actual performance indicators and the variables or factors affecting construction project performance in defense construction enterprise.

3.3. Data Sources

This study used both primary and secondary data sources. Primary sources of data include close ended questionnaire in that the respondents' level of agreement

towards factors affecting the performance of the projects was assessed. Likewise, 8 years cost and time performance of completed and ongoing 41 road and building projects data was taken from project contract document and annual financial and physical performance report of the project. In addition, in order to identify the factors affecting construction project performance various literature reviews was reviewed.

3.4. Target Population

The target population for the study was project managers, top manager, middle manager, lower manager, and senior site and office engineers. There are 23 project manager, 56 office and site engineers, and 39 top, middle, and lower level managers. This gives a total population of 114. A summary of the population is given below:

Table 3.1: **Sampling Frame**

Population Description	number	%
Project Manager	23	20.2%
Senior Office Engineer	26	22.8%
Senior Site Engineer	26	22.8%
Top Management	8	7.0%
Middle Manager	11	9.6%
Lower Level Manager	20	17.5%
Grand Total	114	100%

Source: DCE Human Resource and General Administrative Department

3.5. Sampling Procedure

Proportional purposive sampling procedure was applied in order to select sample from each category of respondent. Yamane (1967) provides a simplified formula to calculate sample sizes.

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

Where
- n is the sample size,

- N is the population size,
- e is the level of precision.

Given the total population of 114 and 95% level of significance (5% level of precision) , the sample size is assumed to be 89 (78%) of the target population.

3.6.   Sampling Frame

Given the proportionate of the sample, the sample distribution is given below

Table 3.2: Sample

Respondent category	number	%
Project Manager	18	20.2%
Senior Office Engineer	20	22.8%
Senior Site Engineer	20	22.8%
Top Manager	6	7.0%
Middle Manager	9	9.6%
Lower Level Manager	16	17.5%
Grand Total	89	

Source: own construction (2018)

3.7.   Data Collection tool

3.7.1.   Questionnaire

Questionnaires were distributed to top, middle, and lower level managers, and senior office and office engineers as well as to project managers who are located in Addis Ababa and outside Addis Ababa. The research evidence was gathered by using close-ended questionnaires.

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. For each of measurement, there are /is an appropriate method/s that can be applied and not others. In this research, ordinal scale was used. Ordinal scale is a ranking or a rating data normally uses integers in

ascending and descending order. Hence, the questionnaires will be structured based on those used by Iyoha and Faboyede (2011), and Sharif (2010). With regard to the close- ended questions, the respondents will be asked to indicate their level of agreement on a five-point Likert scale with the following ratings.

Item	Strongly Agree	Agree	neutral	Disagree	Strongly Disagree
Scale	(5)	(4)	(3)	(2)	(1)

On this scale a score of 5 or 4 indicates that the item is perceived to be essential while a score of 3 or 2 indicates that the item is perceived to be fairly important, but not essential, while a score of 1 indicates that the item could be disregarded for being unimportant. Similar scales have been used by Courtis (1992) and Iyoha and Faboyede (2011) and is found suitable. With respect to the open-ended questionnaires the respondents were asked to provide open ended responses to the questions that require opinion and if they have opinions they feel the researcher would find useful.

The relative index technique has been widely used in construction research for measuring attitudes with respect to surveyed variables. Several researches use the relative importance index in their analysis. The respondents will be asked to gauge the identified interface problems on a five-point Likert scale (1 for the not significant to 5 for the extremely significant). Based on the survey response, a relative the strongly agree). Based on the survey response, a relative importance index was tabulated using the following equation. (et tal Hallay, Tayeh,2015)

$$\textbf{Relative Importance Index} = \sum \frac{\textbf{W}}{\textbf{AN}} = \frac{\textbf{5n5+4n4+3n3+2n2+1n1}}{\textbf{5N}}$$

Where W is the weighting given to each factor by the respondent, ranging from 1 to 5, (n1 = number of respondents for strongly disagree, n2 = number of respondents for disagree, n3 = number of respondents for neutral, n4 = number of respondents for

agree, n5 = number of respondents for strongly agree). "A" is the highest weight (i.e. 5 in the study) and N is the total number of samples.

3.8. Method of Data Analysis

The component part of descriptive statistics such as **Mean** and **Standard Deviation** is used while analyzing and ranking the different factors that affects the performance of the project. In addition to the above, the study uses graphs, tables and other components which are also vital to analyze the collected data.

Furthermore, the relationship between the dependent variable, project performance and the independent variables such as project resource management related factor, procurement management related factors, and quality management related factors, are expressed as a linear combination of the independent variables plus an error term.

Following Greene (2003), the multiple linear regression models is specified as:

$$Y = \beta 0 + \beta 1 X_1 + \beta 2 X_2 + \beta 3 X_3 + \beta 4 X_4 + \varepsilon$$

Where: Y= Project Performance

β_0- Constant term

X1= Resource Management Related Factor

X2= Stakeholder Management Related Factor

X3= Procurement Management Related Factors

X4= Quality Management Related Factors

Where the β_S are coefficients of independent variables, Xs are column vectors for the independent variables in this case; resource management related factor, stakeholder management related factor, procurement management related factors, and quality management related factors, while ε is a vector of errors of prediction. The error was assumed to be normally distributed with an expected value of zero and a common variance.

To do so, the study uses **IBM SPSS 25** which was released on August, 2017, is the most suitable for descriptive statistics and quantitative analysis.

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3.9.   Reliability of the Instruments

This section presents test of reliability of questionnaire according to the pilot study. The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring Polit and Hunger (1985). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient Polit and Hunger (1985).

Cronbach's coefficient alpha George and Mallery (2003) is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing? Cronbach's alpha is used here to measure the reliability of the questionnaire between each field. The normal range of Cronbach's alpha value between 0.0 and + 1.0. The closer the Alpha is to 1, the greater the internal consistency of items in the instrument being assumed. The formula that determines alpha is fairly simple and makes use of the items (variables), k, in the scale and the average of the inter-item correlations, r:

$$\alpha = \frac{k\,r}{1+(k-1)\,r}$$

As the number of items (variables) in the scale (k) increases, the value of α becomes large and also if the inter correlation between items is large, the corresponding α is large. Since the alpha value is inflated by a large number of variables then there is no set interpretation as to what is an acceptable alpha value. A rule of thumb that applies   to   must   situations is:

$0.9 \le \alpha \le 1.0$	Excellent
$0.8 \le \alpha < 0.9$	Good
$0.7 \le \alpha < 0.8$	Acceptable
$0.6 \le \alpha < 0.7$	Questionable
$0.5 \le \alpha < 0.6$	Poor
$0.0 \le \alpha < 0.5$	Unacceptable

Table 3.3 shows the   values   of   Cronbach's

Alpha for each filed of the questionnaire and the entire questionnaire. For the fields, values of Cronbach's Alpha were in the range from 0.60 and 0.92. This range is considered high; the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha equals 0.94 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire. Thereby, it can be said that it is proved that the questionnaire is valid, reliable, and ready for distribution for the population sample.

Table 3.3: Cronbach's Alpha for each filed of the questionnaire

s.n	Factors	Cronbach alpha value
1	Project resource management related factor	0.6
2	Project procurement management related factors	0.91
3	Project stakeholder management related factors	0.92
4	Project quality management related factors	0.82
5	Project performance	0.88
	Overall	0.94

Source: own source (2018)

3.10. Ethical considerations

Ethics is one of the major considerations in research. The study is subject to the following ethical considerations. The research work was started after getting the willingness of the stated organization. Respondents were clearly communicated about the objective of the research before they are asked to give their answer. There was no physical or psychological damage to the respondents because of the research. Respondents were not asked about their name, race, religion, etc.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter provides an analysis of data collected from the survey and secondary data source. The results were presented in tables to highlight the major findings. They were also presented sequentially according to the research questions of the study. Mean scores, standard deviations and mean of mean was used to analyze the data collected. The raw data was coded, evaluated and tabulated to depict clearly the results of factors influencing construction projects costs management in defense construction enterprise.

4.2. Socio-Economic Characteristics of Respondents

This chapter deals with discussions and results of the study. It is based on the information collected from survey. 89 questionnaires were distributed for employees working at defense construction enterprise and **77** questionnaires were responded. The response rate is 87%, which is assumed to be sufficient for further analysis.

Table 4.1: Respondent Educational Level, Work Experience, and Job Position

	Characteristics	N (%)
	Educational Level	
1	Degree	56 (72.7)
2	Second degree and above	21 (27.3)
	Total	**77 (100)**
	Work experience	
1	Below 5 year	11 (14.3)
2	6 – 10 year	32 (41.6)
3	11- 15 year	20 (26)
4	Above 15 year	14 (18.2)
	Total	**77 (100)**

Source: own survey (2018)

The above table shows the respondents educational level, work experience, and job position of respondents. Most of (72.7%) were first degree holders. In the case of work experience, most of the respondents were between the range of 6 and 10 years which indicated that most of respondents were assumed to be young.
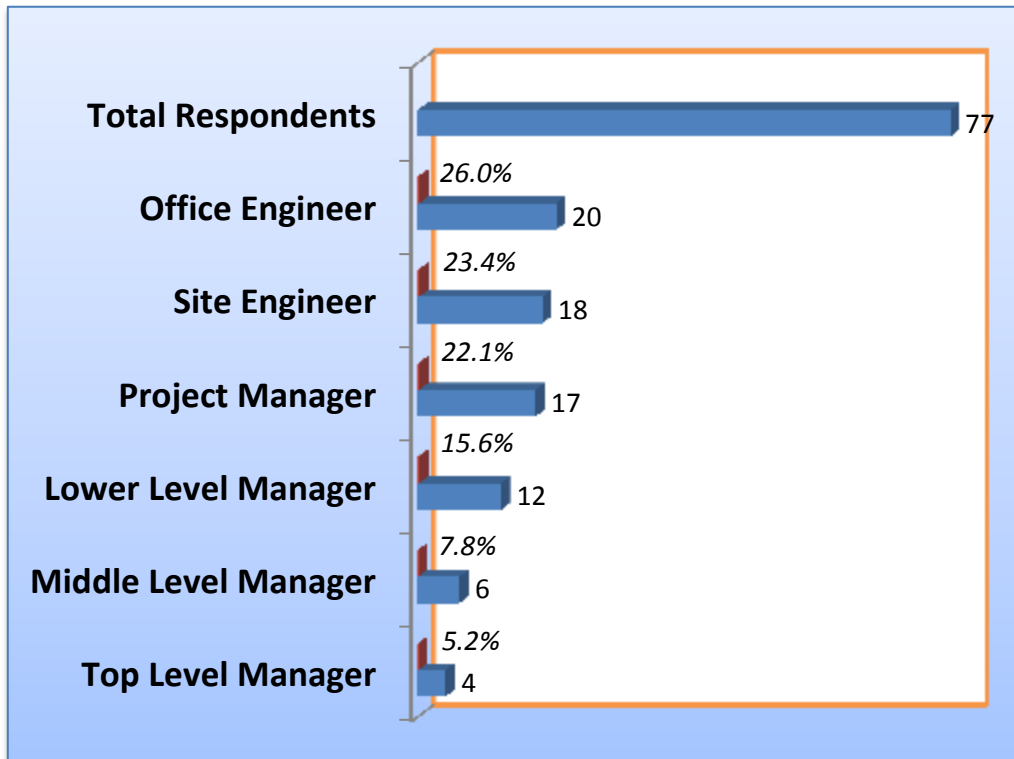
Source: own survey (2018)

Figure 4.1: Job Position of Respondents

Figure 7 shows majority of respondents' job position was site engineer, office engineers, and project manager, which account 26%, 23.4%, and 17% respectively. This implies that most of respondents are people who are actually engaged in the construction process that provided important information to the study.

4.3. Perceived Factors Affecting the Performance of Construction Projects

4.3.1. Perception on the Performance of Construction Projects

The respondents' level perception towards the performance of construction projects is presented in the following table.

Table 4.2: overall Performance of Construction Projects

S.N	Project Performance	N	Mean	SD	Rank
1	The enterprise do not completes projects within the contract schedule (time).	77	4.74	0.55	1
2	The enterprise do not completes projects as per the contract cost	77	4.47	0.64	2
3	Projects are not completed and transferred to client without defects.	77	4.39	0.57	3
4	There is no client and user satisfaction with construction product of the enterprise	77	4.18	0.93	4
	overall mean score	**77**	**4.44**	0.67	

Source: Survey Data (2018)

Table 4.2 shows that most respondents (mean =4.74 and SD=0.55) agree that the enterprise is unable to completes projects within the contract schedule. Likewise, most of the respondents (mean= 4.47 and SD= 0.64) agreed on the view that the enterprise do not completes its projects as per the contracted cost. There is also an agreement among respondents as there is transfer of projects to clients with defects and as there is dissatisfaction among the client and user with the completed projects. Overall, most Respondents agreed that the performance of projects in terms of time, cost, and quality (which is measured defect and client satisfaction) is poor.

4.3.2. Perceived Resource Management Related Factors

Table 4.3: Perceived Resource Management Related Factors

S.N	Resource Management Related Factors	N	Mean	SD	Rank
1	There is cash flow and financial difficulties faced by the enterprise	77	4.64	0.67	1
2	There is price escalation of construction material in the market.	77	4.56	0.60	2
3	There is material wastage on projects	77	4.48	0.64	3
4	There is breakdown and failure of construction equipment in the enterprise.	77	4.48	0.66	4
5	There are changes in material types and specifications during construction.	77	4.38	0.69	5
6	There is no adequate availability of construction material in the market	77	3.97	0.65	6
7	There is payment delay by project owner.	77	3.92	1.13	7
8	There is lack adequate Health and safety for employees at the projects site.	77	3.90	0.91	8
9	There is lack of productivity of labors in the projects	77	3.84	1.14	9
10	There is unavailability of construction equipment and spare parts in the enterprise	77	3.73	0.95	10
11	Project teams have no adequate skill and knowledge of Supervision.	77	3.40	0.86	11
12	There is lack of highly qualified and experienced personnel in the enterprise.	76	3.38	1.11	12
	overall mean score		**4.06**	**0.83**	

Source: survey data (2018)

Table 4.3 shows respondents' perception level towards resource management related factors affecting the performance of the projects.

Cash flow and financial difficulties faced by the enterprise was ranked first by respondents with mean= 4.64 and SD =067. This mainly because cash flow affects the project budget and project cost performance. This result is in agreement with Samson and Lema (2002) because cash flow can give an important evaluation for the cost performance at any stage of project.

Price escalation of construction material in the market was considered by respondents as the second most important (mean = 4.56 and SD =0.60) factor that

affect the performance of projects. This escalation of material prices affect the liquidity of contractors and profit rate of their projects.

Material Wastage on projects was ranked as the third most important resource related factor (mean = 4.48 and SD = 0.64) that affect the performance of the projects. This result is in line with Shaban (2008) where material wastage on the project site was ranked

Respondents' ranked failure of construction equipment and Changes in material types and specifications during construction as the as fourth and fifth important factor that affect the performance of projects respectively.

Unavailability of construction material in the market was ranked sixth by respondents with mean =3.97 and SD = 0.65. This factor affects directly and practically on project performance such as time. If resources are not available as planned through project duration, the project will suffer from problem of time and cost performance. This result is in line with Samson and Lema (2002) as it is remarked that resource availability effects on processes performance of construction projects. In addition, Iyer and Jha (2005) and Ugwu and Haupt (2007) are in agreement with our result because availability of resources as planned through project duration is an important factor for owners in Indian and South African construction projects. This is because resource availability as planned schedule can improve time performance of projects

Respondents were also agree payment delay by project owner, poor Health and safety for employees at the projects site, low productivity level of labors, unavailability of construction equipment and spare parts, lack of skill and knowledge of Project teams, and lack of qualified and experienced personnel in the enterprise affect the performance of projects.

4.3.3. Perceived Procurement Management Related Factors

Table 4.4: Perceived Procurement Management Related Factors

S.N	Procurement Management Related Factors	N	Mean	SD	Rank
1	There is lack of an effective and efficient Procurement planning	77	4.55	0.66	1
2	There is lack of an effective procurement control mechanism in the enterprise	77	4.43	0.79	2
3	There is lack of an effective and efficient contract management in the enterprise.	77	4.18	0.87	3
	overall mean score	77	4.39	0.77	

Source: survey data (2018)

Table 4.4 shows procurement management related factors that affect the performance of projects. Lack of efficient and effective procurement planning in procurement related factors was ranked first by respondents with mean =4.55 and SD = 0.66.The lack of an effective and efficient procurement planning affect the overall performance of the projects. The result is in line with Gerald, (2014) who states effective planning of procurement creates value for stakeholders while improving performance of the project.

Lack of an effective and efficient procurement control and contract management mechanism in the enterprise was ranked as second and third factors relating to procurement management related factors with mean =4.43 and 4.18 and SD= 0.79 and 0.87 respectively.

4.3.4. Perceived Stakeholder Management Related Factors

Table 4.5: Perceived Stakeholder Management Related Factors

S.N	Stakeholder Management Related Factors	N	Mean	SD	Rank
1	The enterprise do not assesses Attributes (power, urgency, and proximity) of Stakeholders	77	3.88	0.99	1
2	There is lack of Stakeholders 'Involvement in Decision Making process in the enterprise	77	3.86	0.84	2
3	The enterprise do not identifies its Stakeholders Properly.	77	3.83	0.95	3
4	The enterprise do not communicates with and engaging stakeholders properly and frequently	77	3.73	0.95	4
5	The enterprise do not keeps and promote good relationships with stakeholders	77	3.53	1.03	5
6	The enterprise do not maintains alignment among stakeholders	77	3.38	0.93	6
7	The enterprise do not properly understands area of Stakeholders' interests	77	3.32	1.14	7
8	The enterprise do not formulates appropriate Strategies to manage Stakeholders	77	3.26	0.97	8
9	The enterprise do not Evaluate the Stakeholder Acceptability	77	3.26	1.02	9
10	The enterprise do not predicts stakeholders 'reactions for implementing the strategies	77	3.25	1.08	10
	overall mean score	77	3.53	0.99	

Source: survey data (2018)

Lack of assessment of stakeholders' attribute (power, urgency, and proximity) by the enterprise was ranked first by respondents with mean= 3.88 and SD =099. The power, urgency, legitimacy and proximity of stakeholders need to be assessed in order to enhance the understanding of their needs. The result is in line with Sheng and Wei (1996) that quality of a construction project is largely dependent on the attitudes of different stakeholders such as client, contractor and consultant.

Lack of Stakeholders Involvement in Decision Making process in the enterprise was ranked second by respondent with mean = 3.83 and SD =0.95. This result is in line with Kolltveit and Grønhaug (2004) that suggests Effective and efficient involvement

of project participants will better assist in improving the total quality of a constructed project and will significantly leads to greater project value.

Lack of Stakeholders identification in the enterprise was ranked third by respondent with mean = 3.86 and SD =0.84. This factor is important as it answers the questions of "who are the project stakeholders that affect the performance of projects. This helps the project manager to manage individuals or groups of stakeholders accordingly, and this is in line with Prisca (2017).

Lack of proper and frequent communication and engagement with stakeholders in the enterprise was ranked forth by respondents to affect the performance of projects. This is a very important critical success factor for projects as communication is essential for maintaining the support and commitment of all stakeholders. This result is in line with Prisca et'al (2007), which states that communication needs to be effective, regular and well planned if, project to be success.

4.3.5. Perceived Quality Management Related Factors

Table 4.6: Perceived Quality Management Related Factors

S.N	Quality Management Related Factors	N	Mean	Std. Deviation	rank
1	There is lack of an effective quality planning, assurance and controlling system in the enterprise.	77	4.2	0.8	1
2	There is lack of management commitment and leadership towards quality in the enterprise.	77	3.8	1.0	2
3	There is lack of an involvement of suppliers to enhance projects quality performance.	76	3.5	1.0	3
4	The enterprise do not provides adequate training to enhance the quality of project performance.	77	3.1	1.1	4
	overall mean score	77	3.6	1.0	

Source: survey data (2018)

Lack of an effective quality planning, assurance and controlling system in the enterprise was ranked first by respondents with mean= 4.2 and SD =0.8 that affect the performance of projects. This mainly is the role of quality management for a construction company is not an isolated activity, but intertwined with all the

operational and managerial processes of the construction project. This result is in agreement with Mane and Patil (2015) which states the quality management system has to provide the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a construction project.

Lack of management commitment and leadership towards quality in the enterprise was ranked second by respondents with mean= 4.2 and SD =0.8 that affect the performance of projects. This result is in line with Low et al. (2004) commented that top management commitment is one of the elements that would reflect quality management performance measures in construction firms. Chin et al. (2003) found that top management commitment is the most critical factor for the successful implementation of ISO 9000.

4.4. Inferential Statistics

Inferential analysis was conducted to generate the regression and correlation results. Regression results included the model of fitness, analysis of the variance and regression coefficients. Before undertaking the correlation and regression, the mean score of each item in the independent variable and dependent variable (mean of performance indicators) was computed using SPSS.

4.4.1. Correlation

The study findings were subjected to correlation analysis to determine the relationship between independent and dependent variable. The table shows the correlation between independent variable (resource, procurement, stakeholder, and quality management related factors and) and dependent variable (performance of projects). Pearson correlation coefficient is a measure of linear dependence between two variables: independent and dependent variable. The researcher correlated the factors influencing projects against projects performance. The results are provided in Table 4.7.

Table 4.7: Pearson Correlation Coefficient Matrix

		Quality Management	Resource Management	Stakeholder Management	Procurement Management
Time Performance	Pearson Correlation	0.196^{**}	0.406	0.377^{**}	0.265^{*}
	Sig. (2-tailed)	0.000	0.042	0.000	0.01
	N	77	77	77	77
Quality Performance	Pearson Correlation	0.495^{**}	$.424^{**}$	$.475^{**}$	$.0401^{**}$
	Sig. (2-tailed)	0.000	0.000	0.000	0.000
	N	77	77	77	77
Cost Performance	Pearson Correlation	0.133	0.604^{**}	0.636^{**}	0.309^{**}
	Sig. (2-tailed)	0.23	0.000	0.000	0.00
	N	77	77	77	77

*. Correlation is significant at the 0.05 level (2-tailed).

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

Correlation analysis results between resource, stakeholder, procurement and quality management related factors and time performance attained a positive correlation coefficient of 0.40, 0.37, 0.26, and 0.19 with a p-value of 0.0042, 0.000, 0.000, and 0.01 respectively. This was an indication that the result was significant at α= 5%, and if resource, stakeholder, procurement and quality management is improved, it would improve projects performance in terms of time. Correlation analysis results between resource, stakeholder, procurement and quality management related factors and quality performance attained a positive correlation coefficient of 0.42, 0.47, 0.40, and 0.49 respectively with a p-value of 0.000. This was an indication that the result was significant at α= 5%, and if resource, stakeholder, procurement and quality management is improved, it would improve projects quality performance.

Correlation analysis results between resource, stakeholder, procurement and quality management related factors and quality performance attained a positive correlation coefficient of 0.60, 0.63, 0.30, and 0.13 respectively with a p-value of 0.000. This was an indication that the result was significant at α= 5%, and if resource, stakeholder, procurement and quality management is improved, it would improve projects cost performance.

4.4.2. Regression Result

The results of linear regression analysis are given in the following table (Table 4.8). The model summary shows that the regression model can explain 43.1 % of the variance in the dependent variable.

Table 4.8: Results of Multiple Regression Analysis

Model	Parameter Coefficients (B)	Standard error	t-value	Significance level (P)
(Constant)	1.517	0.462	3.286	0.002
Resource Management Related Factors	**0.234**	0.134	2.038	**0.045**
Procurement Management Related Factors	0.115	0.091	1.079	0.284
Stakeholder Management Related Factors	0.369	0.095	3.235	**0.002**
Quality Management Related Factor	0.109	0.076	1.110	0.271
F statistics	(4, 77) = 13.647 ,0.00)			
R^2 (R^2 adj.)	0.431 (0.400)			

Source: survey data, 2018

As shown in above Table, the coefficients of the regression for resource management related factors (0.000, $p < 0.05$), stakeholder management related factors (0.000, $p < 0.05$), and procurement management related factors (0.005, $p < 0.05$) are positively and significantly influence project cost performance. This implies the null hypothesis that there is significant and positive relationship between resource, stakeholder, and procurement management related factors and project cost performance is accepted. On other hand, quality management related factors was found positive but not significant factor influencing the cost performance of project. This implies the null hypothesis that there is significant and positive relationship between quality management related factors and project cost performance is rejected.

Also the coefficients of the regression for resource management related factors (0.003, $p < 0.05$) and stakeholder management related factors (0.004, $p < 0.05$) are positively and significantly influence project time performance. This implies the null hypothesis that there is significant and positive relationship between resources and stakeholder management related factors and project time performance is accepted. On other hand, quality management related factors was found positive but not significant factor influencing the time performance of project. This implies the null hypothesis that there is significant and positive relationship between quality and procurement management related factors and project cost performance is rejected.

Furthermore, the coefficients of the regression for resource management related factors (0.006, $p < 0.05$), stakeholder management related factors (0.004, $p < 0.05$), and quality management related factors (0.000, $p < 0.05$) are positively and significantly influence project quality performance. This implies the null hypothesis that there is significant and positive relationship between resource, stakeholder, and quality management related factors and project quality performance is accepted. On other hand, quality management related factors was found positive but not significant factor influencing the cost performance of project. This implies the null hypothesis that there is significant and positive relationship between procurement management related factors and project cost performance is rejected.

As has been reported in the study of Johor state of Malaysia by Memon, Rahman, Asmi, Aziz, & Ravish (2011), it was observed that Construction resources management has a high and significant relationship with cost performance for successful projects. Furthermore, Enshassi (2009) found that resource related factors such as increment of construction materials prices, shortage of cash, delay in payment; fluctuations in the cost of construction materials, and resources constraint of funds were among factors affecting construction performance.

From the regression analysis, it is noticed that one of the influential factors for project performance is stakeholder management related factors. This finding is in line with the study by Mbiti (2017) that statistically significant relationship between Stakeholder management and Effective Implementation of project in Kenya.

Results of Multiple Regression Analysis in table 15 shows that there exists a positive but statistically insignificant (0.284, $p > 0.05$ relationship between procurement management related factors and project performance. The study result contradicts the findings of Aputo (2018) who established that procurement planning and contract management have an effect on Project Performance. Likewise, there is exist a positive but statistically insignificant (0.271, $p > 0.05$ relationship between quality management related factors and project performance. The result is in line with the findings of Leong, Zakuan, Mat Saman, Ariff, & Tan (2014)) indicate that client satisfaction and time variance have positive and significant relationship with quality management system while other project performance indicators such as cost do not show significant results.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter concentrates on the analysis and interpretation given in chapter four. A lot of findings emerged from the study following the presentation of data. Therefore, summary of findings, conclusion and recommendations is based on the objectives of this study as well as the recommendations of the researcher.

5.2. Summary of Major Findings

The study was based on the factors affecting the construction projects performance in defense construction enterprise. It sought to investigate whether resource management, procurement management, stakeholder management, and quality management related factors influence projects performance. Based on the objectives of the research stated, the following summaries were made in relation to the findings:

- The survey revealed that the major resource management related factors that affect the performance of the projects are cash flow and financial difficulties, price escalation of construction material in the market. Material wastage on projects, breakdown and failure of construction equipment in the enterprise, changes in material types and specifications during construction, and unavailability of construction material in the market.

- The survey revealed that the major procurement management related factors that affect the performance of the projects are lack of an effective and efficient Procurement planning, procurement control mechanism, and contract management in the enterprise.

- Most of respondents agreed that the major stakeholder management related factors that affect the performance of the project are lack of stakeholder attribute assessment, lack of Stakeholders involvement in decision making process, lack of stakeholder identification, and lack of stakeholder communication and engagement.

- Most of respondents agreed that among quality management related factor that affect the performance of projects, lack of quality management system

and lack of management commitment and leadership towards quality were the two most important factors that affect the performance of projects.

- The regression result reveals resource, stakeholder, and procurement related factors are positively and significantly influence the project cost performance. Also, regression result reveals resource and stakeholder management factors are positively and significantly influence the project time performance .On other hand, resource, stakeholder, and quality related factors are positively and significantly influence the project quality performance.

5.3.   Conclusion

Based on the objectives of the research stated, the following conclusions were made in relation to the findings:

- Cash flow and financial difficulties, price escalation of construction material in the market. material wastage on projects, breakdown and failure of construction equipment in the enterprise, changes in material types and specifications during construction, and unavailability of construction material in the market were the major resource management related factors that influence the performance of projects

- Lack of an effective and efficient Procurement planning, procurement control mechanism and contract management in the enterprise were the most important procurement management related factors that influence the performance of projects.

- Lack of stakeholder attribute assessment, lack of Stakeholders involvement in decision making process, lack of stakeholder identification, and lack of stakeholder communication and engagement were the most important stakeholder management related factor factors that affect the performance of projects.

- Lack of quality management system and lack of management commitment and leadership towards quality were the two most important quality management factors that affect the performance of projects.

- Finally, the regression result reveals resource, stakeholder, and procurement related factors are positively and significantly influence the project cost performance but quality management related factors were found positive but not significant factor influencing the cost performance of project. Also, regression result reveals resource and stakeholder management factors are positively and significantly influence the project time performance but quality and procurement management related factors were found positive but not significant factor influencing the time performance of project. On other hand, resource, stakeholder, and quality related factors are positively and significantly influence the project quality performance but procurement management related factors was found positive but not significant factor influencing the quality performance of project.

5.4. Recommendations for Policy Intervention

Based on the research findings, the following recommendations should be put into practice for the enterprise who aims at performing better in construction projects.

- The enterprise is recommended to use advance payment properly to avoid the cash flow and financial problems. It should be aware of the business environment risks in their cost estimation and enough contingency allowances should be there to guard against the increasing material prices. The enterprise should see that minimum amount of waste should be produced and also the site should be kept clean in order to minimize material wastage in the project site. The enterprise is advised to set up effective and efficient construction equipment management system so as to manage it construction equipment .It is also important for the enterprise to revise the contract document prior to the start of project execution to avoid changes in material types and specifications during construction. The enterprise is also recommended to set up effective and efficient resource planning and forecasting to avoid shortage of construction material and improve the performance of projects.

- Project Stakeholders are people who are subjected to, part of, or have decision making over the project and it is significant to identify and effectively manage them in order to avoid project delays or failures. Accordingly, the enterprise is recommended to establish a mechanism to manage different kind of stakeholders.

- Procurement management practices have increasingly played an important role in project performance. The enterprise should adopt a formal procurement planning mechanism that provides the basis for organizing the work on the projects, facilitate efficient resource utilization, integrated with the budgeting, and reduces costs. Procurement control mechanism needs to be well developed and clearly detailed so as to reduce the number of risks which may arise during project implementation and increase the chance of achieving project's objectives. Contract management influenced project performance through contract type, acceptance criteria, and dispute resolution mechanism etc. The study recommends the introduction of contract management training to employees who are involved in the contract management activities in the enterprise.

- Quality management is critically required for a construction company to sustain in current construction market which is highly challenging and competitive and it has to provide the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a company. Taking in this into account, the enterprise should adopt appropriate quality management system to enhance it project performance. Likewise, Management commitment to quality and to continuous quality improvement is very important in each phase of the building process. Management must participate in the implementation process and be fully committed to it if quality management practice is to succeed.

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7. APPENDIX

7.1. Survey Questionnaire

ST. MARY'S UNIVERSITY
SCHOOL OF GRADUTE STUDIES

Survey Questionnaire On**: Factor Affecting the Performance of Construction Projects: The Case of Defense Construction Enterprise**

Dear Respondent!

I refer to the above subject matter and hereby confirm that I am second year MA in **Project Management** student of the aforementioned institution, carrying out thesis for academic purposes. All responses given in this regard will be handled in strict confidence.

Your understanding and co-operation are being solicited for providing all necessary information needed to accomplish the objective of this study.

Regards

Gebremedhin Sebsibe

Tel:- 0912-055623
e-mail: gebseb2008@gmail.com

Section A: General Information

1. **Position**

Top level manager ☐

Middle level manager ☐

Lower level manager ☐

Project manager ☐

Site engineer ☐

Office engineer ☐

2. **Age in years:**

       20 – 30 ☐
       31 – 40 ☐
       41 – 50 ☐
       Greater than 50 ☐

3. **Level of Education**

       Diploma ☐
       First Degree ☐
       Second degree & above ☐

4. **Work Experience**

       Below 5 year ☐
       6 – 10 year ☐
       11- 15 year ☐
       Greater than 15 year ☐

Section B: Factors Affecting the Performance of Construction Projects

1. What is your level of perception towards statements for factors affecting the performance of construction project?

Circle Using a scale of 1 to 5 where

        1 = Strongly Disagree

        2= Disagree

        3= Neutral

        4= Agree

        5 = Strongly Agree

s.n	Factors Description	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	**Resource Management Related Factor**					
	Construction material					
1.1	There is **material wastage** on projects	1	2	3	4	5
1.2	There is un**availability of construction material** in the market	1	2	3	4	5
1.3	There are **changes in material** types and specifications during construction.	1	2	3	4	5
1.4	There is **price escalation of construction material** in the market.	1	2	3	4	5
	Construction equipment					
1.5	There is **breakdown and failure** of construction equipment in the enterprise.	1	2	3	4	5
1.6	There is un**availability of construction equipment** and **spare parts** in the enterprise	1	2	3	4	5
	Human resource management					
1.7	There is lack of highly qualified and experienced personnel in the enterprise.	1	2	3	4	5
1.8	Project teams have no adequate skill and knowledge of Supervision.	1	2	3	4	5
1.9	There is lack **adequate Health and safety** for employees at the projects site.	1	2	3	4	5
1.10	There is **lack of productivity** of labors in the projects.	1	2	3	4	5
	Financial management					
1.11	There is **cash flow and financial** difficulties faced by the enterprise	1	2	3	4	5

1.12	There is **payment delay** by project owner.	**1**	**2**	**3**	**4**	**5**
2	**Procurement Management Related Factor**					
2.1	There is lack of an effective and efficient **Procurement planning**	**1**	**2**	**3**	**4**	**5**
2.2	There is lack of an effective and efficient **contract management** in the enterprise.	**1**	**2**	**3**	**4**	**5**
2.3	There is lack of an effective **procurement control** mechanism in the enterprise	**1**	**2**	**3**	**4**	**5**
2	**Stakeholder Management Related Factor**					
2.1	The enterprise do not **identifies its Stakeholders** Properly.	**1**	**2**	**3**	**4**	**5**
2.2	The enterprise do not properly understands area of **Stakeholders' interests**	**1**	**2**	**3**	**4**	**5**
2.3	The enterprise do not assesses Attributes (**power, urgency, and proximity**) of Stakeholders	**1**	**2**	**3**	**4**	**5**
2.4	The enterprise do not Evaluate the **Stakeholder Acceptability**	**1**	**2**	**3**	**4**	**5**
2.5	The enterprise do not keeps and promote **good relationships with stakeholders**	**1**	**2**	**3**	**4**	**5**
2.6	The enterprise do not formulates **appropriate Strategies to manage Stakeholders**	**1**	**2**	**3**	**4**	**5**
2.7	The enterprise do not **predicts stakeholders 'reactions for implementing the strategies**	**1**	**2**	**3**	**4**	**5**
2.8	There is lack of Stakeholders '**Involvement in Decision Making process** in the enterprise	**1**	**2**	**3**	**4**	**5**
2.9	The enterprise do not maintains alignment among stakeholders	**1**	**2**	**3**	**4**	**5**
2.10	The enterprise do not **communicates with** and **engaging stakeholders** properly and frequently	**1**	**2**	**3**	**4**	**5**
3	**Project Quality Management Related Factor**					

s.n		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.1	There is lack of an **effective project quality planning, assurance and controlling system** in the enterprise.	1	2	3	4	5
3.2	There is lack of **management commitment and leadership** towards quality in the enterprise.	1	2	3	4	5
3.3	There is lack of an **involvement of suppliers** to enhance projects quality performance.	1	2	3	4	5
3.4	The enterprise do not provides **adequate training to enhance the quality** of project performance.	1	2	3	4	5

Section C: Performance of Construction Projects

What is your level of perception towards statement the performance of construction project?

Circle Using a scale of 1 to 5 where

        1 = Strongly Disagree

        2= Disagree

        3= Neutral

        4= Agree

        5 = Strongly Agree

s.n	Performance Description	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	**Quality Performance**					
1.1	There is no **client and user satisfaction** with **construction product** of the enterprise.	1	2	3	4	5
1.2	Projects are not completed and transferred to client **without defects**.	1	2	3	4	5
2	**Time Performance**					
2.1	The enterprise do not completes projects within the **contract schedule (time).**	1	2	3	4	5
3	**Cost Performance**					
3.1	The enterprise do not completes projects as per the **contract cost**	1	2	3	4	5

8. ANNEX

Annex - 1: Cost Performance of Completed Project (2011 – 2018)

S.N	NAME OF ROAD PROJECTS	Contract Amount 000,000 birr	Contracted Direct Cost		Actual Direct Cost		(actual direct cost) - (contracted direct cost)	
			%	000,000 ETB	%	000,000 ETB	%	000,000 ETB
1	Berhale Dalol Road Project	1,485.0	68	1,009.8	83	1,230.4	21.8	220.6
2	Agula Shaigube Berhale Road	1,167.8	68	794.1	74	865.8	9.	71.7
3	Mekele-Abi-Adi Road Project	655.7	78	511.4	112	735.7	43.9	224.3
4	Tendaho Irrigation Project	583.3	73	425.8	70	409.6	-3.8	-16.3
5	Grindao Dam Construction	238.2	68	162.0	38	89.5	-44.7	-72.5
6	Addis Ababa Golf Club Project	91.1	73	66.5	58	53.2	-20.0	-13.3
7	Mekele Road Project	79.8	80	63.8	89	70.9	11.1	7.1
8	Awash Mile Lot -1 Project	408.8	78	318.9	85	347.2	8.9	28.4
9	Mekele Apartment	235.7	77	181.3	91	214.1	13.91	32.8
10	Mekele Staff Collage	275.0	77	211.5	82	226.6	5.49	15.1
11	Shire Apartment	103.0	77	79.2	104	106.6	26.61	27.4
12	Shire Hospital	127.9	77	98.3	105	134.7	28.46	36.4
13	Dire Dewa Apartment	109.0	77	83.8	132	143.9	55.13	60.1
14	Dire Dewa Hospital	181.7	77	139.7	79	143.9	2.30	4.2
15	Janmeda Peace Support	103.0	77	79.2	75	77.7	-1.50	-1.5
16	Bahir Dar Apartment	326.7	77	251.2	80	262.6	3.49	11.4
17	Janmeda Staff Collage	110.1	77	84.6	86	94.5	8.99	9.9
18	Calibration Center	176.2	77	135.5	85	149.4	7.90	13.9
	Average	**358.8**	**75**	**260.9**	**85**	**298**	**10**	**37**

Source: Defense Construction Enterprise Financial Report (2011 – 2018)

Annex - 2: Cost Performance of Ongoing Projects (2011 – 2018)

S. N	Name Of the projects	CONTRACT AMOUNT 000,000 ETB	To date Executed Work As Of June 30/2018		contracted direct cost		actual direct cost		(actual direct cost) - (contracted direct cost)	
			000,000 ETB	%	%	000,000 ETB	%	000,000 ETB	%	000,000 ETB
1	Ditcheto Galafi Elidar Belho Road project	2,316	884.6	38.2	73	645.8	88	779.0	20.6	133.2
2	Nekemt airfield project	651	86.5	13.3	83	71.8	84	72.7	1.2	0.9
3	Awash Mile asphalt road upgrading project (contract IV)	302	163.4	54.2	78	127.5	93	152.3	19.5	24.8
4	Adgudom mekele road project	894	239.0	26.7	78	186.4	66	158.9	-14.8	-27.5
5	Mekele Dangolat Samre road project	1,261	298.3	23.7	85	253.6	148	441.1	73.9	187.5
6	Beles Mekane Birhan road project	886	229.0	25.8	78	178.6	71	163.4	-8.5	-15.2
7	Musile Bada design and build road project	1,087	756.9	69.7	73	552.5	107	810.0	46.6	257.5
8	Ahmed Ela road project	1,353	280.4	20.7	73	204.7	73	205.7	0.5	1.1
9	Mekele three-star hotel	141.3	98.3	69.6	80	121.3	123	121.3	43.3	42.6
10	ministry of Defense (head quarter)	1,249.6	727.9	58.2	77	691.3	95	691.3	18.1	131.5
11	Ethiopia Information network security agency	938.4	461.7	49.2	77	379.8	82	379.8	5.4	24.7
12	Addis Ababa city administration modern zoo park	88.8	70.5	79.4	71	51.1	73	51.1	1.1	0.8
13	Addis Ababa city administration Swimming pool	124.5	94.7	76.1	74	61.5	65	61.5	-9.1	-8.6
14	defense collage Debre zeyit collage	430.8	290.8	67.5	77	250.3	86	250.3	9.2	26.7
15	Addis Ababa Children & Youth Center	312.2	154.9	49.6	74	153.6	99	153.6	25.1	38.8
16	Bahir dar hospital	440.9	404.2	91.7	77	317.9	79	317.9	1.8	7.1
17	Mekele hospital	440.9	387.0	87.8	77	266.7	69	266.7	-8.0	-30.9
18	Army foundation phase -1	117.0	92.5	79.0	87	109.0	118	109.0	30.9	28.6
19	Army foundation phase -2	184.0	69.0	37.5	87	83.1	120	83.1	33.5	23.1
20	shegole apartment	134.6	44.3	32.9	77	45.8	103	45.8	26.4	11.7
21	Diredawa Apartment phase -2	1,130.5	144.2	12.8	77	179.7	125	179.7	47.7	68.8
22	Goffa Apartment	149.6	35.5	23.7	77	42.0	119	42.0	41.6	14.8
23	Mekele lache apartment	154.9	21.2	13.7	77	33.7	159	33.7	82.0	17.4
	Average	**643**	**262**	**48**	**77**	**218**	**98**	**242**	**21**	**42**

Source: Defense Construction Enterprise Financial Report (2011 – 2018)

Annex – 3: Time Performance of Completed Project (2011 – 2018)

S.N	NAME OF ROAD PROJECTS	project contract time (calendar days)	Elapsed Time		(Elapsed Time) -(Contract Time)	
			Calendar Days	%	Calendar Days	%
1	Berhale Dalol Road Project	1,095	1735	158.4	640	58
2	Agula Shaigube Berhale Road	1,095	1735	158.4	640	58
3	Mekele-Abi-Adi Road Project	1,095	1565	142.9	470	43
4	Tendaho Irrigation Project	730	1086	148.8	356	49
5	Grindao Dam Construction	365	517	141.6	152	42
6	Addis Ababa Golf Club Project	1,335	1589	119.0	254	19
7	Mekele Road Project	930	1095	117.7	165	18
8	Awash Mile Lot -1 Project	730	730	100.0	0	0
9	Mekele Apartment	1,095	1828	167	733	67
10	Mekele Staff Collage	1,095	1920	175	825	75
11	Shire Apartment	1,040	1750	168	710	68
12	Shire Hospital	1,040	2373	228	1333	128
13	Dire Dewa Apartment	730	1274	175	544	75
14	Dire Dewa Hospital	910	2089	230	1179	130
15	Janmeda Peace Support	600	1623	271	1023	171
16	Bahir Dar Apartment	1,095	1205	110	110	10
17	Janmeda Staff Collage	365	1272	348	907	248
18	Calibration Center	450	1095	243	645	143
	Average	877.5	1471.2	1.779	593.7	77.9

Source: Defense Construction Enterprise annual performance Reports (2011 – 2018)

Annex – 4:-Time Performance of Ongoing Projects (2011 – 2018)

S.N	Name Of The Projects	Contract Time In Calendar Days	Elapsed Time In Calendar Days	%	(Elapsed Time) - (Contract Time) Calendar Days	%
1	Ditcheto Galafi Elidar Belho Road Project	1,170	982	83.9	-188	-16
2	Nekemt Airfield Project	730	438	60.0	-292	-40
3	Awash Mile Asphalt Road Upgrading Project (Contract IV)	730	734	100.5	4	1
4	Adgudom Mekele Road Project	2,555	702	27.5	-1853	-73
5	Mekele Dangolat Samre Road Project	1,095	608	55.5	-487	-44
6	Beles Mekane Birhan Road Project	1,095	637	58.2	-458	-42
7	Musile Bada Design and Build Road Project	1,229	684	55.6	-546	-44
8	Ahmed Ela Road Project	1095	424	38.7	-671	-61
9	Mekele Three Star Hotel	1,020	2,510	246	1490	146
10	Ministry Of Defense (Head Quarter)	1,920	2,427	126	507	26
11	Ethiopia Information Network Security Agency	1,090	2,601	239	1511	139
12	Addis Ababa City Administration Modern Zoo Park	730	1,820	249	1090	149
13	Addis Ababa City Administration Swimming Pool	1,095	1,943	177	848	77
14	Defense Collage Debre Zeyit Collage	1,225	1,555	127	330	27
15	Addis Ababa Children & Youth Center	1,095	1,943	177	848	77
16	Bahir Dar Hospital	930	1,407	151	477	51
17	Mekele Hospital	930	1,407	151	477	51
18	Army Foundation Phase -1	1,227	1,255	102	28	2
19	Army Foundation Phase -2	1,372	869	63	-503	-37
20	Shegole Apartment	730	462	63	-268	-37
21	Diredawa Apartment Phase -2	1,165	334	29	-831	-71
22	Goffa Apartment	730	462	63	-268	-37
23	Mekele Lache Apartment	1,275	462	36	-813	-64
	Average	**1141**	**1159**	**108**	**19**	**8**

Source: Defense Construction Enterprise annual Report (2011 – 2018)

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Declaration

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Temesgen Belayneh (PhD). All sources of material used for thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any higher learning institutions for the purpose of earning any degree.

Geberemedhin Sebsibe   ----------------------------

 Name   **Signature**

St. Mary's University, Addis Ababa   **January, 2019**

Endorsement

This thesis has been submitted to St. Mary's university, school of Graduate studies for Examination with my approval as a university advisor.

Temesgen Belayneh (PhD)   ---------------------------

Advisor   **Signature**

St. Mary's University, Addis Ababa   **January, 2019**