

ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
DEPARTMENT OF PROJECT MANAGMENT



**Factors Affecting Project Closure Practices of Construction
Projects: A Case Study for ETETE Construction**

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Masters Project Work Report for the Partial Fulfillment of the Requirements for
Master of Arts (MA) Degree in Project Management

Advisor- A. Professor Fisseha Afework

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Statement of Declarations

I hereby declare that this research project, entitled “Factors Affecting Project Closure Practices of Construction Projects: A Case Study for ETETE Construction” is my original work submitted for the award of Master of Project Management degree at the College of Business and Economics of Addis Ababa University. It has not been presented for award of any degree in any other higher institution learning and all resources used have been accordingly acknowledged.

Robel Israel

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Fisseha Afework (A. Professor) **Signature** _____ **Date:** _____

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TABLE OF CONTENTS

LIST OF TABLES and FIGURES.....	3
ABSTRACT.....	5
CHAPTER ONE: INTRODUCTION.....	6
1.1 Background of the Study	6
1.2 Background of the Organization.....	7
1.3 Statement of the Problem.....	8
1.4 Research Questions	10
1.5 Research Objectives	10
1.5.1 General Objective	10
1.5.2 Specific Objective.....	10
1.6 Significance of the Study	11
1.7 Scope of the Study	12
CHAPTER TWO: REVIEW OF RELATED LITERATURE.....	13
2.1 Characteristics of the Project	13
2.2 Types of Project Closure	16
2.3 Importance of Project Closure	17
2.4 Process and Components of Project Closure	20
2.5 Review of Empirical Studies	21
2.6 Conceptual Framework of Study	22
Conceptual Framework Figure	24
CHAPTER THREE: RESEARCH METHODOLOGY	25
3.1 Research Design.....	25
3.2 Description of Study Variables	25
3.3 Description of Study Area and Target Population	26
3.3.1 Study Area	26
3.3.2 Target Population	28
3.4 Sampling Methods and Sample Size	28
3.4.1 Sampling Methods	28
3.4.2 Sample Size	29

3.5 Data Collection.....	32
3.6 Data Analysis and Interpretation.....	32
3.7 Reliability and Validity	33
CHAPTER FOUR: RESULTS AND DISCUSSIONS	39
4.1 Introduction.....	39
4.2 Response Rate	39
4.3 Demographic Characteristics	40
4.4 Descriptive Statistics of Practices of Project Closure	42
4.4.1 Frequencies of Practices of Project Closure	42
4.4.2 Effects of Financial, Technical and Administrative Factors	47
4.4.3 Impacts of Closeout Factors on Successful Completion	49
4.5 Analysis of Relationship Between Dependent and Independent Variables.....	50
CHAPTER FIVE: FINDINGS, RECOMMENDATION AND CONCLUSIONS	60
5.1 Summary of Findings	60
5.2 Conclusion	64
5.3 Recommendation.....	67
LIST OF REFFERENCE	69
APPENDIXES	71
Appendix I: Questionnaire for Collecting Responses.....	71
Appendix II: Time Estimate for the Study.....	78
Appendix III: Regression Analysis for Confirmation of Objectives Met Criteria	79
Appendix IV: Regression Analysis for Improving Engagements Criteria	81
Appendix V: Regression Analysis for Capturing Lessons Learned Criteria	83
Appendix VI: Regression Analysis for Customer Satisfaction Criteria	85

List of Tables and Figures

Table 3.1: Completed Projects of ETETE Construction Company.....	27
Table 3.2: Number of respondents in each completed projects.....	31
Table 3.3 Cronbach’s Alpha Reliability Test Classifications.....	33
Table 3.4 Cronbach’s Alpha Reliability Statistics Results.....	34
Table 3.5 Pearson Correlation Analysis for Validation Test of Practices Of Project Closure.....	35-36
Table 3.6 Pearson Correlation Analysis for Validation Test of Effects of Factors of Project Closure.....	37
Table 3.7 Pearson Correlation Analysis for Validation Test of Impacts Of Project Closure on Successful Completion.....	38
Table 4.1 Distributed and Returned Percentage of Participant Responses.....	40
Table 4.2 Background Organizational Profile of Participant Respondents.....	40
Table 4.3 Background Educational and Experience Profile of Participant Respondents.....	41
Table 4.4 Descriptive Statistics Analysis for Preparation of Project Closure Report Documents Criteria.....	43
Table 4.5 Descriptive Statistics Analysis for Actions Taken to Close Project Closure Criteria.....	44
Table 4.6 Descriptive Statistics Analysis for Validating Scope Completion Criteria.....	45
Table 4.7 Descriptive Statistics Analysis for Creating Project Closeout Criteria.....	46
Table 4.8 Descriptive Statistics Analysis for Effects of Factors on Project Closeout.....	47
Table 4.9 Descriptive Statistics Analysis for Effectiveness of Factors On Assuring Timely Closeout.....	48
Table 4.10 Descriptive Statistics Analysis for Impacts of Closeout Phase On Successful Project Completion.....	49
Table 4.11 Correlation Coefficient Analysis for confirmation of objectives Being met criteria.....	51

Table 4.12 Multiple Regression Analysis for confirmation of objectives	
Being met criteria.....	52
Table 4.13 Correlation Coefficient Analysis for Improving Future Engagements criteria.....	53
Table 4.14 Multiple Regression Analysis for Improving future engagements criteria.....	54
Table 4.15 Correlation Coefficient Analysis for Capturing Knowledge as	
Lessons Learned criteria.....	55
Table 4.16 Multiple Regression Analysis for capturing the knowledge in	
Lessons Learned criteria.....	56
Table 4.17 Correlation Coefficient Analysis for Customer Satisfaction criteria.....	57
Table 4.18 Multiple Regression Analysis for Customer Satisfaction criteria.....	58
Figures 2.1: Conceptual Framework.....	24

ABSTRACT

The study is about the factors affecting project closure practices of construction Projects based on the completed projects of a grade one construction company ETETE Construction. It aims on assessing and examination of the practices of the project closure activities in the company in consideration of successful completion factors for project closure process. The study considers four criteria for evaluation of the project closure practices. These criteria are preparation of project closure documents, completing project closure actions, validating scope of project completion and creating closeout report. The criteria are taken from the standard definition in Project Execution & Closeout (AAUSC, 2018). Further the study also examines the effects of financial, technical and administrative factors on project closure practices and along with tries to determine factors which most have an effect on assurance of timely project closeout. Finally, the study also evaluates the competencies of the project team personnel in operating project closure activities and tries to determine the impact each project closure activity has on the successful completion of projects. The study employs primary data for its analysis. The primary data is collected by questionnaire one mode of data collection technique. Responses were collected from project team personnel involved in those completed projects and professional personnel from other ongoing projects. The study uses descriptive analysis to determine the frequency of practices and effects and also multiple regression analysis to determine the relationship between the dependent and independent variables. From the study, it is observed that the company has shortcomings at planning and preparation of project closure activities which is conducted at the beginning of the project closing phase. As with most of the construction works trends, the execution phase of construction projects extend to the completion of the project neglecting the closing phases. The study also observes there is weaknesses in documenting, maintaining and using the archives of previous projects information. These are the important lessons to be learned from. Even though, study observes that the construction company lists out and performs the remaining item of works, completes the project with all the objectives met and also the study notices that the company has a good reputation in terms of quality achievement of the projects.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

According to A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition (Newton, 2013), A project is a temporary activity which is executed to produce a unique product. This uniqueness of the project increases when the project is moving from a simple to a more complex stream of project. This uniqueness and complexity of the project is encountered during development of the phases of the project management processes. Construction, specifically building construction, is one type of project. In construction, the uniqueness of the project become to its ultimate position. Since the planning of the project, to its execution, then to the monitoring and evaluation and finally on its closing makes the construction of any type unique for itself. Due to the specific geographical placement, the engineering design & procurement, unique methodology, stability and environmental factors; building construction is unique and complex in its development of phases and performance of works. Also construction works are tasked with a beginning and an end date on the contract. It has a specific time of beginning for the start of the project, the duration of execution of activities of the project and the final completion or end of the project. These phases of a project are commonly known as planning, executing, monitoring & controlling and closing phases of project.

Closing phase is the last phase of project management processes and is the process performed to conclude all prior activities of project management process groups to complete a project work and close the project as appropriate, According to A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition (Newton, 2013). Closing a project therefore involves; completion of project works by completing each phases of project management processes, declaring that the project is completed and transferring the project to the operations organization. Specifically, construction closing phase of projects involve the completion of the phases of engineering, procurement and construction works. Then formally recognizing the completion of the project and handing over the project to the client or the owner. Within this

simplified steps of closing processes, there are such criteria to be conducted that are obliged to follow so that successful completion of the project is realized. These criteria are; preparation of project closure report document, completing project closure actions, validating the scope of project completion, capturing lessons learned and finally creating close out report. If the project closing process is conducted by successfully performing the above activities of works, then the construction organization will benefit by effectively utilizing its time, effort & credibility and by avoiding unfavorable and adverse scenarios.

This study focuses on factors affecting project closure practices of construction projects, by singling out a construction organization. By conducting a study on a representative construction organization, the study aims to provide verifiable inference for the specific organization and generally organizations involved in the construction industry. The focus of the study is on project closure practices of ETETE construction.

1.2 Background of the Organization

ETETE construction is a legal registered building Contractor with category BC-1 in the Ministry of Urban Development and Construction. It is a privately owned domestic firm established in Addis Ababa with a capital of birr 10,000,000.00 with category one. The company was setup to fulfill the increasing demand of construction firms in the country and also contribute by generating employment. It is highly engaged in building construction activities.

The company's strength is demonstrated in understanding and delivering the needs and aspirations of clients in a manner, by providing trust and confidence at all stages of the construction process. The company has a principle to be regarded as a highly efficient and co-operative construction firm. It successfully operates across a number of sectors of the market and has an experienced employees with expertise in construction and other area.

ETETE Construction undertook and continues to be involved in the construction of new buildings of schools, hospitals, universities, residential quarters etc., as well as in the expansion and rehabilitation of existing buildings. The company believes all construction projects should be done based on the specified quality and be completed according to the intended time and within budget. The company is structured based on these principles.

1.3 Statement of the Problem

Failure to conduct thorough project close out could potentially a) put the organization at a considerable amount of risk, b) prevent the organization from realizing the anticipated benefits from the deliverables of the project, c) result in significant losses to the organization, and d) undermine the project manager and project management team's credibility. (Aziz, 2015). The construction closure process is not given serious consideration for its development and implementation. According to The Project Management Life Cycle (Westland, 2006), more than 90 per cent of projects undertaken fail to independently review the level of success after completion. In Ethiopia, about 50% of the Federal capital budget is routed to development of physical infrastructure and the sector is significantly increasing both in volume and density of work. However, 80% of the construction projects are delayed, run over budget and/or lack the management. (Ashebir, Wubishet, Murad, 2017). This clarifies that the construction projects lack adequate management practices for the project management processes. Since project closure is one of the project management process groups, it lacks sufficient attention for its development and adoption and therefore results in delay of most of the construction projects currently held.

“Some projects never seem to terminate rather, they become like Moses, condemned to wander till the end of their days without seeing the Promised Land”. (Bennet, 2013). One indicator of failure to conduct project close out is the result of a never ending project. Most organizations continue to perform projects where the scope has been completely achieved. This scenario occurs when the construction organization has a vague understanding of its responsibilities and continues to hold and perform the responsibility of operations organization. This situation will negatively impact the capability of the construction organization by occupying important skills, tools and means in an already completed project but not understood to be completed because the proper project close out phase is not undertaken.

Another problem of failure to conduct project close out is lack and loss of valuable recording of lessons learned documents. This capturing of lessons learned document is an important aspect of project closure where it has an importance for reusing the document for future projects. Especially, for repetitive type of projects, recording of lessons learned has a significant importance. Important knowledge and experiences can be gained from gleaning to these appropriately compiled documents and some mistakes can be eliminated before they occur.

The first problem in the practice of project closure in construction projects is that it is not given appropriate consideration for its planning and implementation. In the planning phase of construction projects, a schedule is prepared beforehand for the project. This schedule starts from the project handover date and gives a mobilization phase for the construction organization to mobilize its resources to the project site. After this fixed mobilization phase, the start of the project date is pin pointed and the project work starts. Also at the completion phase of the project, there should have been a completion phase where the project is being handed over again to the operations organization or the client. But this is the shortcoming in most of the schedules prepared. The project is expected to be completed on the final completion date and there is no phase for project closure. It means there is no project closure phase that is distinct from the execution phases. The project schedule only show the project completion date.

The second problem is regarding the recording of project closeout reports. These project closeout reports are the lessons learned documents that can be used for future projects. Two problems arise regarding project closeout reports. The first is there is lack of project closeout reports in already completed construction projects. Here the construction project is completed and gradually handed over to the client or owner but the summary about the life time of project information is not prepared and documented. These create lost information for the construction organization for its prior experience and work methods. The second problem arises when the project closeout reports are prepared but they are not used as reference and often neglected as already completed reports. This also creates a void as; important lessons cannot be learned from good practices and even to avoid previous errors.

This study tries to contribute for bridging the gap to the above problems. First, the study tries to show the importance of the project closure process and then create awareness in the concerned stakeholders to include the project closure phases in the preparation of project schedules. By then, the concerned stakeholders will be aware of the importance of project closure phases, will insert it in the project schedule and conduct the necessary procedures for the closure phase. Regarding the second problem, the study tries to show the importance of project closeout reports and the importance of using them as a reference. By then, the construction organization can easily refer the good practices and repeat them in other project and also refer errors and avoid doing same errors in other projects. Also, generally in the construction sector, government

organizations can also refer to completed project closeout reports and whenever there is a need for a new project, these reports will be a foundational reference for planning processes. Since project closeout reports are realistic hard fact data, valuable information regarding project costs, time and scope can be gained. This can also reduce to a substantial amount the project cost overrun, project scope exceeding, delay of project and also provide information for project tendering by showing the realistic project amount.

1.4 Research Questions

This project work intends to answer to the following research questions:

1. What are the project closure practices that were implemented for building construction projects in ETETE Construction Company?
2. How do financial, technical and administrative factors have effect on the project closure practices for successful completion of construction projects in ETETE Construction Company?
3. What are the factors that have an effect on assurance of timely project closeout? What are the factors that have impact on project closeout for successful project completion?
4. How does the project management team develop and apply the necessary project closure plan? What necessary experience, knowledge and skill does the project management team gather from involving in the project closure practice?

1.5 Research Objectives

1.5.1 General Objectives

The main objective of the study is to assess and examine the project closure practices of construction projects in ETETE Construction Company in consideration of successful completion factors for project closure practices.

1.5.2 Specific Objectives

This study intends to address the following important research objectives:

1. To assess the implementation of project closure practices for completed projects in ETETE Construction Company?
2. To examine the effects of financial, technical and administrative factors on the project closure practices in completed building projects of ETETE construction?
3. To determine the factors that have an effect on assurance of timely project closeout? To determine the factors that have impact on project closeout?
4. To examine the competencies gathered for the project management team, in terms of knowledge, skills and expertise, in developing and handling of the project closure plans and strategies?

1.6 Significance of the Study

The project closure process in the construction industry in Ethiopia is at its infancy stage. In most of the construction projects, project closure is given limited attention. A lot of projects are being constructed with no limit for their completion time with a never ending project types. This in turn affects the time, resources and credibility of the construction organizations and the project management team involved in the project. Another problem is no record of lessons learned documents. It is a fact that, a lot of construction project are encountering the same challenges for different repetitive project types but the method of responding to the challenges never seem to develop. In construction, risks, uncertainties and challenges are one part of the work. If there had been proper project closure practice at previous completed projects, many risk, uncertainties and challenges would have been solved from the lesson learned documents. This affects the future capability of the construction, commissioning and operating organizations as a whole by not having reference data to view for future projects. This project work thesis tries to examine and assess the current trends of the project closure practices in one of the prominent construction companies, ETETE Construction.

Therefore, this thesis will have significance for the construction, commissioning and operating organization by:

- Assessing the current practices, examining the benefits and recommending better strategies, plan and implementation for building construction projects

- Encouraging further study on the project closure with regard to other construction types in construction projects

1.7 Scope of the Study

The scope of the study is focused for those projects that are on normal closure due to project completion. Therefore this study is limited to building construction projects which are conducted and formally completed in ETETE Construction projects. The lesson that can be gained from this thesis will give important insights to other similar type of construction organizations and as a whole to the general construction industry. This thesis focuses on both governmental and non-governmental projects completed within the construction company. The projects have the following characteristics:

- Building Construction projects located in Addis Ababa and in Regions
- Building Construction projects that have been completed prior to 2012 E.C.
- Building Construction projects that have project costs above 35 Million and above
- Building Construction projects that are governmental, under the ownership of Federal Government of Ethiopia, and that are private projects.

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 Characteristics of Project

A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. A project may also be terminated if the client (customer, sponsor, or champion) wishes to terminate the project. A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition (Newton, 2013). A project is a temporary activity. In the temporary activity of a project, it means a project has a definite beginning and completion time. A project is usually characterized by: a) Relatively short lifetime, with a clearly defined start and end date, b) Well-defined and static budget for the entire duration of the project, usually with pre-defined items, and c) People temporarily allocated to the project (Frisanco and Anglberger, 2008). First, the temporary activity of a project is displayed by the nature of the project contract. It has a definite starting date and a completion date. These dates limit the duration of a project. A project passes through four stages within this duration. Planning, Executing, Monitoring & Controlling and Closing Stages.

Planning is one of the management functions which involve determination of missions, goals and strategies to achieve these predetermined objectives. It gives bases for implementation, monitoring and evaluation of activities. Similarly, project planning is among the primary phases and activities to be accomplished which enables project managers to determine project scope that defines what is to be included in the project and what is not. (AAUSC, 2014)

The planning phase of a project is the phase where planning for the project is conducted based on the main objective of the project. It involves listing out the activities of the project based on the scope of the work. These activities are then broken down into easily workable deliverables using work breakdown structure. For each deliverable listed out, resources are assigned that are needed to perform the work. The resources for the execution of the works are material, machinery and

man power resources. These activities are then sequenced in their order of works to be completed by specific time, within budget and according to specification. Since construction, specifically building construction, is one kind of project, planning is an important phase in the project. The planning phase in building construction has the same mentioned procedures of listing out activities of project, breaking down of activities to deliverables using work breakdown structure, and sequencing of activities. The activities of works are listed out from the contract document which is the binding document for the construction, commissioning and operating organization. Based on the specification of works in the contract document, the activities of the works are further broken down into easily workable items of deliverables using standard work breakdown structure template. Here the resources for the work including of material, machinery and manpower resources are determined. At this instance, when the workable deliverables of the project and the resources being determined, it is easy to order the activities of works. Based on their order of works, the activities are sequenced by Gantt chart or scheduling software.

The execution stage of a project is the transformation of a theoretical and planned concept into physical and material structures. During this stage, we see the actual site preparation, buildings, equipment, and machinery constructed (systems) and begin functioning to deliver the project objectives. The organizational framework and structure (people) are developed, personnel are hired and trained to operate the project, and adequate systems for managing and operating the project are developed. Also, processes such as procurement (supply chain management), maintenance management, accounting, and marketing are developed to meet the operational needs of the project. (Lutchman, 2011).

The execution phase for building construction projects is the longer phase and the duration where the actual performance of works happens. The work is executed according the plan of works which is developed in the planning phase. The works plans are divided into milestone and within each milestone the necessary resources of material and equipment are deployed before the beginning of the intended work. Here the necessary staff personnel; technical personnel for the direct construction work and the supporting personnel staff such as procurement, finance, logistics are hired and put to work.

Monitoring is an important task in the life of a program or project and is a continuous process of regular systematic assessment based on participation, reflection, feedback, data collection,

analysis of actual performance (using indicators) and regular reporting. Monitoring tells us where we are in relation to where we want to be, it helps us keep on track by gathering data and evidence, identifying issues and analyzing documents and reports. We monitor for accountability purposes and in order to communicate results to stakeholders and adjust our implementation to better meet expected results and inform decision-making. (UNDP, Results-Based Management Handbook, 2010)

Monitoring and controlling in building construction projects serve two functions. First it serves as a mapping point where the project manager and the team track the progress of the construction work in relative to the plan. Here the project team members know their performance in terms of effectiveness and efficiency. By effectiveness, the team can determine the timely performance of their work in relative of the plan and by efficiency the project team can determine the consumption of the work in relative to the standard resource consumptions. Secondly, the monitoring and controlling phase also serves as a communication channel between the project team and the concerned stakeholders. The project team will develop a reporting format that entails the executed works in comparison to the plan of works including of the resources consumed. This report, when submitted to clients, will serve as a communication channel between the project team and the concerned stakeholders about the progress of the project.

The Project Closing Process Group consists of those processes performed to conclude all activities across all Project Management Process Groups to formally complete the project, phase, or contractual obligations. This process group, when completed, verifies that the defined processes are completed within all of the Process Groups to close the project of phase, as appropriate, and formally establishes that the project or project phase is complete” A Guide To The Project Management Body of Knowledge (PMBOK Guide) – Fifth Edition (Newton, 2013)

Project Closure is the final phase in the lifetime of a construction building project. It conveys the main message that the construction project is officially completed and it is handed over to the operating organization or the client. Construction project closure consists processes to be performed to officially announce the completion of the closure phase and generally the completion of the project. These processes are preparation of project closure report document, completing project closure actions, validating the scope of project completion and finally creating close out report.

2.2 Types of Project Closure

Ideally, all projects continue until successful conclusion, with all deliverables meeting specifications and pleasing customers. However, this is not always the case. Sometimes, a project is terminated before its normal completion. Early termination can be by mutual agreement between the contractor and buyer, because one of the parties has defaulted (for cause), or for convenience of the buyer. (AAUSC, 2016)

Projects experience two types of project closure situations. Early termination before project completion and normal closure due to project completion.

For early termination of projects, there are three conditions.

- The first condition is mutual agreements. In this type of early termination of projects, the projects deliverables are not fully completed but agreements and settlements take place between both parties, the contractor and the client. This condition may happen when there is scope change in the project and it cannot be accommodated and continued in the current project. The remaining works of items are either stopped altogether or incorporated in to another phase of project. But both parties reach to an agreement for the negotiated settlements.
- The second condition of early termination is termination for default. Here, the project closing is conducted due to the poor performance of the contractor. It can be related to time, cost, quality and performance issues of the contractor. The client terminates the contractor when the client is not satisfied with the performance.
- The third condition of early termination is termination for convenience of buyer. This is a condition that happens when the client faces difficulties in terms of financial issues and unexpected conditions that forces the project to be terminated. This is not due to the fault of the contractor and thus the contractor will be provided with the payment up to the final progress of the project. (AAUSC, 2016)

There is also the normal completion of the project where the project is completed having met all the objectives. All deliverables for the project are met, financial and procurement issues of the project are properly settled and finally the project is officially closed. Here, the stakeholders are

in good working relationships; the contractor performs, completes and hands over all the project deliverables to the client, the client is satisfied with the performance and accepts the deliverables. This condition of project closure is very important in terms of building credibility and promoting engagement between parties.

2.3 Importance of Project Closure

Project Closing Process Group is as impactful and significant as the Initiation, Planning, Executing, and Monitoring and Controlling Process Groups. The impact of project closing can be extensive, both to the project and to the organization. Failure to conduct thorough project close out could potentially (a) put the organization at a considerable amount of risk, (b) prevent the organization from realizing the anticipated benefits from the deliverables of the project, (c) result in significant losses to the organization, and (d) undermine the project manager and project management team's credibility. (Aziz, 2015)

The project closure in construction projects is has significance importance when considering the budget that is expensed in the industry and the amount of man power it encompasses. Construction project closure has the following importance;

➤ Confirmation of Objectives being met

At the beginning of a construction project, the major constraint factors are related to time, quality, scope and cost. The construction industry, specifically building construction industry, has large expenditures with regard to consumable resources, has a specified duration of time for its startup & completion and has contractual specification of items that serve as guidance for quality of work. At the closure of a project, these constraints has to be met to declare performance of a successful project. One of project closure importance is confirmation of objectives being met. In construction project closure, there is a project closure report document. This document entails the activity of works that has been completed by the project and also outlines remaining works of items that has to be completed. This document and the actions taken to complete any remaining works are one way of confirmation that the project objectives are met. The client or the operating organization, the commissioning organization and the construction

organization together refer to the project closure document and confirm the completion of the project by affirming that all the project objectives have been met according to the satisfaction of the client.

➤ **Improving future engagements**

By making sure the project objectives have been met according to the client satisfaction, the construction organization will have valuable credibility and gain an important experience and knowledge for its future successive projects. Project closure is a process. Conducting the process carefully will help the organization avoid unfavorable and adverse scenarios. One unfavorable condition is the never ending project. Many organizations have undertaken projects that, despite fulfilling all of their scope and quality obligations, have continued to be perceived by the rest of the organization as projects. In this scenario, the organization does not distinguish between responsibility for maintaining and operating the deliverables of the project by other departments, but rather continues to hold the project management team accountable for such activities. (AZIZ, 2015). If a construction organization can not differentiate between its responsibility and that of the operating organizations, not only does the project's scope is enlarged but also the cost of the project will exceed more than the expected amount. And this is not in the interest of both parties. Therefore, the construction organization must know when to draw the lines and start the project closure process for the benefit of both the operating and construction organization. In this way, the construction organization will have a good project closure system that will be used uniformly in all the projects the construction organization is performing.

➤ **Capturing the Knowledge**

The process of capturing and discussing lessons learned is valuable learning for the participants. However, for the remainder of the organization to capitalize on those lessons, a method must be established for documenting and sharing the lessons. (AAUSC, 2016) Capturing the knowledge of lessons learned through the lifetime of construction activities is one part of closure process. Since construction involves a lot of working activities, it presents many surprises to the project team. The project team will face risks that may be uncertain but that can be managed somehow or the team may face certain risks that have impact on the scope of the project. These and other

factors present risk and uncertainty for a project. One way of capturing the lessons learned is through the occurrences of risks and how the risks were managed. The project manager and the project team will have a better knowledge about risks and the competency to manage them, if project closure processes of previous projects have been documents according to the standard. Also, good practices of work are also other opportunities to gain important knowledge and practices. These practices of work can be gleaned if only the project closure process is conducted according to its requirement of processes.

➤ **Customer Satisfaction**

The increasing focus by businesses on customer satisfaction has driven competition, improved quality, and fuelled innovation in the past two decades. Despite the lack of interest in the Commissioning Phase by project practitioners and even researchers in the project management area, the customer shows the highest interest in the first and last phases of the project: the Planning Phase and the Commissioning Phase (Frame, 1998).

At the beginning of the project, the client is interested in making sure that the stated requirements are formally planned and scoped for. At the end of the project, the client asks the question: “Will the project be completed on time and meet our specifications?” Naturally, the client’s level of interest is very high towards the end of the project. Thus, both the project and its client have a joint stake in successful completion of the project. (Sohmen, 2002).

The primary purpose of the existence of projects is to satisfy the business needs of the client or the operating organization. Owners or clients therefore want projects that are clearly defined in the planning phase that meets their business objective and also projects that are completed meeting the objectives that have been defined in the planning phase. Therefore, project closure is an important phase in the client or operating organization. Successful completion of projects that has been proved with project closure processes reflects the customer satisfaction on the project. Operation organization or owners are confident and satisfied with the project that it will deliver the intended objective of their business.

2.4 Process and Components of Project Closure

Project closure is initiated with **preparation of project closure report document**. A project closure report is a document which formalizes the closure of a project. It provides confirmation that the criteria for customer acceptance have been met and request sign off from the project sponsor to close the project. Project Execution and Closeout (AAUSC, 2008). This report document is the first activity in the project closure phase. It identifies the activities and the actions needed to be performed to close a project. These activities are administrative and financial closure activities. In the administrative closure; it lists actions required to handover of deliverables and documentation to the client and in the financial closure; it lists actions required to closeout contract for the main project, for the subcontractors and suppliers involved. In this process, outstanding project deliverables are listed out in punch list forms and the actions to be taken and the responsible personnel are also included. Completion criteria is also included in the project closure report document. It details the actions to be taken to complete the deliverables and any outstanding activities.

Completing project closing actions is the second activity in the project closure process. For those activities and outstanding works in the project closure report document, action is taken to complete all works according to the deliverable requirement of the client. All administrative and financial closure activities that are listed in the project closure document are being executed at this stage.

Validating the scope of project completion is the third activity in this process. It means that the scope of the project that was identified during the initiation and planning phases of the project has been successfully achieved and any deliverables listed and outlined as pending or outstanding are executed and completed.

The final activity in the project closure is creating close out report. It officially represents the completion of the project. This is the status summary about the project. It includes the valuable information about the project that can be viewed as reference for future projects. It also includes valuable lessons learned during the project. This involves the project manager and project team gaining knowledge about the process of doing the work and the results achieved. It includes any good practices that should be repeated in another repeatable project and any mistakes that can be avoided in the future project in which the project team might encounter.

2.5 Review of Empirical Studies

According to the statistics compiled by the Standish Group (North, 2001):

- 31 percent of projects are cancelled before completion.
- 53 percent of projects overrun costs by 188 percent and schedule by 222 percent.
- Only 16 percent are delivered on time, within budget, and with correct functionality.

Considering these staggering statistics, it is clear that the losses to firms implementing projects would run into trillions of dollars in monetary terms alone, apart from loss of markets, opportunity costs, and organizational failures. Therefore, there is an imperative need to analyze the factors causing termination delays with a view to addressing the problem. The salutary effects of minimizing the chances of delayed termination can hardly be exaggerated. (Sohmen, 2002)

The construction sector is one of the most important contributors for the political, economic, social and technological development of one country. Existing facts show that about 50% of the Federal capital budget of Ethiopia is routed to the development of physical infrastructure. A number of study in the public sector show that more than 80% of the construction projects are delayed, run over budget and/or lack the management. (Ashebir, Wubshet, Murad, 2017) The construction industry is the backbone of the economy of Ethiopia. Although it encounters delays on more than half of the country's projects. Failure to plan, failure to appropriately apply the project closure practices; failure to document and failure to refer to documented information are among the reasons for the many problems that are visible in construction project works. Construction in its nature is a repetitive activity although the final product is unique. It means the complementing activities that produce or construct the building, for instance concrete works, formwork or reinforcement bar works to name among the activities, are routine and repetitive activities. Lessons can be learned to repeat good practices of previous works or to avoid mistakes or errors that has been made in previous works. For this purpose, documented project information is necessary. More than 90% of projects implemented fail to independently review the extent of success at project termination. (Westland, 2006). Project closure is neglected to avoid extra costs & time needed to formally close the project and to review an extent of

achievement. If a project owner gives emphasis to complete the phase, he/she will not only close timely & efficiently, but get lessons that can benefit the next projects. (Sahle, 2018)

2.6 Conceptual Framework of the Study

Orderly termination on or before the Target Termination Date (TTD) is important to ensure client satisfaction and neat completion of the project and its final payments. It is also good for favorable publicity for the firm, for general goodwill in the community, and for repeat business with competitive clients. (Sohmen, 2002)

Orderly completion of projects is the concept of project closure process in project management. It is evident the construction organization will gain credibility in the business environment, if the construction projects it is conducting are completed with project closure practices. Operating organizations or clients want their business projects to be delivered to them as per their requirement in the initiation and planning phase. One way to assure them that their requirements have been met is through the project closure practices by involving them through the processes and creating a mentality of satisfaction from the projects constructed. Preparation of project closure report document, completing project closure actions, validating the scope of project completion and finally creating close out report are the critical factors for ensuring whether the project has been completed according to the desired objectives or not.

According to Project Execution & Closeout (AAUSC, 2018), a project closure activity includes securing customer feedback and approval, planning and conducting a smooth transition of project deliverables to a client or into ongoing operations, capturing and sharing lessons learned, performing administrative closure, celebrating success, and providing ongoing support. The conceptual framework of this thesis is constructed based on the above factors and based on the theoretical concepts of project closure phases in project management. This thesis examines the project closure practices of ETETE construction in the concept mind of preparation of project document, completing project closure actions, validating scope of project completion and creating close out report. The concept will be applied to projects within the construction organization that are building construction and that have been completed.

During project closure practices, the operating organizations or the clients who provide the fund for the project are also who express interest in the completion of the works. The client desires the project to be completed as per the standard and specification that was expected. The commissioning organizations or consulting organizations hold on the responsibility of performing supervision works to make sure construction work is executed as per specifications and standards. Also, the consulting organization checks the final deliverables with respect to the contract specifications and involves in the handover process from the constructing to the operating organizations. The construction organization or the contractor, ETETE Construction, who have the responsibility of execution of the construction works from the beginning to the end, also have the responsibility of handing over the deliverables to the operating organization as per the specifications and standards.

The independent variables in the project closure analysis are preparation of project closure documents, completing project closure action, validating scope of project completion and creating closeout report.

The dependent variables in the project closure analysis are confirmation of objectives being met, improving future engagements, capturing the knowledge in lessons learned and customer satisfaction.

Conceptual Framework

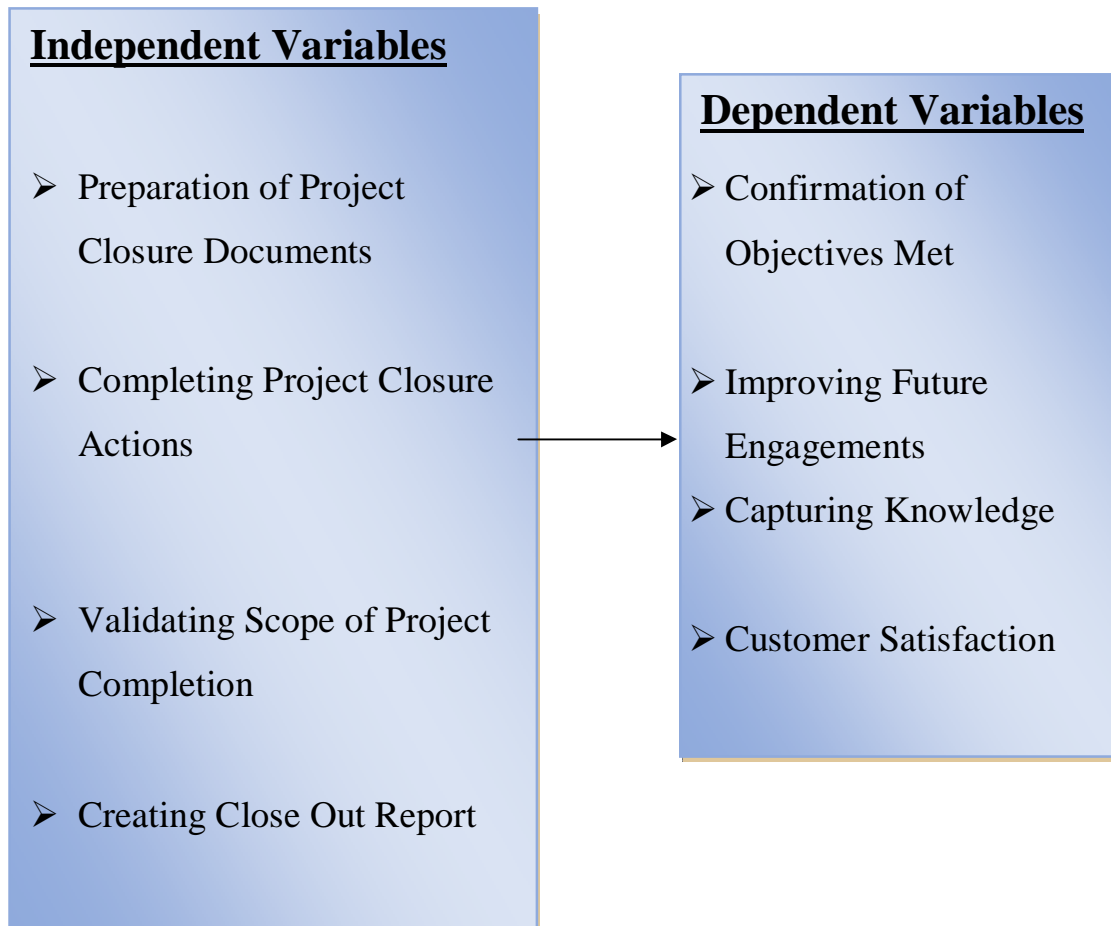


Figure 2.1 Conceptual Framework

Source: Project Execution & Closeout (AAUSC, 2018)

CHAPTER 3

RESEARCH METHODOLOGIES

3.1 Research Design

This study uses descriptive type of research for its research design. In this research type, the problem is described in clear manner to provide information about the current phenomenon of the situation. So, the current practices for project closure phases are described to provide insight about application of project closure. According to the principles of descriptive research types, solutions are produced for the problems that are arising in the closure phase of the construction project. For this study, both quantitative and qualitative research methods are adapted. First empirical quantitative study is applied. The responses from the respondents is converted into mean and standard deviation figures and is being analyzed. The results are then translated and given interpretation by using qualitative research types. Therefore, this study adapts both quantitative and qualitative research types to come up to a recommendation for the solution of a problem.

3.2 Description of Study Variables

The variables for the practices of project closing in construction projects of ETETE construction are; preparation of project closure report document, completing project closure actions, validating the scope of project completion and finally creating close out report.

Project closing is initiated with preparation of project closure report document. A project closure report is a document which formalizes the closure of a project. It provides confirmation that the criteria for customer acceptance have been met and request sign off from the project sponsor to close the project. Project Execution and Closeout (AAUSC, 2008).

Project closure report document is as a guideline or a map to follow throughout the process. It is prepared by the project manager and submitted to the sponsor or client to be approved for the steps and activities to conduct during the project closure processes. In this study, the practice of

project closure for construction projects in ETETE construction is examined. Therefore, preparation of project closure report document is examined as starters.

Completing project closing actions is the second variable in the project closure process. Whether actions have been taken is examined in ETETE construction, according to the criteria that is listed in the Project closure document. At this stage, completed and any remaining works of items will be outlined and examined. Also the assessment includes the administrative and financial closure activities that are conducted in the company according to the closure document.

Validating the scope of project completion is the third variable in this process. In this stage, whether the organization has conducted a scope analysis will be examined. One focus of project closure is validating that the scope of the project is successfully achieved. One way of making sure the scope is achieved is by checking on the project closure document that all the remaining works of items are finished and project deliverables are completely met.

The final variable is creating close out report. It portrays the project to be completed since all the important information will be recorded in this report. Whether the organization has this report will be evaluated.

3.3 Description of Study Area and Target Population

3.3.1 Study Area

The study area for this research is the construction projects that are completed and that have been constructed by ETETE construction prior to 2013 E.C. These projects are currently in the ownership of the clients and completely handed over. For this study, 10 construction projects are considered to be studied. These projects are University projects, Addis Ababa Administration Projects and privately owned projects with more than contractual amount of 35,000,000 Ethiopian Birr.

Item No.	Name of Project	Unit of Currency	Contract Amount
1	Arba Minch University Assembly Project	BIRR	218,263,712.91
2	Wolaita Sodo University Student Dormitory LOT IV	BIRR	156,652,810.01
3	Debre Birhan B+G+6 Post Graduate Complex Dormitory	BIRR	115,866,868.57
4	Arba Minch University Water Center Project	BIRR	98,547,966.81
5	Bahir Dar University Class Room and Laboratory Project	BIRR	88,877,166.67
6	Amrosh Real Estate Bole Addis Ababa	BIRR	81,949,874.51
7	Wollega University Administration Building Shamboo Campus	BIRR	51,054,790.94
8	Bahir Dar Ato Mulugeta Mekonnen B+G+8 Building	BIRR	47,180,544.14
9	40/60 Saving House Project	BIRR	43,048,480.51
10	Fiesta Hotel Building	BIRR	38,520,547.95

Table 3.1 Completed Projects of ETETE Construction Company

3.3.2 Target Population

The target population for the study are the project team members that were directly involved in these projects, the monitoring and evaluation professionals that were coordinating the project from the head office level, the client and consulting representatives for each respective projects and other professional personnel that are in different projects but whose valuable insight can be an important input for the study. This study targets 86 professionals among which; 58 was from to the contractor side, 18 was from to the consultant and 10 was from to the client side.

3.4 Sampling Methods and Sample Size

3.4.1 Sampling Methods

Sampling is the process or technique of selecting a suitable sample for the purpose of determining parameters or characteristics of the whole population. (John, Hafiz, Robert and David, 2007). In this study, the population under study are selected based on two criteria. For project team members who involve in construction completion works, the study uses non-probability purposive sampling method. Any conclusion that can be derived based on the results from these respondents can be reflecting factor for the general construction project. Also the study selects respondents that have been involved in construction works that may or may not involve in construction completion works. For this population group, probability sampling method is selected. The response that is derived from this group is valuable for comparison of observations.

3.4.2 Sample Size

The study focuses on the practices of project closure in the completed construction projects of ETETE Construction that are handed over to the client or the owner. The target population are the project team members who have been in the projects. These project team members include; the project manager, the construction engineer, the site engineer and the office engineers who participated in completed projects and who take part in handling of project closure activities.

When determining the sample size, the study uses the following sampling size standard formula

$$\text{Necessary Sample Size} = (\text{Z-score})^2 * \text{StdDev} * (1 - \text{StdDev}) / (\text{margin of error})^2$$

By assuming to choose a 95% confidence level, our standard Z-score is 1.96. Using a standard deviation of 0.5 for the study and based on the 95% confidence level, the study determines marginal error of (Confidence interval) $\pm 13.2\%$ from the industrial standard for confidence level table.

The study then evaluates the sample necessary sample size as;

$$\text{Necessary Sample Size} = \frac{1.96^2 * 0.5 * (1-0.5)}{0.132^2}$$

$$\text{Necessary Sample Size} = \underline{55}$$

Based on the above minimum number of computed sample size, the study needs a minimum number of 55 respondents. Accordingly, the study conducts a questionnaire data collection technique and collects 70 responses from the targeted population more number of respondents than the necessary sample size.

It. No	Name of Project	Client Representative	Resident Engineer	Contractor				Total Sample Size
				Project Manager	Department Head	Site/Office Engineer	Coordinators	
1	Arba Minch University Assembly Project	1	1	1		3		6
2	Wolaita Sodo University Student Dormitory LOT IV	1	1	1		3		6
3	Debre Birhan Post Graduate Complex Dormitory	1	1	1		3		6
4	Arba Minch University Water Center Project	1	1	1		2		5
5	Bahir Dar University Class Room and Laboratory Project	1	1	1		2		5
6	Amrosh Apartment Addis Ababa	1	1	1		2		5
7	Wollega University Administration Building Shamboo Campus	1	1	1		3		6
8	Bahir Dar Ato Mulugeta Mekonnen B+G+8 Building	1	1	1		2		5
9	40/60 Saving House Project	1	1	1		2		5
10	Fiesta Hotel Building	1	1	1		3		6
11	Head Office				2		3	5
12	Other Projects (Ongoing Projects)	2	1	2		5		
TOTAL		12	11	12	2	30	3	70

Table 3.2 Number of respondents in each completed projects

3.5 Data Collection

Data collection is the process of collecting, measuring and analyzing of related data that give better judgmental results and conclusions about the topic. There are two types of data, primary and secondary data. For this study, primary data is utilized since it is the first data that will be collected from respondents of project team members. For collection of primary data, questionnaire will be used as primary source of data which will be helpful in answering questions related to the study objectives. The responses that is derived from these questionnaires will be therefore primary data feedbacks for this thesis.

The questionnaire has four sections;

- Part I: - This section gathers general information about the respondent personal and organizational background profile
- Part II: - This section gathers data about the practices of project closure processes in ETETE Construction completed projects.
- Part III: - This section gathers data on the financial, technical and administrative effects that influence project closure processes and factors that have effects on the timely project closeout.
- Part IV: - This section gathers data on the factors that can have impact on project closeout for successful project completion.

3.6 Data Analysis and Interpretation

Analysis of data involves processing and analyzing the collected data. The data collected by questionnaire is analyzed using quantitative data analysis techniques. The analyzed data is summarized and presented using appropriate table format with frequencies, percentages using SPSS statistic software for classifications of responses for easier understand and easier visual impression.

In this study, descriptive statics is chosen as the main technique of statically analysis using Microsoft Excel spreadsheet and other computer software like IBM - SPSS.

First quantitative data is analyzed. This data is obtained from the responses of project team members that have been involved in construction completion projects of ETETE Construction Company and professionals who are working in construction projects but whose valuable response is important input for the study. 47 questions are forwarded for each respondents in each parts. Their response from their questionnaire is coded, labeled, categorized and recorded in SPSS software. Unbiased estimates of sample mean, standard deviation and correlational factors is derived using the data analysis software SPSS.

3.7 Reliability and Validity

Reliability and validity very important factors for establishing the credibility and truthfulness of the findings. Reliability refers to the extent to which the same answers can be obtained using the same instruments more than one time. It is a concern every time a single observer is the source of data, because we have no certain guard against the impact of that observer's subjectivity. Validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration. It is the extent to which this research measures what it claims to measure. Also using validity, the study also computes on how the research findings on this research can be generalized to other relevant settings.

For testing the reliability of the research, Cronbach's alpha test was used.

Cronbach's Alpha	Description
$\geq .9$	Excellent
$\geq .8$ but $< .9$	Good
$\geq .7$ but < 0.8	Acceptable
$\geq .6$ but < 0.7	Questionable
$\geq .5$ but $< .6$	Poor
$< .6 = .5$	Unacceptable

Table 3.3 Cronbach's Alpha Reliability Test Classifications

Reliability Statistics

Cronbach's Alpha	N of Items
0.815	47

Table 3.4 Cronbach's Alpha Reliability Statistics Results

According to the results obtained from the SPSS software, the reliability statistics is found to be 0.817. This is found in the second row, which is in the "GOOD" section which is higher than 0.8. This shows that the research method is reliable and if secondary measurement is taken based on the same measurement technique, then there will be a "GOOD" probability of getting the same responses for the same questions presented to respondents.

Accordingly, validity of the research method is tested using the following method.

Sample Size = $N = 70$

Degree of Freedom = $DF = N - 2 = 70 - 2 = 68$

If Obtained Value > Critical Value of Pearson Correlation Coefficient for each question, then the question under study is valid.

For this study, using the 95% confidence level – 0.05 and a degree of freedom (DF) = 68; the critical value is 0.2352 which is found from Pearson Correlation Coefficient table. Therefore, after obtaining the responses for each questions from each respondents, this study will compare the Pearson correlation coefficient results obtained from the SPSS software with the critical value obtained for each questions. If the obtained value of the Pearson Correlation coefficient is greater than that of the critical value, then the question under study is VALID but if the obtained value is less than the critical value then the question is INVALID.

Correlations		
		TOTALPRACTICE
Project Completion Criteria Preparation	Pearson Correlation	.330**
	Sig. (2-tailed)	0.005
Outstanding Activities Identified	Pearson Correlation	.370**
	Sig. (2-tailed)	0.002
Concerned Stakeholders Informed about set of actions	Pearson Correlation	0.094887601
	Sig. (2-tailed)	0.435
Project Closure report request is submitted and approved by client	Pearson Correlation	0.181412314
	Sig. (2-tailed)	0.133
Outstanding activities undertaken and completed	Pearson Correlation	.529**
	Sig. (2-tailed)	0.000
Project Deliverables tested as per contract specification	Pearson Correlation	.307**
	Sig. (2-tailed)	0.010
All contracts been completed	Pearson Correlation	.580**
	Sig. (2-tailed)	0.000
All Payment for vendors and subcontractors paid	Pearson Correlation	0.210235098
	Sig. (2-tailed)	0.081
All audits completed and issues resolved	Pearson Correlation	.293*
	Sig. (2-tailed)	0.014
External Certifications and Authorizations been signed and approved	Pearson Correlation	.482**
	Sig. (2-tailed)	0.000
Total Expense Register is monitored to assess total expenditure	Pearson Correlation	.586**
	Sig. (2-tailed)	0.000
Client is satisfied with overall level of expenditure or project cost	Pearson Correlation	.463**
	Sig. (2-tailed)	0.000
Contractual Quality Targets identified and attained	Pearson Correlation	.718**
	Sig. (2-tailed)	0.000
Staff Operate according to their defined quality role	Pearson Correlation	.393**
	Sig. (2-tailed)	0.001
Additional Time required for any activity over that planned	Pearson Correlation	0.095407675
	Sig. (2-tailed)	0.432
Timesheet information recorded in project plan	Pearson Correlation	0.129035426
	Sig. (2-tailed)	0.287
All risks managed through formal risk process	Pearson Correlation	.494**
	Sig. (2-tailed)	0.000
Staff Operate according to their	Pearson Correlation	.588**

defined risk role	Sig. (2-tailed)	0.000
Acceptance reviews undertaken for each deliverable	Pearson Correlation	.678**
	Sig. (2-tailed)	0.000
Client accepts all deliverables	Pearson Correlation	.475**
	Sig. (2-tailed)	0.000
Staff Operate according to their defined acceptance role	Pearson Correlation	.377**
	Sig. (2-tailed)	0.001
Project Plans and supporting documentation been revised to reflect "as built" condition	Pearson Correlation	.662**
	Sig. (2-tailed)	0.000
Final Project Reports Prepared and distributed	Pearson Correlation	.505**
	Sig. (2-tailed)	0.000
Project Plan been archived with supporting data	Pearson Correlation	.541**
	Sig. (2-tailed)	0.000
Lessons Learned been documented, archived and distributed	Pearson Correlation	.497**
	Sig. (2-tailed)	0.000
Maintaining and Using Archives	Pearson Correlation	.361**
	Sig. (2-tailed)	0.002
Identifying and Addressing Success	Pearson Correlation	.694**
	Sig. (2-tailed)	0.000
Client Project Signoff	Pearson Correlation	.566**
	Sig. (2-tailed)	0.000
Project Facilities, Equipment and other resources been allocated	Pearson Correlation	.696**
	Sig. (2-tailed)	0.000
TOTALPRACTICE	Pearson Correlation	1
	Sig. (2-tailed)	
	N	70

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

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

Table 3.5 Pearson Correlation Analysis for Validation Test of Practices of Project Closure

From the correlation table, the study finds that out of 29 questions raised to evaluate the practices of project closure practices in ETETE Construction, 24 questions are VALID and 5 questions are found to be INVALID. Therefore from the correlation analysis, the questions for evaluation of the practices are VALID with 83% and it means most of the questions are measuring what the research is intending to measure and the questions adequately reflect the real meaning of the concept for the practices of project closure in the company.

Correlations

		TOTALEFFECT
Client Directed change orders	Pearson Correlation	.468**
	Sig. (2-tailed)	0.000
Delay by client for payment	Pearson Correlation	.692**
	Sig. (2-tailed)	0.000
Contractor Project Team Incentives	Pearson Correlation	.634**
	Sig. (2-tailed)	0.000
Technical Expertise on site	Pearson Correlation	.390**
	Sig. (2-tailed)	0.001
Lack in planning and resources allocation	Pearson Correlation	0.190776348
	Sig. (2-tailed)	0.114
Unclear directives for closeout, in specifications and contractual requirements	Pearson Correlation	0.197348089
	Sig. (2-tailed)	0.102
Procedural Inexperience of owner or consulting representative	Pearson Correlation	.469**
	Sig. (2-tailed)	0.000
Improper contractual closeout documentation	Pearson Correlation	.677**
	Sig. (2-tailed)	0.000
Multiple Punch Lists	Pearson Correlation	.690**
	Sig. (2-tailed)	0.000
Shortage or late arrival of resources i.e. material, manpower and equipment	Pearson Correlation	.363**
	Sig. (2-tailed)	0.002
Consideration of Early Closeout at Planning Stage or during project scheduling	Pearson Correlation	.740**
	Sig. (2-tailed)	0.000
Incentives for Early Completion	Pearson Correlation	.602**
	Sig. (2-tailed)	0.000
Penalty for Late Completion	Pearson Correlation	.288*
	Sig. (2-tailed)	0.015
Early reference to previous project closeout reports	Pearson Correlation	.732**
	Sig. (2-tailed)	0.000
TOTALEFFECT	Pearson Correlation	1
	Sig. (2-tailed)	
	N	70

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

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

Table 3.6 Pearson Correlation Analysis for Validation Test of Effects of Factors of project Closure

From the correlation table, the study finds that out of 14 questions raised to evaluate the effects of technical, financial and administration factors on project closure practices in ETETE Construction, 12 questions are VALID and 2 questions are found to be INVALID. Therefore from the correlation analysis, the questions for evaluation of the effects are VALID with 86% and it means most of the questions are measuring what the research is intending to measure and the questions adequately reflect the real meaning of the concept for the effects of technical, financial and administration factors on project closure practices in the company.

		TOTALIMPACT
Confirmation of project objectives being met	Pearson Correlation	.765**
	Sig. (2-tailed)	0.000
Improving future engagements and building credibility	Pearson Correlation	.812**
	Sig. (2-tailed)	0.000
Capturing the knowledge in lessons learned documents	Pearson Correlation	.746**
	Sig. (2-tailed)	0.000
Customer Satisfaction	Pearson Correlation	.688**
	Sig. (2-tailed)	0.000
TOTALIMPACT	Pearson Correlation	1
	Sig. (2-tailed)	
	N	70

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

Table 3.7 Pearson Correlation Analysis for Validation Test of Impacts of Project Closure on Successful Completion

From the correlation table, the study finds that out of 4 questions raised to evaluate the impacts of listed factors on project closure practices in ETETE Construction, all the 4 questions are VALID. Therefore from the correlation analysis, the questions for evaluation of the impacts are VALID with 100% and it means most of the questions are measuring what the research is intending to measure and the questions adequately reflect the real meaning of the concept for the impacts of listed factors on project closure practices in the company.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter is concerned with analyzing the results of data responses that were collected from the questionnaire from the participants that have been involved in the project closure practices. The participating personnel were from the contractor, the client and the consultant side. The analysis is conducted in three parts. The first part deals with the analysis of the demographic data of the participants that involve in the data collection. The data collection was taken from the technical personnel that take part in project closing practices mostly from ETETE construction projects. The second part deals with encoding of the data in SPSS software and analyzing the results of data on; the Frequencies of practices of project closure activities, Effects of technical, financial and administrative factors project closure practices and the Impacts of project closure practices on successful completion of projects, by using mean score and standard deviation descriptive statistics as measurement factors. The third part deals with analyzing the relationship between the independent and dependent variables using multiple regression analysis.

4.2 Response Rate

The questionnaire was distributed to 86 professional personnel from the contractor, the consultant and the client side. From the 86 questionnaires distributed, 58 was sent to the contractor, 18 was sent to the consultant and 10 was sent to the client side. Out of the 86 distributed, 70 (81.39%) was responded by the participating respondents as; 53 (75.72%) responses from the contractor, 11 (15.71%) responses from the consultant and 6 (8.57%) responses from the client was completed and returned from the respondents. This is tabulated in the following table.

Respondents Category	Questionnaire Distributed	Questionnaire Returned	Percentage returned %
Client	10	6	6.97%
Consultant	18	11	12.79%
Contractors	58	53	61.63%
Total	86	70	81.39%

Table 4.1 Distributed and Returned Percentage of Participant Responses

4.3 Demographic Characteristics

The first part of analysis is analyzing the demographic characteristics or the personal profile of the participating respondents. In this section, the analysis will be conducted based on the type of organization, the educational background status, the work experience in years and finally on the job position in the organization the participant holds. The findings of the above information is summarized and presented in the tables below.

Item No.	Background Variable	Description	Frequency	Percent (%)
1	Type of Organization	Client	6	8.57%
		Contractor	53	75.72%
		Consultant	11	15.71%
2	Job Position in Organization	Department Head	2	2.86%
		Project Manager	14	20.0%
		Site/Office Engineer	37	52.86%
		Resident Engineer	11	15.71%
		Client Representative	6	8.57%
		Total	70	100.0

Table 4.2 Background Organizational Profile of Participant Respondents

As shown from the table above, the number of respondents from the contractors' side take the highest number of response with a percentage 75.72% followed with the consultant side 15.71% and the client side with a percentage 8.57%. Regarding the job positions the respondents hold in their respective organizations, there is high number of response from Site/Office Engineering (including Coordinators) personnel with a percentage of 52.86%, following are the response from the Project Manager with 20.0%, the Residence Engineer with 15.71% and the Client Representative with 8.57%. There is also a 2.86% response from the Department Head personnel that are from the contractors' side.

Item No.	Background Variable	Description	Frequency	Percent (%)
1	Educational Status	Masters	19	27.1
		Degree	51	72.9
2	Experience In Years	1 – 5 Years	23	32.8
		6 – 10 Years	34	48.6
		11 – 15 Years	13	18.6
		Total	70	100.0

Table 4.3 Background Educational and Experience Profile of Participant Respondents

As can be observed from the above table, the number of respondents who have a Degree educational background have more number of response with a 72.9% percentage, and those participants with a Masters educational background have 27.1% percentages. Also regarding the experiences of the participants in years, the respondents having a 1 – 5 years of experiences in construction have a 32.8%, those with 6 – 10 years of experience 48.6% and finally those respondents with 11 - 15 years of experience in construction sector have an 18.6% percentages.

4.4 Descriptive Statistics of Practices of Project Closure

This part of analysis is conducted based on the descriptive statistics analysis of the results obtained from the questionnaire. The study uses mean and standard deviation scores for the measurement factors of each variables. By using the mean and standard deviation scores for each variables, the study justifies by using the calculation to show the respondent's average responses for each question included in each dimension of the independent variable to achieve the great mean of each dimension. The analysis is carried out by using the great mean for each variable to come up to a recommendation and conclusion for the research objective of the study. The analysis is performed using the measurement scale interval and adapts the following ranges for the classification of the results obtained from the analysis. Mean scores 4.51-5.00 Excellent or very good, good 3.51-4.50; average or moderate 2.51-3.50; fair 1.51-2.50; and poor 1.00-1.50 (Reilly & Pepe, 1995).

The analysis from the descriptive statistics is performed based on the three sections that were presented to the respondents on the questionnaire. The first section is concerned with the frequencies of practices of project closure activities on project completion on ETETE Construction projects, the second section is concerned with the effects of technical, financial and administrative factors on project closeout activities and the third section focuses on the impacts of project closeout activities on successful completion of construction projects.

4.4.1 Descriptive Statistics of Frequencies of Practices of Project Closure

When analyzing the frequencies of the practices of project closure activities, four criteria are observed that are necessary for determining how the company undertakes the project closure activities for its completed projects. These are mentioned in the conceptual framework of the study as; preparation of project closure report document, completing project closure actions, validating scope of project completion and creating close out report. The study analyzes and summarizes each criteria as tabulated in the following tables.

➤ **Preparation of Project Closure Report Documents**

Descriptive Statistics

Item No.	Preparation of Project Closeout	N	Mean	Std. Deviation	RANK
1	Project Completion Criteria Preparation	70	3.27	0.815	MODERATE
2	Outstanding Activities Identified	70	4.26	0.630	GOOD
3	Concerned Stakeholders Informed about set of actions	70	4.14	0.490	GOOD
4	Project Closure report request is submitted and approved by client	70	4.01	0.691	GOOD

➤ Table 4.4 Descriptive Statistics Analysis for Preparation of Project Closure Report Documents Criteria

Regarding the preparation of project closure report documents, four independent variables were identified and presented to respondents to evaluate their frequencies of practicability. The Outstanding Activities Identified variable (Mean=4.26&SD=0.630), Concerned Stakeholders Informed about set of Actions variable (Mean=4.14&SD=0.490) and Project Closure Report Request Submitted variable (Mean=4.01&SD=0.691) is found in the GOOD range to being frequently practiced as project closure activities. But the Project Completion Criteria variable (Mean=3.27 & SD=0.815) is found in the MODERATE range of mean classification.

➤ **Actions Taken to Close Project Closure Activities**

Descriptive Statistics

Item No.	Actions taken to Close Project Closure Activities	N	Mean	Std. Deviation	Rank
1	Outstanding activities undertaken and completed	70	4.67	0.557	VERY GOOD
2	Project Deliverables tested as per contract specification	70	4.14	0.621	GOOD
3	All contracts been completed	70	4.56	0.651	VERY GOOD
4	All Payment for vendors and subcontractors paid	70	4.50	0.558	GOOD
5	All audits completed and issues resolved	70	4.07	0.573	GOOD
6	External Certifications and Authorizations been signed and approved	70	4.01	0.712	GOOD
	Valid N (list wise)	70			

Table 4.5 Descriptive Statistics Analysis for Actions Taken to Close Project Closure Criteria

When analyzing the actions taken to close project closure activities, six independent variables were identified and presented to respondents to evaluate their frequencies of practicability. The Outstanding activities undertaken and completed variable (Mean=4.67&SD=0.557) and All contracts been completed variable (Mean=4.56&SD=0.651) are found in the VERY GOOD range to frequently being practiced when conducting project closure phases. The All Payment for vendors and subcontractors paid variable (Mean=4.50&SD=0.558), Project Deliverables tested as per contract specification variable (Mean=4.14&SD=0.621), All audits completed and issues resolved variable (Mean=4.07&SD=0.573) and External Certifications and Authorizations been signed and approved variable (Mean=4.01&SD=0.712) are found in the GOOD range of mean classification.

➤ **Validating Project Scope Completion**

Descriptive Statistics

Item No.	Validating Project Scope Completion	N	Mean	Std. Deviation	Classification
1	Total Expense Register is monitored to assess total expenditure	70	3.76	0.770	GOOD
2	Client is satisfied with overall level of expenditure or project cost	70	3.90	0.386	GOOD
3	Contractual Quality Targets identified and attained	70	3.99	0.434	GOOD
4	Staff Operate according to their defined quality role	70	3.99	0.466	GOOD
5	Additional Time required for any activity over that planned	70	4.51	0.584	VERY GOOD
6	Timesheet information recorded in project plan	70	3.90	0.617	GOOD
7	All risks managed through formal risk process	70	3.19	0.666	MODERATE
8	Staff Operate according to their defined risk role	70	3.33	0.696	MODERATE
9	Acceptance reviews undertaken for each deliverable	70	3.80	0.604	GOOD
10	Client accepts all deliverables	70	4.24	0.669	GOOD
11	Staff Operate according to their defined acceptance role	70	3.97	0.416	GOOD
	Valid N (list wise)	70			

Table 4.6 Descriptive Statistics Analysis for Validating Scope Completion Criteria

Regarding validating project scope, eleven independent variables were identified and submitted to respondents to evaluate their frequencies of practicability in the company. Additional Time required for any activity over that planned variable (Mean=4.51&SD=0.584) is in a VERY GOOD range to be frequently practiced, Client accepts all deliverables variable (Mean=4.24&SD=0.669), Contractual Quality Targets identified and attained variable (Mean=3.99&SD=0.434), Staff Operate according to their defined acceptance role variable (Mean=3.97&SD=0.416), Staff Operate according to their defined quality role variable

(Mean=3.99&SD=0.466), Client is satisfied with overall level of expenditure or project cost variable (Mean=3.90&SD=0.386), Timesheet information recorded in project plan variable (Mean=3.90&SD=0.617), Acceptance reviews undertaken for each deliverable variable (Mean=3.80&SD=0.604) and Total Expense Register is monitored to assess total expenditure variable (Mean=3.76&SD=0.770) are found in a GOOD range to be frequently practiced and Staff Operate according to their defined risk role variable (Mean=3.33&SD=0.696) & All risks managed through formal risk process variable (Mean=3.19&SD=0.666) are found in a MODERATE range to be frequently practiced when validating the project scope during conducting of project completion works.

➤ **Creating Project Closeout Report**

Descriptive Statistics

Item No.	Creating Closeout Report	N	Mean	Std. Deviation	Classification
1	Project Plans and supporting documentation been revised to reflect "as built" condition	70	4.54	0.606	VERY GOOD
2	Final Project Reports Prepared and distributed	70	3.81	0.748	GOOD
3	Project Plan been archived with supporting data	70	3.61	0.748	GOOD
4	Lessons Learned been documented, archived and distributed	70	3.14	0.728	MODERATE
5	Maintaining and Using Archives	70	2.83	0.742	MODERATE
6	Identifying and Addressing Success	70	3.97	0.834	GOOD
7	Client Project Signoff	70	4.21	0.899	GOOD
8	Project Facilities, Equipment and other resources been allocated	70	4.46	0.736	GOOD
	Valid N (list wise)	70			

Table 4.7 Descriptive Statistics Analysis for Creating Project Closeout Criteria

When analyzing the creating project closeout report, eight independent variables were identified and presented to respondents to evaluate the frequency of their practicability when creating the project closeout reports. Project Plans and supporting documentation been revised to reflect "as built" condition variable (Mean=4.54&SD=0.606) is found in a VERY GOOD range to be frequently practiced, Project Facilities, Equipment and other resources been allocated variables

(Mean=4.46&SD=0.736), Client Project Signoff variable (Mean=4.21&SD=0.899), Identifying and Addressing Success variable (Mean=3.97&SD=0.834), Final Project Reports Prepared and distributed variable (Mean=3.81&SD=0.748) & Project Plan been archived with supporting data variable (Mean=3.61&SD=0.748) are found in GOOD range to be frequently practiced and Lessons Learned been documented, archived and distributed variable (Mean=3.14&SD=0.728) & Maintaining and Using Archives variable (Mean=2.83&SD=0.742) are found in MODERATE range to be frequently practiced in creating project closeout report while undertaking project closure activities.

4.4.2 Analysis of Effects of Financial, Technical and Administrative Factors on project closeout phase and Effectiveness of Factors to assure timely project closeout

Item No.	Effects of Factors on Project Closeout	N	Mean	Std. Deviation	Classification
Financial Factors					
1	Client Directed change orders	70	4.61	0.666	VERY GOOD
2	Delay by client for payment	70	4.69	0.578	VERY GOOD
3	Contractor Project Team Incentives	70	3.70	1.026	GOOD
Technical Factors					
4	Technical Expertise on site	70	4.33	0.675	GOOD
5	Lack in planning and resources allocation	70	4.10	0.617	GOOD
6	Unclear directives for closeout, in specifications and contractual requirements	70	3.87	0.563	GOOD
7	Procedural Inexperience of owner or consulting representative	70	3.83	0.613	GOOD
Administrative Factors					
8	Improper contractual closeout documentation	70	4.03	0.636	GOOD
9	Multiple Punch Lists	70	4.44	0.927	GOOD
10	Shortage or late arrival of resources i.e. material, manpower and equipment	70	4.74	0.440	VERY GOOD
	Valid N (list wise)	70			

Table 4.8 Descriptive Statistics Analysis for Effects of Factors on Project Closeout

Financial, technical and administrative factors were identified and presented to respondents to determine their effect on the project closeout phases. Accordingly, financial factors of Client Directed change orders (Mean=4.61&SD=0.666), Delay by client for payment (Mean=4.69&SD=0.578) & administrative factor of Shortage or late arrival of resources (Mean=4.74&SD=0.440) are found in VERY GOOD range to have a very good effect on the process of project closeout activities. Financial factor of Contractor Project Team Incentives (Mean=3.70&SD=1.026), technical factors of Technical Expertise on site (Mean=4.33&SD=0.675), Lack in planning and resources allocation (Mean=4.10&SD=0.617), Unclear directives for closeout (Mean=3.87&SD=0.563), Procedural Inexperience of owner or consulting representative (Mean=3.83&SD=0.613), administrative factors of Improper contractual closeout documentation (Mean=4.03&SD=0.636) and Multiple Punch Lists (Mean=4.44&SD=0.927) are found in a GOOD range to have a good effect on the process of project closeout activities.

Descriptive Statistics

Item No.	Effectiveness of Factors on Assuring Timely Closeout	N	Mean	Std. Deviation	Classification
1	Consideration of Early Closeout at Planning Stage or during project scheduling	70	4.37	0.887	GOOD
2	Incentives for Early Completion	70	3.60	0.841	GOOD
3	Penalty for Late Completion	70	4.06	0.587	GOOD
4	Early reference to previous project closeout reports	70	4.29	0.870	GOOD
	Valid N (list wise)	70			

Table 4.9 Descriptive Statistics Analysis for Effectiveness of Factors on Assuring Timely Closeout

Four factors were identified and presented to respondents that might be utilized to assure timely project closeout. Therefore, Consideration of Early Closeout at Planning Stage (Mean=4.37&SD=0.887), Early reference to previous project closeout reports (Mean=4.29&SD=0.870), Penalty for Late Completion (Mean=4.06&SD=0.587) and Incentives for Early Completion (Mean=3.60&SD=0.841) are found in GOOD range to have a good effect on assurance of timely project closure activities.

4.4.3 Descriptive Statistics of Impacts of Project Closeout Factors on Successful Project Completion

Descriptive Statistics

Item No.	Impacts of Closeout Phase on Successful Project Completion	N	Mean	Std. Deviation	Classification
1	Confirmation of project objectives being met	70	4.59	0.551	VERY GOOD
2	Improving future engagements and building credibility	70	4.20	0.604	GOOD
3	Capturing the knowledge in lessons learned documents	70	4.27	0.588	GOOD
4	Customer Satisfaction	70	4.76	0.464	VERY GOOD
	Valid N (list wise)	70			

Table 4.10 Descriptive Statistics Analysis for Impacts of Closeout Phase on Successful Project Completion

Regarding factors that have an impact on successful project completion, four factors were identified and presented to respondents to determine the impacts of each factors on the successful completion of construction projects in ETETE construction projects. Customer Satisfaction (Mean=4.76&SD=0.464) and Confirmation of project objectives being met (Mean=4.59&SD=0.551) are in a VERY GOOD range to have a very good impact on the successful completion; whereas Capturing the knowledge in lessons learned documents (Mean=4.27&SD=0.588) and Improving future engagements and building credibility (Mean=4.20&SD=0.604) are in a GOOD range to have a good impact on the successful completion of construction projects that have been completed in ETETE construction company.

Those independent variables with a VERY GOOD & GOOD mean classification have a profound good frequencies of practicability when completing construction projects in ETETE Construction Company. Also those independent variables with a MODERATE mean classification has somehow moderate frequencies of practicability in completion of construction projects.

4.5 Analysis of Relationships of Practices of Project Closure with Factors Affecting Project Closure Practices of Construction Projects

The study has predetermined the independent and the dependent variables in the conceptual framework of the study. Therefore, it is expected that the independent variables will have an influence on the dependent variables whether the relationship has positive or negative impact. Regarding the effectiveness of the practices of the project closure activities on the successful completion of construction projects in ETETE Construction Company;

The independent variables in the project closure analysis are preparation of project closure documents, completing project closure action, validating scope of project completion and creating closeout report and

The dependent variables in the project closure analysis are confirmation of objectives being met, improving future engagements, capturing the knowledge in lessons learned and customer satisfaction.

When analyzing the relationship between the variables, the study employs multiple regression analysis. Responses of data are entered in the statistics analysis software SPSS and the results of the relationship analysis are tabulated based on the responses of the respondents.

According to the results of the multiple regression analysis,

R – is the correlation coefficient that shows the higher quality of prediction for dependent variable under study. The higher the value of R the higher is the capacity of the independent variable to predict the dependent variable.

R^2 – is the coefficient of determination which explains how much the dependent variable can be explained by the independent variable.

β – is the beta value that explains the type of relationship between the dependent and the independent variable. When the value is positive then the variables have a positively influencing relationships but when the value is negative then the variables have a negatively influencing relationships. The higher the value of β value then the higher the independent variable will have influence on the dependent variable.

ρ – is the significance factor. If $\rho < 0.05$, then the test is significant and there is significant relationship between the dependent and the independent variables but If $\rho \geq 0.05$ then the test is not significant and there is no any significant relationship between the dependent and the independent variables.

The study analysis the relationships of the independent and the dependent variables based on the β value and ρ value. The results of the regression analysis for all the variables analyzed are listed and tabulated in the Appendix section.

➤ **Confirmation of Objectives Being Met as Dependent Variable**

The first dependent variable for the multiple regression analysis is the confirmation of objectives being met variable. Analysis is undertaken on this variable by considering the variables that are included and listed in the independent variables. The results of the study are tabulated and summarized as below.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.811 ^a	0.725	0.489	0.424

Table 4.11 Correlation Coefficient Analysis for confirmation of objectives being met criteria

From the correlation coefficient ($R=0.811$ or 81.1%) and the coefficient of determination (R square= 0.725 or 72.5%) results, the study finds that the confirmation of objectives being met dependent variable is predicted with 81.1% quality of precision by the independent variables included in preparation of project closure documents, completing project closure action, validating scope of project completion and creating closeout report predict. Also 72.5% of the dependent variable is explained well by the independent variables and it suggests that any change in the dependent variable is 72.5% correctly explained from the independent variables.

Coefficients^a

Model	Confirmations of Objectives Met Criteria	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.587	1.660		3.969	0.000
2	Outstanding Activities Identified	0.655	0.159	0.748	4.121	0.000
6	Project Deliverables tested as per contract specification	0.438	0.195	0.510	2.187	0.043
7	All contracts been completed	0.563	0.227	0.665	2.484	0.017
11	Total Expense Register is monitored to assess total expenditure	0.299	0.120	0.417	2.481	0.017
13	Contractual Quality Targets identified and attained	0.635	0.245	0.754	2.655	0.002
14	Staff Operate according to their defined quality role	0.518	0.223	0.437	2.326	0.025
16	Timesheet information recorded in project plan	0.433	0.194	0.504	2.175	0.044
17	All risks managed through formal risk process	-0.480	0.169	-0.587	-2.837	0.014
18	Staff Operate according to their defined risk role	-0.347	0.167	-0.438	-2.085	0.043
20	Client accepts all deliverables	0.630	0.244	0.749	2.644	0.003
23	Final Project Reports Prepared and distributed	-0.393	0.160	-0.534	-2.464	0.018
24	Project Plan been archived with supporting data	-0.604	0.201	-0.819	-3.000	0.005
25	Lessons Learned been documented, archived and distributed	-0.434	0.138	-0.572	-3.148	0.003
26	Maintaining and Using Archives	-0.525	0.170	-0.638	-3.096	0.004

a. Dependent Variable: Confirmation of project objectives being met

Table 4.12 Multiple Regression Analysis for confirmation of objectives being met criteria

Assigning the dependent variable as Confirmation of project objective being met and analyzing the correlation, fourteen independent variables are selected based on the significance factor

which is less than $\rho < 0.05$. Those variables with significance factor more than $\rho \geq 0.05$ are not considered to be further analyzed because according to the responses from the participants, there is no significant relationship between those independent variables and the dependent variable Confirmation of project objective being met.

Referring from the table in Appendix III, the study selects the above independent variables who have a significant correlation relationship with the dependent variable. Outstanding Activities Identified ($\beta=0.655$), Contractual Quality Targets identified and attained ($\beta=0.635$), Client accepts all deliverables ($\beta=0.630$), All contracts been completed ($\beta=0.563$), Staff Operate according to their defined quality role ($\beta=0.518$), Project Deliverables tested as per contract specification ($\beta=0.438$), Timesheet information recorded in project plan ($\beta=0.433$) and Total Expense Register is monitored to assess total expenditure ($\beta=0.299$) independent variables have a positively influencing impacts on the dependent variable of Confirmation of project objective being met. This means any changes in the independent variables will have a directly proportional positive change or impact on the dependent variable under study.

Project Plan been archived with supporting data ($\beta=-0.604$), Maintaining and Using Archives ($\beta=-0.525$), All risks managed through formal risk process ($\beta=-0.480$), Lessons Learned been documented, archived and distributed ($\beta=-0.434$), Final Project Reports Prepared and distributed ($\beta=-0.393$) and Staff Operate according to their defined risk role ($\beta=-0.347$) independent variable have a negatively influencing impact on the dependent variable. Because this independent variable practice are not frequently applied by the contractor, the dependent variable Confirmation of Objectives being met is impacted by the negative impact. The more this independent variable is not practiced by the contractor, the less is the dependent variable Confirmation of project objectives being met attained.

➤ **Improving Future Engagements as Dependent Variable**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.829 ^a	0.754	0.480	0.444

Table 4.13 Correlation Coefficient Analysis for Improving Future Engagements criteria

When assigning improving future engagements and building credibility as a dependent variable and undertaking a multiple regression analysis for all independent variables, the study finds in the analysis that the independent variables has a correlation coefficient $R=82.9\%$ of quality & capacity of predicting the dependent variable and also the independent variables have a coefficient of determination $R^2=75.4\%$ meaning the independent variables explain 75.4% for the changes that occur in the dependent variable.

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.379	1.739		1.944	0.059
2	Outstanding Activities Identified	0.458	0.166	0.477	2.749	0.009
13	Contractual Quality Targets identified and attained	0.555	0.230	0.429	2.389	0.031
14	Staff Operate according to their defined quality role	0.567	0.233	0.437	2.431	0.020
17	All risks managed through formal risk process	-0.438	0.209	-0.421	-2.113	0.019
19	Acceptance reviews undertaken for each deliverable	0.539	0.227	0.418	2.331	0.046

a. Dependent Variable: Improving future engagements and building credibility

Table 4.14 Multiple Regression Analysis for improving future engagements criteria

Regarding the dependent variable of Improving future engagements and building credibility, five independent variables are found significant having significance factor $p < 0.05$. The study will analyze the relationship of these factors with the dependent variable and neglects those independent variables with significance factor $p \geq 0.05$ since there is no significant relationship between those independent variables and the dependent variable according to the response from the participants.

Referring from the table in Appendix IV, the study selects the above independent variables who have a significant correlation relationship with the dependent variable. Staff Operate according

to their defined quality role ($\beta=0.567$), Contractual Quality Targets identified and attained ($\beta=0.555$), Acceptance reviews undertaken for each deliverable ($\beta=0.539$) and Outstanding Activities Identified ($\beta=0.458$) independent variable have a positively influencing impact on the dependent variable meaning any changes in these variables will have a directly proportional positive change on the dependent variable of Improving future engagements and building credibility.

All risks managed through formal risk process ($\beta=-0.438$) independent variable will have a negatively influencing impact on the dependent variable. Because these independent variable practices are not frequently applied by the contractor, the dependent variable improving future engagements and building credibility is impacted by the negative impact. The more this independent variable is not practiced by the contractor, the less is the Building Credibility of the dependent variable will be attained.

➤ **Capturing Knowledge as Lessons Learned as Dependent Variable**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.801 ^a	0.701	0.394	0.462

Table 4.15 Correlation Coefficient Analysis for Capturing Knowledge as Lessons Learned criteria

Assigning the dependent variable to be Capturing Knowledge as Lessons Learned and undertaking a multiple regression analysis with the independent variables, the study finds from the response of the participants that the test have a correlation coefficient $R=80.1\%$ of quality of predicting the dependent variable and also the test have a coefficient of determination $R^2=70.1\%$ meaning the independent variables can explain 70.1% of the changes that occur on the dependent variables.

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.086	1.809		3.365	0.002
21	Staff Operate according to their defined acceptance role	0.707	0.265	0.500	2.664	0.011
24	Project Plan been archived with supporting data	-0.471	0.220	-0.599	-2.147	0.038
25	Lessons Learned been documented, archived and distributed	-0.426	0.175	-0.446	-2.522	0.048
27	Identifying and Addressing Success	0.586	0.184	0.831	3.192	0.003
28	Client Project Signoff	0.725	0.267	0.510	2.724	0.001

a. Dependent Variable: Capturing the knowledge in lessons learned documents

Table 4.16 Multiple Regression Analysis for Capturing the knowledge in lessons learned criteria

For the dependent variable of Capturing the knowledge in lessons learned, five independent variables have the significance factor of $p < 0.05$. Therefore the study proceeds with these five independent variables to analyze their relationship with the dependent variable.

Referring from the table in Appendix V, the study selects the above independent variables who have a significant correlation relationship with the dependent variable. Client Project Signoff ($\beta=0.725$), Staff Operate according to their defined acceptance role ($\beta=0.707$) and Identifying and Addressing Success ($\beta=0.586$) independent variables have a positively influencing impact on the dependent variable. It means any changes in the independent variable have a directly proportional positive change on the dependent variable.

Project Plan been archived with supporting data ($\beta=-0.471$) and Lessons Learned been documented, archived and distributed ($\beta=-0.426$) independent variable will have a negatively influencing impact on the dependent variable. Because these independent variable practices are not frequently applied by the contractor, the dependent variable capturing the knowledge in lessons learned documents is impacted by the negative impact. The more these independent

variables are not practiced by the contractor, the less is the Capturing the knowledge in lessons learned documents of the dependent variable will be attained.

➤ **Customer Satisfaction as Dependent Variable**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.879 ^a	0.773	0.608	0.290

Table 4.17 Correlation Coefficient Analysis for Customer Satisfaction criteria

Regarding the dependent variable Customer Satisfaction and conducting multiple regression analysis, the test has a correlation coefficient of R=87.9% of quality of predicting the dependent variable and also a coefficient of determination of R²=77.3% meaning the independent variables explain 77.3% of the changes that occur in the dependent variable.

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.389	1.323		2.562	0.016
1	Project Completion Criteria Preparation	-0.444	0.097	-0.779	-4.582	0.000
2	Outstanding Activities Identified	0.575	0.109	0.780	5.280	0.000
4	Project Closure report request is submitted and approved by client	0.206	0.093	0.307	2.215	0.033
5	Outstanding activities undertaken and completed	0.453	0.156	0.636	2.916	0.001
7	All contracts been completed	0.449	0.155	0.630	2.892	0.006
10	External Certifications and Authorizations been signed and approved	0.452	0.155	0.635	2.911	0.002
11	Total Expense Register is monitored to assess total expenditure	0.282	0.083	0.467	3.416	0.001

12	Client is satisfied with overall level of expenditure or project cost	0.559	0.193	0.465	2.901	0.006
13	Contractual Quality Targets identified and attained	0.438	0.154	0.614	2.825	0.02
14	Staff Operate according to their defined quality role	0.927	0.153	0.931	6.079	0.000
15	Additional Time required for any activity over that planned	-0.313	0.135	-0.394	-2.318	0.026
16	Timesheet information recorded in project plan	0.429	0.152	0.601	2.773	0.031
17	All risks managed through formal risk process	-0.343	0.105	-0.527	-3.277	0.014
20	Client accepts all deliverables	0.427	0.152	0.599	2.763	0.033
21	Staff Operate according to their defined acceptance role	0.642	0.167	0.576	3.849	0.000
22	Project Plans and supporting documentation been revised to reflect "as built" condition	0.292	0.130	0.381	2.236	0.031

a. Dependent Variable: Customer Satisfaction

Table 4.18 Multiple Regression Analysis for Customer Satisfaction criteria

For the Customer Satisfaction dependent variable, sixteen independent variable are found as significant having a significance factor of $p < 0.05$. The study also analyzes further the correlation analysis for these independent variables to determine their relationship with the dependent variable of Customer Satisfaction.

Referring from the table in Appendix VI, the study selects the above independent variables who have a significant correlation relationship with the dependent variable. Staff Operate according to their defined quality role ($\beta=0.927$), Staff Operate according to their defined acceptance role ($\beta=0.642$), Outstanding Activities Identified ($\beta=0.575$), Client is satisfied with overall level of expenditure or project cost ($\beta=0.559$), Outstanding activities undertaken and completed ($\beta=0.453$), External Certifications and Authorizations been signed and approved ($\beta=0.452$), All contracts been completed ($\beta=0.449$), Contractual Quality Targets identified and attained ($\beta=0.438$), Timesheet information recorded in project plan ($\beta=0.429$), Client accepts all deliverables ($\beta=0.427$), Project Plans and supporting documentation been revised to reflect "as built" condition ($\beta=0.292$), Total Expense Register is monitored to assess total expenditure ($\beta=0.282$) and Project Closure report request is submitted and approved by client ($\beta=0.206$)

independent variables have a positively influencing impact on the Customer Satisfaction dependent variable. It means any changes in the independent variables will have a directly proportional positive change on the Customer Satisfaction variable.

Project Completion Criteria Preparation ($\beta=-0.444$), All risks managed through formal risk process ($\beta=-0.343$) and Additional Time required for any activity over that planned ($\beta=-0.313$) independent variables have a negatively influencing impact on the Customer Satisfaction dependent variable according to the responses from the participants. Because these independent variable practices are not frequently applied by the contractor, the dependent variable Customer Satisfaction is impacted by the negative impact. The more these independent variables are not being practiced by the contractor, the less is the Customer Satisfaction will be attained.

CHAPTER 5

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

5.1 Summary of Findings

This chapter deals with the summary of findings, recommendations and conclusions. The main objective of the study is to assess and examine the project closure practices of construction projects in ETETE Construction Company in consideration of successful completion factors for project closure process. In consideration of this objective, the study will now summarize and discuss the findings of the results analysis.

The summary of findings is undertaken from analysis of the data responses based on the responses from the participants who were part of the completed projects in ETETE Construction.

1. Regarding the practice of project closure activities, four criteria were identified to determine the frequency of the practices; preparation of project closure report documents, actions taken to close Project Closure Activities, validating project scope completion and creating project closeout report. Within these criteria, 29 independent practices of activities were identified and listed. For these activities results of descriptive statistics were conducted and obtained and these results were discussed in earlier chapter. In this chapter, the study will construct and converge the results from the basis of the conceptual framework of the study.

For the first criteria; Preparation of project closure report documents, it is found that the company mainly practices identifying outstanding activities, informing stakeholders about set of actions and submitting closure report request. As discussed in the statement of problem in chapter one of this study, in construction projects there is no a distinct line between the execution and the closing phase of projects. This is visible from the results of the analysis that the contractor starts the closing phase by identifying outstanding activities rather than listing out and preparing project completion criteria.

For the second criteria; Actions taken to close project, it is also found that the company have the practices of taking action on outstanding activities, making sure contracts are completed, finalizing payments and vendors, testing project deliverables as per the contracts specification,

finalizing audits and authorizations of certifications. In this criteria, the study observes that the contractor has a good practice in terms of taking action to close a project. Project closure phase involves not only taking action for outstanding activities but also assuring the contract specifications have been achieved and payments finalized.

For the third criteria; Validating project scope completion, all activities except risk management issues are addressed and practiced by the contractor. The study observes that ETETE construction has good practice of cost management issues in terms of expense and total project cost; a good practice of quality management issues in terms of achieving contractual quality targets and the staff are capable to do so; a good practice of acceptance management issues in terms of reviewing acceptance documents and the client accepting the deliverables of the project. For time management issues, it is observed most of the projects required additional time and this is regarding of time management issues from the contractor. But this can be justified from the contractor that the additional time is from the demand of the client or consultant or site condition by including variation of works additional to that of the contractual item of works. The study observes the contractor does not have a practice of risk management issues. This is evident from the responses of respondents but this is also the fact in most of construction works such that more focus is given on planning of contractual item works and risk planning is neglected.

For the fourth and final criteria; Creating project closeout report, all activities of works are practiced within the criteria except activities related to past data/projects archive documentation, archive reference and lesson learning from archive. It is observed that project data documentation and archiving is not practiced as it should be by the contractor. Completed projects data is very important for reference. Especially very good practices of work and solutions derived for challenges can be gleaned from these documentations and be adapted to other successive projects and also errors and mistakes can be avoided not to repeat them in other projects from referring to archive data.

2. The second analysis was done to determine the effects of financial, technical and administrative factors on project closeout phases for successful completion of construction projects in ETETE Construction. Ten factors were presented to participants; three financial, four technical and three administrative factors, to select the level of effectiveness of each

factor on the project closure phase of construction projects. Among these, three factors have the most dominant effect on the project closure process according to the responses. These factors are Client directed change orders concerning variation of work issues, Payment delay and Shortage or late arrival of resources. In fact, these factors have a determinant effect on the project regarding the time and cost management of projects. Projects can be delayed because of late delivery or shortage of materials and also if payment is not effected on time to the contractor. Also, additional works of items or variations also affects the project completion process by pushing the completion date of the contractual project time when considering and including the time for the additional works of variation items. Project closure processes will be affected the most from the above financial and administrative factors according to the participant responses.

3. Among the four factors that were presented to respondents to determine which factor has the most effect on assuring timely project closure; Consideration of closure process early at planning stage comes at first place. It is an important activity to undertake since planning the closing phase of the project at the beginning or planning phase helps to be aware about the project closure activities that must be conducted. This gives more value and attention to the closure phase. In most construction projects, the most attention is given to execution phase of the project and the closure phase is almost neglected. Sometimes projects are executed with best works but due to inefficient completion technique, the projects may not have their respective level of achievement. Closing a project is an important phase of a project by helping the contractor in showing what has been achieved by the project and to also formally undertake the project handover activities. The second factor that affect project closure is reference to previous project closeout reports. Reference to previous projects is very important to repeat good practices and solutions and to avoid mistakes. The third factor that affect project closure is penalty for late completion. So penalty for delay is a pushing factor that helps the contractor to deliver its project completion and the project closing activities on time. The study observes that penalty instead of incentives helps to assure timely closeout.

Another analysis is performed to determine the factors that have an impact on successful project completion. Four factors are listed and presented to participants to select the level of impact on each factor. Accordingly, project closeout have the most impact on customers or

clients. This is based on the confirmation of project objectives being met and thus creating customer satisfaction. Since project closeout is the final phase of a project, it is the phase where the stakeholders examine the fulfillment and execution of the project goals and objectives. What has been provided in the project planning phase as an objective is evaluated at this stage to determine the level of accomplishment. If the objectives are met as expected, it is definite the customer will be satisfied with the project. Based on the responses gathered from participants, Confirmation of objectives being met and Customer Satisfaction have the most impact for successful completion of projects. Also Improving future engagement & building credibility and Capturing knowledge in lessons learned also have a good impact regarding successful completion of projects. If the project is delivered according to the expectation of the client, the construction company will have a good engagement with the customer and thus it is building good credibility. One part of tendering process is examination of technical capability. One way of evaluating the company's technical accomplishments is done in terms of successful completion. Therefore, building credibility is very important not only for the completed projects but also for future probable projects. Also Capturing knowledge in lessons learned documents does have an impact on successful completion of projects by providing actual data on previous accomplishments that can be referred to. Referring to this documents, the project can repeat the best practices of previous projects and also avoid mistakes that has been committed.

4. From the analysis conducted on the project closure practices of the construction company, this study determines that the project team has a good performance regarding quality, cost and acceptance role. Regarding cost of the project, the study observes that the client is satisfied with the overall level of project cost. It means that the project team has delivered the project with justified and reasonable project cost and expenditures. The project has not expensed more than it needs since the cost is determined based on the contractual amount and the project team also has delivered the project within the limitations of the contractual amounts of the project. This study also observes that the project team delivered the projects according to the quality and acceptance expectance from the client. On the contrary, the project team fail to operate according to risk management issues. This is mainly because the contractor does not include risk management issues in its project management components and thus the project team also lack this important competency.

5.2 Conclusion

The study examines the project closure practices of construction projects in ETETE Construction Company by taking in to account successful completion factors for project closure process. ETETE Construction Company is legal registered building contractor with category BC-1. The company undertook and continues to execute construction of buildings of university projects, federal governmental projects and private projects. This study focuses on the examination of 10 completed projects of the company which have been handed over to the client. These projects are seven university construction projects, one federal governmental project and two private projects. The project closure practices for these projects are assessed and examined.

The conceptual frame work of the study deals with examination of the practices of construction projects and how applying of these practices based on certain factors help achieve successful project completion. In order to examine the practices of project closure in the construction projects, four major criteria were identified and used for evaluation. These are preparation of project closure report documents, actions taken to close project closure activities, validating project scope completion and creating project closeout report. In relation to the effects; financial, technical and administrative factors have on the project closure processes, ten factors were presented to participants to give their level of agreement or disagreement on the effectiveness of each factor on project closure processes and also four factors were provided to the respondents to select the most influential factors to assure timely project closeout. Regarding the impact of project closeout on successful project completion, four factors were identified and presented to respondents to give their response on the level of impact each factors have on the successful completion of construction projects. Within these criteria, 47 respective activities were identified, listed and presented to participants to provide their level of agreement or disagreement on the concepts raised by each activities.

The independent variables identified by the study are the four criteria mentioned above that are used to examine the practices of project closure in construction projects. The dependent variables identified by the study are the four factors that have an impact on the successful completion of project. These are confirmation of project objectives being met, improving future engagements & building credibility, capturing knowledge in lessons learned documents and customer satisfaction. The study explains that effective practices of the independent variables have a direct

effect on the dependent variables. If the dependent variables are effectively achieved, then these variables will also have a good impact on the successful completion of the construction projects.

Analysis was undertaken for the 60 responses that is obtained. The first is descriptive statistics analysis. Descriptive statistics analysis is conducted to determine the practices of the project closure processes for the completed projects of ETETE Construction Company. The results of the descriptive analysis are summarized and concluded as per the four criteria.

The study finds in the first criteria that the company conducts preparation of project closure report document practices but this is undertaken without the planning of preparation of the completion criteria. In construction projects the difference between the execution and the closing phase is hard to determine. In this case also, the study concludes that the company undertakes the project closure processes without officially establishing the closing phase of the project. For the second criteria, the study concludes that the company has a good practice and reputation of taking actions to close project closure activities. All issues regarding taking action & completing projects, testing project deliverables, finalizing contractual, financial and procurement issues and finally getting the authorization for completion is practiced by the company. This is a good practice and it helps in improving engagements and building credibility for the company. For the third criteria, the study concludes that all issues are frequently practiced by the company except risk management issues. For the last criteria, the study concludes that the company have a good practice of preparation of as built condition drawings and documents but on the contrary the company also have a weakness in documenting, maintaining and using archives of previous project information.

Regarding the effectiveness of financial, technical and administrative factors, the study finds that all of the factors have a positive effect on the project closeout process. This means that the project closeout process is affected directly with the occurrence of each factor and thus the construction company should give special attention to each factors in the planning, execution and closure processes.

Multiple regression analysis was also undertaken to determine the relationship between the independent and the dependent variables. From the results of the analysis, the study concludes that there is a positive relationship between the independent variables and the dependent variables of confirmation of objectives met, building credibility and customer satisfaction.

However, the study also found out there is a negative relationship between the independent variables and the dependent variable of capturing knowledge in lessons learned. This is due to the weakness in the company in not documenting, maintaining and referencing archives of previous project information.

Finally, regarding the performance of the project team on the project completion processes, the study finds that the staff operate according to their expected role in terms of quality, technical and acceptance issues except risk management issues. Risk management is not included in the planning phase of the projects and this is the shortcomings for the competency of the project team. Otherwise, the project team is found to have a good competency regarding quality issues by delivering the expected quality, regarding financial issues by completing the project within the limit of the contractual amount of the project and regarding acceptance issues by handing over the project to the client or the customer in a way the customer can completely accept the deliverable and create a satisfaction on the work performed.

5.3 Recommendation

From the findings of the research, the study recommends the following issues:

➤ **Preparation of Detailed Project Closure Phases on Planning Phase**

It is evident from the trend in many construction works, also for the construction company under study, that during planning phase of projects, attention is only given to the planning and the execution phases of the project. It means the project planning schedule includes the mobilization phase, the project start up activities and the execution phases for the contractual item of works. The schedule is then closed at the completion time of the project by showing the finishing of execution of the final contractual item of work. There is no any project closing phase included in the planning schedules. This is the shortcomings in most of the schedules prepared. Project closure phase is concerned with finalizing a project activities and handing over the project to the client or owner appropriately. Within this definition, there are important tasks to be performed so that the project is appropriately handed over to the client or owner. If project plans and schedules does not include the project closure phases, then it is evident these important tasks of project closures will not be effectively performed. This is the case in most of construction projects where planning the project closing phases are neglected.

The study recommends to include the project closure activities on the project planning and scheduling. By that, the stakeholders involved in the project will be aware of the project closure mandatory tasks, responsibilities and duties. In fact closing a project appropriately helps the contractor mainly to improve its future engagements by building credibility and assuring the project objectives have met to provide customer satisfaction. It also notifies the stakeholders the time required by the project closure phase to be undertaken. To perform the tasks in the project closure phase, respective time is needed and therefore by preplanning the project closure phase the stakeholder can reduce the lengthy handover process of project completion that is visible in current construction projects.

➤ **Effectively Recording, Maintaining and Referring Previous Project Information (Lessons Learned Document Archives)**

Important lesson is learned from experience. Construction projects are faced with various types of situations and conditions when performing the project objectives. These different conditions

of a project execution during its lifetime is recorded in reports regularly as a project information. When the project is completed and handed over, these reports are summarized to provide a clear and concise summary about the project information. The information includes the project achievements, the problems confronted, the solutions taken and many related issues. This lessons learned documents or archives are very important for current and future projects of construction companies. It is especially important to glean from these lessons learned documents the good practices and the solutions taken so as to apply the same solution to the probable same problems faced and also to avoid committing same mistakes that are included in the documents.

Also these project report documents (archives) are very helpful in the general construction sector especially in government organization construction works. In many instances, same type of construction projects in various regions are undertaken by the government organizations. The projects mostly have same designs. In these conditions, government organizations can refer to already completed projects with same typical design whenever there is a need to begin a new project. These reports will be a foundational reference for prefeasibility, feasibility, tendering and planning processes since actual amounts of costs and time is available in the recorded documents. Additionally, the reports also can reduce project cost overrun, project scope exceeding and delay of project by providing the realistic project amount in terms of time and cost.

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APPENDIXES

Appendix I: Questionnaire for Collecting Responses



ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

Title: Factors Affecting Project Closure Practices of Construction

Projects: A Case Study for ETETE Construction

Dear Respondent;

First of all thank you for willing to receive, fill and respond to the questions that are provided in this study questionnaire. The purpose of this questionnaire is to obtain information on the 'Factors Affecting Project Closure Practices of Construction Projects completed in ETETE Construction Company' as a requirement in partial fulfillment of the award of Master's Degree in Project Management. The research focuses on project management specifically the practice of project closure phases especially in construction projects. The study respects confidentiality of the respondent and all information that is provided will be used only for academics purposes.

Many Thanks for your Cooperation

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Part I: Respondent Personal & Organizational Background Profile

Please mark “√” on the space that best describe your profile

1. Which type of Organization do you work?

- Client Contractor Consultant Other

If your answer above was other, please

Specify: _____

2. What is your educational status?

- MSc/MA Degree Diploma Other

3. How many years of experience do you have in construction projects?

- <1 Year 1-5 Years 6-10 Years
 11-15 Years >15 Years

4. What is your current position/Job Category?

- Senior Management Department Head Project Manager
 Site/Office Engineer Resident Engineer Client Representative

If others please specify your job title _____

5. Name of Project: _____

Part II: Practices of Project Closure Processes

The following activities are practices of project closure process for construction project. They are presented on a five point Likert Scale. Each number represents the measurement variable that is shown in the table below. Based on your experience, indicate how frequently each of them are practiced on construction project completion.

Please indicate the level of your agreement with the statement by marking “√” in the box of your choice on a scale of 1 to 5. You can leave those that you regard as non-applicable

1	2	3	4	5
Never	Seldom	Sometimes	Often	Always

1. For projects that have reached final closeout and which has been officially completed, please rate the frequent practices of the following activities when undertaking project closure processes in your experience.

Project Closeout Phase Activities	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
1. Preparation of Project Closure Report Document					
Detail List of Project Completion Criteria prepared					
List of Outstanding Activities Identified					
A set of actions for closure activities identified and concerned stakeholders are informed					
Request for Project Closure report submitted and approved by the client					
2. Actions taken to Close Project Closure Activities					
All and Outstanding activities undertaken and completed					
Project deliverables are tested as per the contract specification					
All contracts been completed					
All payments been made to vendors and contractors					
All audits been completed and issues resolved					
External certifications and authorizations been signed and approved					

3. Validating Project Scope Completion (Conformance of project to Plan)					
3.1 Cost Management Issues					
The total expense register is monitored to assess total expenditure					
The customer is satisfied with the overall level of expenditure/project cost					
3.2 Quality Management Issues					
Contractual quality targets identified and attained					
Staff Operate according to their defined quality role					
3.3 Time Management Issues					
Additional time required for any activity over that planned					
Timesheet information recorded in project plan					
3.4 Risk Management Issues					
All risks managed through formal risk process					
Staff operate according to their defined risk role					
3.5 Acceptance Management Issues					
Acceptance reviews undertaken for each deliverable					
Client or Customer formally accepted all deliverables					
Staff operate according to their defined					

acceptance role					
4. Creating Project Closeout Report and Post Implementation Evaluation Report (PIER)					
Project plans and supporting documentation been revised to reflect “as-built” condition					
Final project reports been prepared and distributed					
Project plan been archived with supporting data					
“Lessons learned” been documented, shared with appropriate people and archived with project plans					
Maintaining and using the archives					
Identifying and addressing success					
Customer project Sign-off					
Project facilities, equipment and other resources been allocated					

Part III: Effects of Factors on Project Closure Processes

The following are some of the factors that have effect on project closure processes. Based on your experience, indicate how each of the factors have effect on construction project closure processes.

Please indicate the level of your agreement with the statement by marking “✓” in the box of your choice on a scale of 1 to 5. You can leave those that you regard as non-applicable

1	2	3	4	5
Not Effective	Somehow Effective	Not Sure	Effective	Very Effective

1. For projects that have reached final closeout on schedule and that has been officially completed, please rate the **effects of financial factors** on project closeout phase.

Effects of Financial Factors on Project Closeout Phase	Not Effective (1)	Somehow Effective (2)	Not Sure (3)	Effective (4)	Very Effective (5)
Owner directed change orders					
Delay by owner for work payment before substantial completion					
Contractor project team incentives					

2. For projects that have reached final closeout on schedule and that has been officially completed, please rate the **effects of technical factors** on project closeout phase.

Effects of Technical Factors on Project Closeout Phase	Not Effective (1)	Somehow Effective (2)	Not Sure (3)	Effective (4)	Very Effective (5)
Technical Expertise					
Lack in planning and resource allocation					
Unclear directives for closeout, in specifications and contractual requirements					
Procedural inexperience of owner representative or consulting representative					

3. For projects that have reached final closeout on schedule and that has been officially completed, please rate the **effects of administrative factors** on project closeout phase.

Effects of Administrative Factors on Project Closeout Phase	Not Effective (1)	Somehow Effective (2)	Not Sure (3)	Effective (4)	Very Effective (5)
Improper/Untimely contractual closeout documentation					
Multiple Punch Lists					
Shortage/Late arrival of resources, i.e. manpower, materials and equipment					

4. For the following items that might be utilized to assure timely project closeout, rate your perception of the effectiveness of each.

Strategy	Not Effective (1)	Somehow Effective (2)	Not Sure (3)	Effective (4)	Very Effective (5)
Consideration of project closeout early at planning stage of construction/during project scheduling					
Incentives for early completion					
Penalty for late completion					
Early reference to previous project closeout reports					

Part IV: Impact of Project Closeout on Successful Project Completion

Please rate the impact of the following factors on successful completion of projects by marking “✓” in the box of your choice on a scale of 1 to 5. You can leave those that you regard as non-applicable

Impact of Project Closeout on Successful Project Completion	No Impact (1)	Low Impact (2)	Medium Impact (3)	High Impact (4)	Very High Impact (5)
Confirmation of project objectives being met					
Improving future engagements and building credibility					
Capturing the knowledge in lessons learned documents					
Customer Satisfaction					

Appendix II: Time Estimate for the Study

Description of Works	March				April				May				June			
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Proposal Submittal & Literature Review	■	■														
Preparation of Questionnaire			■	■												
Primary Data collection					■	■	■	■								
Output analysis									■	■	■	■				
Interpretation of the Output											■	■	■			
Check Validation													■	■		
Report writing															■	■

**Appendix III: Multiple Regression Analysis for Confirmation of Objectives
Being Met Criteria**

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.587	1.660		3.969	0.000
1	Project Completion Criteria Preparation	-0.156	0.141	-0.230	-1.101	0.277
2	Outstanding Activities Identified	0.655	0.159	0.748	4.121	0.000
3	Concerned Stakeholders Informed about set of actions	-0.325	0.174	-0.288	-1.870	0.069
4	Project Closure report request is submitted and approved by client	0.035	0.136	0.043	0.255	0.800
5	Outstanding activities undertaken and completed	-0.038	0.177	-0.038	-0.214	0.831
6	Project Deliverables tested as per contract specification	0.438	0.195	0.510	2.187	0.043
7	All contracts been completed	0.563	0.227	0.665	2.484	0.017
8	All Payment for vendors and subcontractors paid	-0.495	0.245	-0.501	-2.020	0.050
9	All audits completed and issues resolved	-0.201	0.167	-0.208	-1.200	0.237
10	External Certifications and Authorizations been signed and approved	0.071	0.153	0.092	0.466	0.644
11	Total Expense Register is monitored to assess total expenditure	0.299	0.120	0.417	2.481	0.017
12	Client is satisfied with overall level of expenditure or project cost	0.552	0.281	0.386	1.962	0.057
13	Contractual Quality Targets identified and attained	0.635	0.245	0.754	2.655	0.002

14	Staff Operate according to their defined quality role	0.518	0.223	0.437	2.326	0.025
15	Additional Time required for any activity over that planned	-0.264	0.197	-0.280	-1.340	0.188
16	Timesheet information recorded in project plan	0.433	0.194	0.504	2.175	0.044
17	All risks managed through formal risk process	-0.480	0.169	-0.587	-2.837	0.014
18	Staff Operate according to their defined risk role	-0.347	0.167	-0.438	-2.085	0.043
19	Acceptance reviews undertaken for each deliverable	0.255	0.229	0.280	1.114	0.272
20	Client accepts all deliverables	0.630	0.244	0.749	2.644	0.003
21	Staff Operate according to their defined acceptance role	0.404	0.243	0.305	1.659	0.105
22	Project Plans and supporting documentation been revised to reflect "as built" condition	0.208	0.190	0.229	1.094	0.280
23	Final Project Reports Prepared and distributed	-0.393	0.160	-0.534	-2.464	0.018
24	Project Plan been archived with supporting data	-0.604	0.201	-0.819	-3.000	0.005
25	Lessons Learned been documented, archived and distributed	-0.434	0.138	-0.572	-3.148	0.003
26	Maintaining and Using Archives	-0.525	0.170	-0.638	-3.096	0.004
27	Identifying and Addressing Success	0.189	0.168	0.285	1.120	0.270
28	Client Project Signoff	-0.267	0.143	-0.435	-1.867	0.069
29	Project Facilities, Equipment and other resources been allocated	0.062	0.166	0.082	0.371	0.712

a. Dependent Variable: Confirmation of project objectives being met

Appendix IV: Multiple Regression Analysis for Improving Future Engagements Criteria

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.379	1.739		1.944	0.059
1	Project Completion Criteria Preparation	-0.070	0.148	-0.094	-0.473	0.639
2	Outstanding Activities Identified	0.458	0.166	0.477	2.749	0.009
3	Concerned Stakeholders Informed about set of actions	0.155	0.182	0.126	0.851	0.400
4	Project Closure report request is submitted and approved by client	-0.062	0.142	-0.071	-0.439	0.663
5	Outstanding activities undertaken and completed	-0.091	0.186	-0.084	-0.492	0.625
6	Project Deliverables tested as per contract specification	0.098	0.167	0.100	0.585	0.562
7	All contracts been completed	0.224	0.237	0.242	0.946	0.350
8	All Payment for vendors and subcontractors paid	-0.068	0.257	-0.063	-0.267	0.791
9	All audits completed and issues resolved	-0.046	0.175	-0.044	-0.263	0.794
10	External Certifications and Authorizations been signed and approved	-0.222	0.160	-0.261	-1.385	0.174
11	Total Expense Register is monitored to assess total expenditure	0.094	0.126	0.120	0.749	0.458
12	Client is satisfied with overall level of expenditure or project cost	0.366	0.295	0.234	1.243	0.221
13	Contractual Quality Targets identified and attained	0.555	0.230	0.429	2.389	0.031

14	Staff Operate according to their defined quality role	0.567	0.233	0.437	2.431	0.020
15	Additional Time required for any activity over that planned	-0.418	0.207	-0.403	-2.022	0.050
16	Timesheet information recorded in project plan	-0.088	0.162	-0.090	-0.543	0.590
17	All risks managed through formal risk process	-0.438	0.209	-0.421	-2.113	0.019
18	Staff Operate according to their defined risk role	-0.115	0.174	-0.133	-0.660	0.513
19	Acceptance reviews undertaken for each deliverable	0.539	0.227	0.418	2.331	0.046
20	Client accepts all deliverables	0.218	0.178	0.242	1.229	0.226
21	Staff Operate according to their defined acceptance role	0.347	0.255	0.239	1.361	0.181
22	Project Plans and supporting documentation been revised to reflect "as built" condition	0.338	0.199	0.339	1.694	0.098
23	Final Project Reports Prepared and distributed	-0.107	0.167	-0.132	-0.638	0.527
24	Project Plan been archived with supporting data	0.065	0.211	0.080	0.307	0.761
25	Lessons Learned been documented, archived and distributed	-0.109	0.144	-0.132	-0.758	0.453
26	Maintaining and Using Archives	0.039	0.174	0.048	0.223	0.824
27	Identifying and Addressing Success	-0.054	0.176	-0.074	-0.305	0.762
28	Client Project Signoff	0.146	0.150	0.218	0.978	0.334
29	Project Facilities, Equipment and other resources been allocated	-0.160	0.174	-0.194	-0.918	0.364

a. Dependent Variable: Improving future engagements and building credibility

**Appendix V: Multiple Regression Analysis for Capturing Knowledge in
Lessons Learned Criteria**

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.086	1.809		3.365	0.002
1	Project Completion Criteria Preparation	-0.030	0.154	-0.041	-0.192	0.849
2	Outstanding Activities Identified	0.086	0.173	0.092	0.496	0.623
3	Concerned Stakeholders Informed about set of actions	0.194	0.189	0.161	1.023	0.312
4	Project Closure report request is submitted and approved by client	-0.095	0.148	-0.112	-0.643	0.524
5	Outstanding activities undertaken and completed	0.310	0.193	0.294	1.604	0.117
6	Project Deliverables tested as per contract specification	-0.011	0.174	-0.012	-0.064	0.949
7	All contracts been completed	0.398	0.247	0.441	1.613	0.115
8	All Payment for vendors and subcontractors paid	-0.413	0.180	-0.431	-2.434	0.076
9	All audits completed and issues resolved	-0.192	0.182	-0.188	-1.056	0.297
10	External Certifications and Authorizations been signed and approved	0.082	0.167	0.100	0.493	0.624
11	Total Expense Register is monitored to assess total expenditure	0.242	0.131	0.317	1.844	0.073
12	Client is satisfied with overall level of expenditure or project cost	-0.099	0.306	-0.065	-0.322	0.749
13	Contractual Quality Targets identified and attained	-0.551	0.289	-0.407	-1.907	0.064

14	Staff Operate according to their defined quality role	0.129	0.242	0.102	0.531	0.598
15	Additional Time required for any activity over that planned	0.004	0.215	0.004	0.020	0.984
16	Timesheet information recorded in project plan	-0.406	0.183	-0.422	-2.384	0.092
17	All risks managed through formal risk process	0.159	0.198	0.180	0.801	0.428
18	Staff Operate according to their defined risk role	-0.127	0.182	-0.150	-0.700	0.488
19	Acceptance reviews undertaken for each deliverable	-0.204	0.250	-0.210	-0.818	0.418
20	Client accepts all deliverables	0.078	0.185	0.089	0.424	0.674
21	Staff Operate according to their defined acceptance role	0.707	0.265	0.500	2.664	0.011
22	Project Plans and supporting documentation been revised to reflect "as built" condition	0.231	0.207	0.239	1.116	0.271
23	Final Project Reports Prepared and distributed	-0.349	0.206	-0.356	-2.001	0.214
24	Project Plan been archived with supporting data	-0.471	0.220	-0.599	-2.147	0.038
25	Lessons Learned been documented, archived and distributed	-0.426	0.175	-0.446	-2.522	0.048
26	Maintaining and Using Archives	-0.370	0.197	-0.381	-2.145	0.168
27	Identifying and Addressing Success	0.586	0.184	0.831	3.192	0.003
28	Client Project Signoff	0.725	0.267	0.510	2.724	0.001
29	Project Facilities, Equipment and other resources been allocated	-0.070	0.181	-0.088	-0.390	0.699

a. Dependent Variable: Capturing the knowledge in lessons learned documents

Appendix VI: Multiple Regression Analysis for Customer Satisfaction Criteria

Coefficients^a

Model	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.625	1.138		3.186	0.003
1	Project Completion Criteria Preparation	-0.444	0.097	-0.779	-4.582	0.000
2	Outstanding Activities Identified	0.575	0.109	0.780	5.280	0.000
3	Concerned Stakeholders Informed about set of actions	-0.037	0.119	-0.039	-0.308	0.760
4	Project Closure report request is submitted and approved by client	0.206	0.093	0.307	2.215	0.033
5	Outstanding activities undertaken and completed	0.453	0.156	0.636	2.916	0.001
6	Project Deliverables tested as per contract specification	0.083	0.109	0.110	0.756	0.454
7	All contracts been completed	0.449	0.155	0.630	2.892	0.006
8	All Payment for vendors and subcontractors paid	-0.309	0.168	-0.372	-1.841	0.073
9	All audits completed and issues resolved	-0.057	0.115	-0.070	-0.498	0.621
10	External Certifications and Authorizations been signed and approved	0.452	0.155	0.635	2.911	0.002
11	Total Expense Register is monitored to assess total expenditure	0.282	0.083	0.467	3.416	0.001
12	Client is satisfied with overall level of expenditure or project cost	0.559	0.193	0.465	2.901	0.006
13	Contractual Quality Targets identified and attained	0.438	0.154	0.614	2.825	0.02

14	Staff Operate according to their defined quality role	0.927	0.153	0.931	6.079	0.000
15	Additional Time required for any activity over that planned	-0.313	0.135	-0.394	-2.318	0.026
16	Timesheet information recorded in project plan	0.429	0.152	0.601	2.773	0.031
17	All risks managed through formal risk process	-0.343	0.105	-0.527	-3.277	0.014
18	Staff Operate according to their defined risk role	-0.170	0.114	-0.255	-1.489	0.144
19	Acceptance reviews undertaken for each deliverable	0.159	0.157	0.206	1.009	0.319
20	Client accepts all deliverables	0.427	0.152	0.599	2.763	0.033
21	Staff Operate according to their defined acceptance role	0.642	0.167	0.576	3.849	0.000
22	Project Plans and supporting documentation been revised to reflect "as built" condition	0.292	0.130	0.381	2.236	0.031
23	Final Project Reports Prepared and distributed	-0.160	0.109	-0.257	-1.459	0.152
24	Project Plan been archived with supporting data	-0.309	0.106	-0.473	-2.947	0.086
25	Lessons Learned been documented, archived and distributed	-0.315	0.106	-0.481	-2.998	0.075
26	Maintaining and Using Archives	-0.277	0.107	-0.422	-2.636	0.154
27	Identifying and Addressing Success	-0.198	0.110	-0.295	-1.867	0.322
28	Client Project Signoff	-0.191	0.098	-0.371	-1.954	0.058
29	Project Facilities, Equipment and other resources been allocated	-0.159	0.114	-0.253	-1.401	0.169

a. Dependent Variable: Customer Satisfaction