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SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

Identification of Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office

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Certificate of Approval

This is to certify that the thesis prepared by **Yeshidinber Ketema**, entitled "Identification of Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office" meets the accepted standards with respect to originality and quality.

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Declaration

Yeshidinber Ketema, the under signed, declare that this thesis entitled: "Identification of Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office" is my original work. With the help and direction of the research advisor, I conducted the research independently. This study was not submitted for consideration for any degree or diploma program at this school or any other, and all sources of information used in the thesis have been properly acknowledged.

Yeshidinber Ketema

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First of all, I would say thanks to the Almighty God for his helps in my course of action in doing this research work. Following this, I would like to express my sincere gratitude to my advisor Dr. Abraham Assefa for his valid and helpful idea for providing assistance on this research and patience in commenting this tiresome research work. Last but not least, I have great full thanks to families for their support, care and affection for me.

Table of contents

List of Tables

List of Figures

Abbreviations and Acronyms

CA	Contract Administration
CCA	Construction Contract Administration
CM	Contract Management
CPM	Construction Project Management
DG	Director General
DDG	Deputy Director General
ERA	Ethiopian Roads Administration
GPMO	Gambella Projects Management Office
PD	Project Development
RSDP	Roads Sector Development Program

Abstract

The objective of the study is to identify the Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office. The study prepared five scale based questionnaires and distributed to 141 sample populations and was analyzed using descriptive statistics, correlation and regression analysis. The descriptive and frequency analysis, interview response, meta-analysis and case study showed that documentation, resources, claim and dispute management, risk management, project process management, communication, project closure and stake holders are important in contract administration. The correlation analysis also showed that at significance level of 0.000 contract administration has high positive correlation with claim and dispute management (.769), moderate positive correlation with documentation (.651), project closure (.622), Risk Management (0.616) and project process management (.543) and low positive correlation with communication (.488), resource (.398) and stakeholder management (0.052). The regression analysis on the other hand showed that documentation, project closure, claim and dispute management and project process management have significant effects on Contract Administration with significance value of 0.001, 0.000, 0.000 and 0.006 respectively and, the coefficient significance value of communication (.134), resource (.147) and stake holders (.101) are significant at above 10% significant level and that of Risk Management (0.416) at 41.60% in which the variables have a significant relation with contract administration. In addition the foregoing; meta-analysis has been carried out to identify the best suit study among the similar perspective studies. Finally, the study recommends that recently launched ERA's various Manuals, Guidelines and Reports shall be properly implemented by the parties in the contract, better Communication scheme shall be devised among the parties, timely certification of Payments, assignment of qualified personnel for the works, establishment of strong Workshop, deployment of proper machineries both in number and quality, proper Stakeholder Management, Proper Risk Management, due consideration shall be given for the road at the Design Stage notably Design shall be done in due consideration of the actual site scenario, and last Security issue shall be resolved in the project vicinities.

Key words: Contract Administration Documentation, Ethiopian Roads Administration, Gambella, Resources, Claim and Dispute Management, Risk Management, Project Process Management, Communication, Project Closure and Stake holders Management

CHAPTER ONE

1 INTRODUCTION

Various entities with varying levels of interest and involvement in the project carry out a succession of tasks, procedures, activities, or operations that make up a construction project. Furthermore, because the construction industry functions in a dynamic environment, changes in one area or process may have an indirect or direct impact on other areas or processes (Rendon, 2010). Moreover, managing the relationships, duties, and interactions among various stakeholders in the construction industry requires robust tools because it involves numerous people, activities, resources, and information. One of the powerful tools that are guaranteed to deal with the changing environment and required adherence to required duties is an effective contract administration. On the other hand, poor contract management could result in subpar processing, which would have a detrimental impact on the project's schedule, cost, and quality (Ahmed, 2020).

The Ethiopian main road network comprises a significant amount of national asset that requires careful development planning, project implementation and maintenance in order to provide the high level of service that is demanded by the road users and communities (ERA, 2019). In recognition of this aspect of the road network service and also in recognition of the Government's commitment to meet the Development Goals set for Ethiopia, Ethiopian Roads Administration (ERA) has initiated the Roads Sector Development Program (RSDP - currently Phase VI) to address the broader development planning issues of "accessibility" and "connectivity" that will provide the underlying transport infrastructure support to meet these and future economic and social development goals. Effective project management and contract administration is fundamental to the successful delivery of this and subsequent programs (ERA, 2019).

1.1 Problem Statement

Poor management of the contract administration process may result in project delays, reworks, obstruction to progress, deterioration of relationships between the key project stakeholders, and an increase in the project's overall cost. The fundamental guidelines for contract management and activities are explicitly specified in the standard forms of contracts, although they are occasionally misinterpreted, improperly administered, undervalued, or overlooked. As a result, disagreements arise and the project's overall performance suffers. As a result, the client, consultant, and contractor require a framework and model to manage, measure, monitor, and control the execution of those Construction Contract Administration operations in an effective and efficient manner (Ahmed, 2020). ERA has acknowledged that as an organization it struggles to administer both Works contracts and Services contracts effectively (ERA, 2019). This lack of effective administration is a significant contributory

factor in the poor delivery of road construction projects, particularly in terms of cost, time and quality. This is despite there being existing Works Contract and Services Contract Administration manuals.

In view of the foregoing, ERA in order to overcome the contract administration challenges; it needs to identify the key factors (activities) that affect Construction Contract Administration (CCA) performance which will in turn help to measure the performance of CCA activities, minimize contractual problems, improve project control, and trace staff performance at the successive stages of the post awarding phase. The problem that poses this research is thus the need to identify the key factors (activities) that affect CCA performance.

1.2 Research Questions

Establishing a well-designed instrument to assess the operational success of CCA activities from the beginning of the construction phase through to project close out would help avoid poor CCA and achieve adequate CCA, (ERA, 2019). The Research intends to answer the following questions:

1. How the determinant factors are correlate with the Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office?

2. How the determinant factors do affect the Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office?

3. What are the practical implications of the determinant factors for contract administration in Ethiopian Roads Administration Gambella Area Projects Management Office?

1.3 Objective of the Research

1.3.1 General Objective

The main objective of the research is to identify the Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office.

1.3.2 Specific Objective

Specifically after conducting regression and correlational analysis, the study's specific objectives are:

1. To investigate the correlation of determinant factors with the Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office.

2. To assess the extent of how determinant factors do affect Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office.

3. To investigate the practical implication of the determinant factors for contract

administration in Ethiopian Roads Administration Gambella Area Projects Management Office.

1.4 Significance of the Study

This study will help ERA, Contractors, Consultants, Stakeholders, Researchers, Experts and others to know the key factors (activities) that affect CCA performance in the global and national context. This study will provide knowledge of contract administration requirements under standard forms, techniques for overcoming administrative challenges and avoiding ineffective administrative practices.

1.5 The Scope of the Study

The study, as its primary objective, will be limited on the **Identification of Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office** in order to assist the Client, the Consultant, and the Contractor to effectively plan, manage, measure, monitor, and control the CCA performance. The study will focus on on-going road construction contracts under ERA Gambella Area Construction Projects Management Office.

1.6 Limitation of the Study

The Researcher does not encounter with access of first hand data so long as the study area is limited however similar studies in the subject area in Ethiopia are few which can be mentioned as limitation.

1.7 Organization of the Research

The study is organized into the following chapters:

Chapter 1: Introduction. This chapter contains the Problem Statement, Research Question, Research Objectives, Significance of the Study, Scope of the Study, and Organization of the Research.

Chapter 2: Literature Review. This chapter reviews the relevant literature which depicts the historical trend of road construction in Ethiopia, Contract Administration Practices and Gaps in Ethiopian Road Administration. In addition to these, this chapter includes Meta-Analysis.

Chapter 3: Research Methodology. This chapter describes the research process undertaken that includes research design and data analysis.

Chapter 4: Data Analysis and Findings. The chapter discusses the analysis undertaken and the findings from the analysis. The chapter is structured into introduction, Descriptive and Frequency Analysis, Inferential Statistics, and Case Study.

Chapter 5: Conclusion, Recommendations and Future Research. The chapter describes the Conclusion, Recommendation and Future Research.

CHAPTER TWO

2 Literature Review

2.1 Introduction

In the early 20th century, Addis Abeba and Addis Alem, as well as Harar and Dire Dawa, were connected by Ethiopia's first modern roadways (Ahead, 2005). Even though Emperor Menelik tried to modernise Ethiopia, not much was done before the Italian occupation (1936–41). The Italian government made large financial investments for the at-the-time exceedingly inadequate infrastructure. Over the course of a year, these enterprises employed close to 60,000 Italians. The road network of Addis Abeba was designed even back then to link the ports of Massawa and Mogadishu that were under Italian occupation. When the Italian occupation ended in 1941, there were 7,000 km of roads left behind, with over half having asphalt surfacing. The restored Imperial administration, however, lacked the required information, assets, and tools to continue where the Italians left off. In 1951, the government established the Imperial Highway Authority with financial assistance from the World Bank and technical support from the US Bureau of Public Roads. The nation's transport needs have persistently trailed behind Ethiopia's road network. After the Imperial Regime was overthrown in 1984, Derg reorganised the highway authority into the Ethiopian Roads Authority and the Rural Roads Task Force. The latter's objectives were to build rural roads outside of the main system and to construct feeder roads inside it. The World Bank, the African Development Bank, and other organisations helped in the construction and maintenance of new roads.

The majority of the roads constructed after the government changed in 1991 were a part of the rural road network, which was further dwindled after Eritrea became a state. In 1993, the Ethiopian Roads Authority (ERA) was reinstituted and given legal authority in addition to full planning, construction, maintenance, and administration duties for the country's major trunk and connecting roads. The former Ethiopian Roads Authority, now known as the Ethiopian Roads Administration, is run by a director general who reports to a board of directors made up of representatives from different ministries. It has five deputy directors general, including one for the director general's office, one for project development, one for asset management, and one for corporate services.

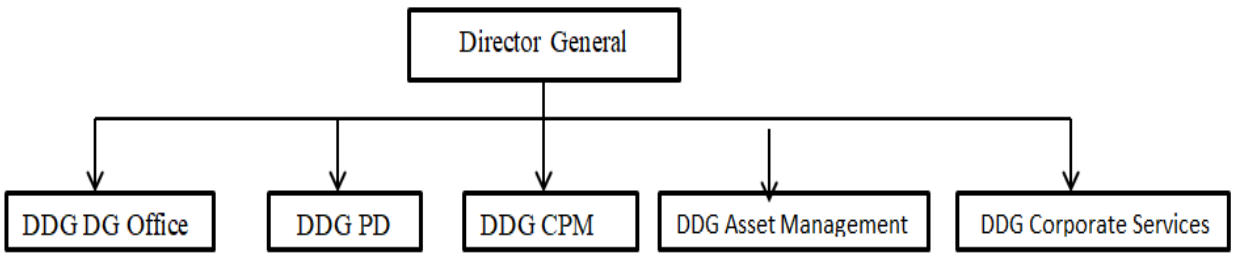


Figure 2-1: Executive Management of ERA

2.2 Project Management and Contract Administration

2.2.1 Project Management

A project is a brief undertaking started with the intention of producing a special good, service, or outcome. Projects' transient nature denotes that they have a distinct beginning and end. A project being temporary does not always indicate it will be completed quickly. The completion of a project occurs when its goals have been completed, when it is abandoned because its goals won't or can't be attained, or when it is no longer necessary. A relevant authority must approve and authorize the decision to end a project. Applying knowledge, skills, tools, and procedures to project activities in order to achieve project requirements is known as project management. By properly implementing and integrating the project management processes that have been specified for the project, project management is accomplished. (The PMI's A Guide to the PMBOK, Fourth Edition Newtown Square, PA: PMI, 2017).

As was already mentioned, a project is defined as a brief attempt started with the intention of producing a certain good, service, or outcome. Implementing a project management method allows for the completion of this work. A procedure or methodology is developed, just like in any other field, to ensure that uniform guidelines and standards are followed. Consistent processes give everyone access to a shared vocabulary, a well-organized organizational structure, and a consistent point of reference. Integration, Scope, Schedule, Cost, Quality, Resource, Communications, Risk, Procurement, and Stakeholder Managements are the primary procedures that make up a project management discipline (Paul C. D. and Jeannette C. B., 2011).

For a project to be successful, it must be managed. Project Management, as the name implies, is the management of a project as a whole. Contract Administration is the management of the Contract, which is a part of Project Management. The two parts are inextricably linked. Organizations such as ERA tend to let one or more contracts for every project which they wish to implement and, because of this they tend to refer to the administration of contracts rather than the administration of projects. ERA's road works projects normally have at least two contracts for each project i.e. the Supervision Services Contract and the Works Contract. There may also be separate feasibility study, environmental impact study and design contracts. For this reason, it is better to refer to Project Management (including all its associated contracts) than Contract Management or Administration. Given the multiplicity of contracts associated with any one project a structured management process is needed.

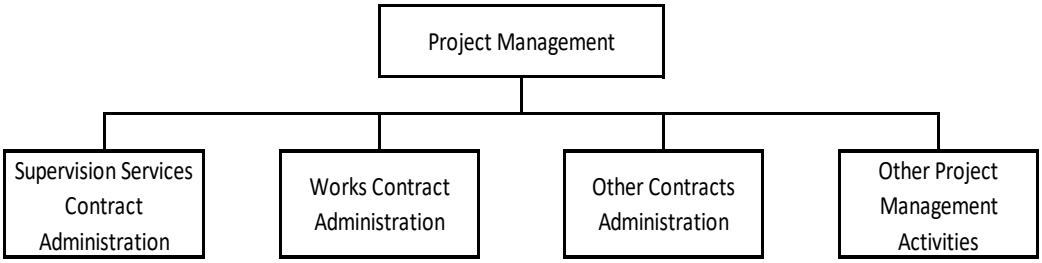


Figure 2-2: Relationship of Project Management and Contract Administration in ERA

2.2.2 Contract Administration

According to Rendon (2011), contract administration refers to all project tasks that are delegated to the contract administrator and his or her team from the time the contract is signed until the work is accepted, the last payment is received, or the contract is terminated. Up until the project's final closeout, the construction contract administration team handles contract implementation, daily operations, technical and contractual issues, performance measures, payments, changes, information sharing, communications, commissioning, handover, defects, and notifications (Niraula et al. 2008; PMI 2016).

Poor Construction Contract Administration is considered one of the biggest challenges facing project stakeholders. It is also one of the principal causes of problems (PMI 2016), because poor CCA results in significant risk causing disputes (El-adaway et al. 2018), and thereby may lead to the termination of a construction project (Hoe 2013) due to the shortage of contract experts (Park and Kim 2018). Moreover, some authors report several consequences of poor contract administration to include;

1. Inadequate control of operations (Al Jurf and Beheiry 2012; Hoe 2013),
2. Problems with contractor-owner relationships (Al Jurf and Beheiry 2012),
3. Delays in completion (Ayarkwa et al. 2014; Salama et al. 2008),
4. Budgets problems (Abdul-Malak and Khalife 2017),
5. Dispute (Abotaleb and El-Adaway 2017; Ayarkwa et al. 2014),
6. Claims (Ayarkwa et al. 2014; Ntiyakunze 2011),
7. Unwarranted litigation (Ntiyakunze 2011),
8. Project failures (Chow and Ng 2007),
9. Lengthy bureaucratic procedures (Abotaleb and El-Adaway 2017), and
10. Abandoned projects (Hoe 2013).

Post award contract administration faces various internal and external challenges that may negatively affect the contract administration process. The main challenges include contract managers' experience (Ahmed 2015; Rendon 2010), budget constraints (Doloi 2013; Sertyesilisik 2010; Surajbali 2016), unidentified project status (Memon et al. 2015; Rendon 2010), inadequate resources (Hoe 2013), lack of

cooperation and inflexibility (Hoe 2013; Salwa 2017), many changes (Al Jurf and Beheiry 2012), language difference (Hoe 2013), corruption (Ahmed 2015; Oluka and Basheka 2014), delayed payments (Gyadu-Asiedu 2009; Salwa 2017), data management, timeline constraints, statutory amendments, insufficient use of information-communication-technology (Joyce 2014; Rendon 2010), and unclear project scope (Davison et al. 2012; Hoe 2013).

2.3 ERA Implementation Process

Following the signing of the contracts for the provision of works and supervision services, the engineering procurement directorate transfers the relevant Regional Directorate with the contract documents for execution. A counterpart project engineer is designated to serve as the focal point for project administration and management, and the Regional Directorate places the project under the purview of one of the then Implementation teams now called Project Management Offices. The supervising consultant is expected to offer a thorough analysis of the various elements of the roadway design and the contract documents ERA upon which the Works Contract was let throughout the early phases of the project's implementation. The primary goal of the post-contract design and contract document revision is to determine whether the current contract and design are in harmony with the actual physical, social, environmental, economic, and other relevant conditions that could influence the performance of the works. It is inevitable that doing the evaluation after the Works Contract has been granted will result in modifications to the Works Contract's schedule and price, (ERA, 2019).

The mobilization of the Supervision Consultant is directly supervised by ERA, and the Contractor's mobilization is supervised by the Supervision Consultant. The Contractor and the Supervision Consultant, respectively, must prepare quality control and assurance manuals as part of the project implementation planning stage. ERA has quality assurance manuals as a foundation, the 2012 edition being the most recent. The creation of formats and checklists by the consultant for systematic quality assurance and quality follow-up, the contractor's preparation and approval of work programs, the review and approval of the contractual requirements from the contractor's program (and methodology), insurance requirements, and other activities are among the other activities. Frequently, the contract stipulates that the aforementioned documents must be submitted within a certain amount of time following the contract's commencement. While the Supervision Consultant is expected to review the Contractor's quality control plan and examine the quality control system of each construction activity with the goal of attempting to ensure that the final road satisfies the requirements set for it, the Authority/Administration reviews and comments on the quality assurance standards, checklist, and formats to ensure that they are in accordance with the Authority's quality assurance manual, (ERA, 2019).

In general, two levels are used to manage the contract implementation processes. As an employer under the contract, the Administration is in charge of monitoring the overall effectiveness of the procedures and taking action on any concerns that are specified in the agreement as being outside the consultant's purview. The majority of site implementation procedures are supervised by the consultant. The consultant is typically required to provide full engineering services in all respects under the supervision contract, subject to the restrictions on its authority (in terms of contract and change, management) set forth in the works contract.

The majority of the Administration's contract administration (for the Works) is handled by its supervision consultant. According to the restrictions on the consultant's authority outlined in the Works contract, the Supervision Consultant shall serve as 1) a contract administrator who monitors the execution of the Works Contract, and 2) a technical expert who identifies, analyzes, and advises ERA of changes that may improve the project's performance.

When putting the processes into practice, ERA focuses on matters that require the Administration's special attention, like managing variation orders, claims, additional budget transfers, addressing disputes, and overall progress monitoring and the quality assurance system. The Supervision Consultant oversees daily performance evaluation and quality control at the location. The duties of ERA and its supervisor in overseeing these activities are often outlined in the supervision and works contracts.

The Regional Directorates are considered by ERA to be the 'owners' of the implementation procedures, as was already mentioned. The regional project engineer with in the Directorate adheres to the implementation procedures after consulting with the Project Manager. The project engineer serves as the focal point of communications for ERA, ensuring that tasks are coordinated, progress is tracked, and productions are carried out in accordance with the contract's specifications. The Implementation and Design team is in charge of channeling any issue that calls for the employer's hierarchical attention (such as changes) in addition to overseeing the implementation processes. Additionally, it gathers progress reports and distributes them to the various administrative entities. The ToR outlines the quality assurance responsibilities, and ERA is wholly dependent on the Supervision Consultant's performance in this area.

2.4 Factors Affecting Contract Administration

2.4.1 Documentation

The vehicle for achieving national development is efficient procurement. But this must obtain through monitoring which in turn depends on Effective Documentation. Procurement is viewed by Ajator and Agusiobu (2007) and Eze (2009) as the acquisition of goods, works and/or services at the best possible

total cost of ownership, in the right quantity and quality at the right time, in the right place for the direct benefit or use of Government, corporation/organization or individuals. According to Ahmed (2020) this factor covers the critical issues with respect to contract records such as the system of electronic and integrated record management. The key to the achievement of effective procurement is monitoring and evaluation. To monitor, there must be well documented plan of activities, standards and cost baselines against which the actual is compared or benchmarked. Hence to monitor is to keep under observation and check for possible deviations from plans, standards and cost levels. So effective documentation which provides these plans, standards and baselines; becomes of paramount importance.

Most projects require the use of basic contract documents. These include (IBRD, 1999, Langdon, 2007); articles of agreement, conditions of contract with all necessary deletions/amendments if standard form is used, drawing/or specifications of work to be done. Cost estimates/priced bills of quantities including post-tender negotiation documentation, and contract programme/progress charts. Other basic documentations required in projects include pre-tender documentations, early warning charts, quality performance charts, minutes of site meetings, project instructions, valuations/certifications, cash flow and earned value management among others. Ajator (2012) recorded the importance index of some project documentation variables in which professionals ascribed high percentage ratings of 32,26,26 and 23 to BOQ preparation, project design, construction plan and change orders (variation) documentations respectively. When these variables are efficiently documented, they provide relevant databases for resolution of disputes at project delivery. Other researches (Ajator, 2007, 2000a, 2000b; Project Documentation Certification Taskforce, 1997; Galo, etal 2002; Tilly, etal 2000, 2002; Love etal, 2000, 1996) have identified declining quality of these documentations and disregard of due processes and inefficiencies which have resulted in increased project cost, time, risk, delay and disputes. Tilley, et al (2002), Gallo, etal (2002) and Ajator (2012) specifically identified issues associated with documentation failings and its manifestations, some of which are consequential on others and some involving more than one stakeholder.

2.4.2 Communication:

According to Davey et al. (2001), excellent communication between client and contractor organizations is one of the crucial success criteria. A crucial aspect of the relationship between the consenting parties to the contract is the establishment of proper and honorable communication. International best practices have demonstrated that poor or ineffective communication can result in issues with trust and worry about the project's performance in relation to contract execution. According to Ahmed (2020), this component encompasses managing relationships and communications that involve creating relationships, providing feedback, sharing information, holding meetings, making decisions together, writing letters, and consulting with and having talks with the contractual parties. All of these issues are brought up by those in charge of managing the contract between the contractor and the client because they neglect to

establish an effective communication channel to address the problems that are causing conflict in the project or to convey to the contractors the concerns, intentions, and goals of the client in each project.

To achieve the project's shared purpose, communication is the essential means by which a construction manager can interact with the other project shareholders or involved parties. In 1994, Orlikowski. The ability of the construction management group to interact with the direct contractor or other subcontractors on the project is crucial (Shohet and Frydman, 2003). The first step in effective communication is to initiate it as soon as the contract is signed by concluding the final meetings. A policy for ongoing information exchange between the customer and the contractor must also be established. "It is important to 'open' the boundaries of the relationship because it can relieve stress and enhance adaptability, information exchange, joint problem solving, and promise better outcomes," observes Usta (2005)

2.4.3 Project Resources Management

2.4.3.1 Financial Management

Ahmed (2020) states that this factor covers the payment and financial management key activities necessary to avoid cost overrun, shortage of funds, and related disputes the detail of which are establishment of a financial management system(FMS), assessment of the Contractor’s compensation for delayed payment cases in compliance with any contractual provision, proper issuance of instructions to spend provisional sum items, advising the employer in contingency planning/ additional fund, fair, reasonable, and equitable certification of due payments to the contractor, collecting quotations for price estimates and contractor’s price negotiations in respect of additional works/variation and timely notifying the employer about the contractor’s due payment timelines are financial status are important.

Similar to how time management affects projects, expenses may arise over the course of a project that the project manager simply did not account for as direct work activity expenditures but which nevertheless have an impact on the project budget. The majority of project expenditures that are directly related to work activities are included in the baseline of estimates for the budget. Nevertheless, there may be additional expenditures over the course of the project, and the project manager must address these costs and their impact on the triple constraint and project budget. The cost of quality and some components of risk or uncertainty, which might result in additional charges, are examples of additional costs that are not directly related to the project work activity. Randal Wilson discusses these additional costs so that the project manager is aware of both the direct costs and the additional charges to take into account when reviewing all the costs involved in generating a project budget (Randal Wilson, 2015).

2.4.3.2 Human Resources and Machineries

Mekdim (2017) studied the planning and management issues with construction equipment in road construction projects in Ethiopia's Addis Ababa city roads. He conducted a study, and the majority of the

respondents felt that equipment management, which directly affects the cost of operating any equipment, includes maintenance as a very significant component. The effective use of personnel, materials, and equipment must be vigorously pursued in good project management in the construction industry. The improvement of worker productivity ought to be a top priority for anyone in charge of keeping construction facility costs under control. To cut costs, material handling this includes purchasing, inventory management, shop fabrication, and field maintenance needs special consideration. Construction technology has undergone radical development in recent decades because to the employment of new tools and creative techniques. Organizations that fail to understand the effects of various advances and do not adapt to changing surroundings have legitimately been ejected from the construction activities.

Additionally, Charhate and Phadatare (2016) demonstrated how modern industry's overall productive effort is dependent on machinery and equipment. Therefore, they are a crucial component of industry. Equipment and machinery downtime or idleness consequently costs a lot of money. Therefore, it is crucial that the plant's machinery is well maintained. The majority of expenses are typically attributed to maintenance charges that are connected to maintaining a piece of equipment. It is also referred to as the biggest percentage of cost associated to the equipment's complete life cycle by peurify and schexnayder (2002). Depreciation accounted for 25% of the breakdown, followed by overhead at 15%, operating costs at 23%, and maintenance and repair at 37%. Therefore, a lack of proper equipment management leads to a number of unfavorable outcomes, including equipment breakdowns, client dissatisfaction, worker productivity reductions, equipment waste, high project costs, and delays in the progress of the work at hand, which has an impact on the efficient use of scarce resources. The majority of construction companies place minimal emphasis on creating a department that oversees the management of their equipment, which leads to poor equipment management, if there is any. Equipment management errors can be considered losses since they have a negative impact on construction projects. On tiny locations, the management of the equipment is handled by people who have little to no experience doing it. Since the management of equipment affects construction projects in a variety of ways, it is important for construction firms to take a close look at it. In relation to human resources Ahmed (2020) has enlisted that this element include the establishment of the contract administration team, the assignment of roles and responsibilities, and actions that enhance capacity, like training and staff performance evaluation.

2.4.3.3 Construction Materials

The Construction Materials required for road construction including the natural and manufactured includes inter alia; Borrow Materials, Quarry Materials, Sands, Cement, Reinforcement Bars and Others. The Natural materials like borrow and quarry materials can be scarce in some of the road projects. In addition to this, it is evident that the construction industry is exposed for scarcity of manufactured construction materials like cement, reinforcement bars and explosives.

2.4.4 Claims and Disputes Management

To manage disputes that occurred in contractual obligations it will cost about two to three folds of the project cost, claims and litigation are on a dramatic rise throughout the construction industry. To minimize dispute occurrence during any construction project period adopting methods are a tool to resolve disputed matters, according to suggestion to resolve, methods of dispute resolution shall be devised, "in these circumstances, various methods have been created to resolve disputes" (Sina Safinia (2014). Many stakeholders and participants in the construction industry are still unfamiliar with these methods and improvements in the prevention of disputes. To enhance the knowledge of groups involved in the construction industry. Naturally, all project participants have a keen interest in avoiding and minimizing the problems that lead to disputes. According to (Bekele, 2005) dispute is associated with distinct justifiable issues, disputes are short-term disagreements that are relatively easy to resolve. And generally, the study of (Bekele, 2005) disputes are stated that dispute is a class or kind of conflict, which manifest itself indistinct, justifiable issues. Worke, Z. T. (2018) suggested that Dispute resolution may have the following aspects/dimensions, namely the "Preventive dimension; the amicable settlement dimension; and the Judgmental dimension".

Abebe Dinku and Girmay Kahssay (2003) suggested that it involves disagreement over issues capable of resolution by "negotiations, meditation, or third-party adjudication. To avoid complicated costly and time-consuming arbitration proceedings, parties to a contract may institute in their contract documents as an option of claim settlement, Alternative Dispute Resolution(ADR) mechanisms which may include; Direct Negotiation, Mediation, Conciliation, Mini-trial procedure, Claims review board(CRB); and Pre-arbitral review board. In the event the above options fail, Arbitration proceedings may then follow". According to Kiwanuka, Frank (2012) the Road construction industry dispute in Uganda shall be managed or resolved as ''the researcher identified negotiation as the most preferred method of dispute resolution and the researcher recommended that all parties to the construction contracts should ensure that they play their roles effectively to prevent professional negligence, which may result into costly disputes".

The goal of a project that is planned to satisfy an Employee's project requirements should have to plan the value of the project management to minimize the occurrence of dispute within the project period, preventing disputes is advised to the industry by improving communication and understanding of others' objectives in the culture of the industry. Leung,M.,Ng,S.T.,and Cheung,S.O.(2002) Suggested that "value management is a goal-setting process that aims to satisfy the client's project requirements". Value management is the service that boosts the practical performance of development form from concept to completion in comparison and a close look/Audit at all decisions against the value system set or determined with the employer by setting the structural framework facilitating which the decisions are effective to successive achieving of objectives of the project. According to Leung,M.,Ng,S.T., and Cheung,S.O. (2002) "cognitive Scientists argue that a suitable level of conflict can stimulate a team's

creativity, which could lead to better decision-making, productivity, and satisfaction".

As of Hogan Lovells (2015), generally the tracking of difficulties is a key component of claims management, which also necessitates maintaining records and claims from the outset of the dispute itself. Planning for lawsuits and looking for ways to do so even before the loss, emergency response, business restart, and disaster recovery, the process of compiling data pertaining to the claim and this should be ongoing. Ensuring clear, concise, and efficient communication between the required parties and teams, offering ongoing feedback, and taking into account questions about the applicability of foreign law in cross-border transactions, which frequently involve the application of various laws from various jurisdictions and various judicial practices. Failure to raise claims promptly or at the proper time is one of the reasons why they fall through. A claim gets more difficult to pursue and/or defend the longer it is delayed. Factors like factual distortion over time, verbal agreements made in haste on the ground, the absence of key personnel involved in the claim or the project, claims being barred by contractual or statutory time limitations, or generally drawn-out negotiations and a lack of motivation can all be a cause for this. According to Ahmed (2020), this element includes the essential contract management procedures to reduce disagreements and issues. These actions consist of fairly evaluating the contractor's claims, responding promptly, and settling claims to avoid litigation. When all other dispute resolution options have been exhausted and court proceedings cannot be avoided, it expands the contract administration role to support the client.

2.4.5 Stakeholders Management

Owners and users of facilities, project managers, project architects and engineers, designers, shareholders, local governments, legal authorities, employees, subcontractors, suppliers, process and service providers, competitors, banks, insurance companies, media, community representatives, neighbors, general public, government establishments, visitors, customers, and regional development agencies are just a few of the many stakeholders involved in construction projects (Newcombe, 2003). Project stakeholders, in Newcombe's definition, are organizations or people who have an interest in or an expectation for the success of the project. The complexity and ambiguity of the scenario typically rise when there are more parties involved or interested in the project. Every stakeholder typically has distinct priorities and interests, which can lead to conflicts or conflict with the project (Karlsen, 2008). At some point, their influence may affect how a project develops, and some stakeholders' influence may affect the project more frequently than others. Therefore, in order for a construction project to be successful when there are various stakeholders involved, a plan for managing them must be established. Stakeholders are those with the authority to influence an organization or initiative in some way. "People or small groups with the ability to influence, negotiate, and alter the organization's or project's strategic future" In 1998, Eden and Ackermann (p. 117). A stakeholder is defined as "any group or individual who can affect or is affected by the achievement of the organization's objectives" by Bryson (2004:22) in his widely read

book "Strategic Management". The term "client" originally referred to the financial sponsoring organization that is directly in charge of the production and development of a project. Newcombe, 2003 studied the idea of the construction project stakeholders as "multiple clients" for construction projects and thought it was necessary to distinguish them from that term. Project stakeholders are described by the Project Management Institute (PMI 2008 in PMBOK 2013, 391-415) as "individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion."

Internal stakeholders are those who directly participate in an organization's decision-making process (such as owners, customers, suppliers, and employees), and external stakeholders are those who are significantly impacted by the organization's activities (such as neighbors, the local community, the general public, and local authorities). While the external stakeholder relationships have been somewhat viewed as a task for public officials via the rules and legislation that concern facility development, there has been a strong emphasis on the internal stakeholder relationships in construction, such as procurement and site management (Atkin and Skitmore, 2008). Similar classifications of inner and outside stakeholders, as well as direct and indirect stakeholders, were used by Newcombe (2003) and Smith and Love (2004).

Primary stakeholders are a group of people whose continued participation in the project is crucial for the survival of the project organization because the organization cannot survive when they do not participate in the project work, according to Carroll and Buchholtz (2006). Secondary stakeholders are those who influence or are influenced by the organization. The organization may be able to influence this group of stakeholders, or they may be able to influence the organization. Contrasting with secondary stakeholders, who have no formal contractual involvement or contracted responsibilities but are in an indirect or secondary relationship with an organization (Smith and Love, 2004; Carroll and Buchholtz, 2006), primary stakeholders could be service providers (e.g., contractors, subcontractors, consultants) or those in a direct relationship with an organization. Mitchell et al. (1997) suggested a method for categorizing stakeholder concerns by fusing different characteristics like power, legitimacy, and urgency. They divide organizational stakeholders into internal and external groups based on their connections to the company. According to the nature of the project, their investments in the project, and their interests in the project, stakeholders and their levels of influence vary. When stakeholders band together to try to halt a project, one of the frequent negative impacts, it is crucial for the project team to be aware of the necessary measures to manage them.

Table 2-1: Stakeholders and their Role and Objective in Construction

Stakeholder Group	**Objectives and Roles**
Client	The client can be either private or public. The primary distinction between a private construction project and a public project is that in a private construction project, both the client and the beneficiary are the same, whereas in a reconstruction housing

Stakeholder Group	Objectives and Roles
	project, the main initiator is the beneficiary and the benefit goes to the affected communities (Siriwardena et al., 2010).
Consultant	Offers consulting assistance for the project's design, cost estimation, and technical concerns (engineering advise electrical, civil, etc.).
Contractor/Subcontractors	actual building activities in accordance with the plans, specifications, and contract papers conveyed by the pertinent parties (Siriwardena et al. 2010)
Funding body/Sponsor	Ensures that the funds are used for their intended purpose and that they are used in accordance with the planned budget and timetable. Makes sure that deliverables are delivered on schedule, at the agreed-upon cost.
Municipalities/Land Owners	Provides the land on which building is done. Their assistance is crucial for the construction project's timely procurement, planning, execution, and completion
Surrounding Communities	It is necessary to evaluate their interest, impact, and support for the project.
Politicians	Politicians play a crucial role in project development because they are the representatives of the communities that will be affected by it. They are powerful and influential
Government and other Authorities such as counties	Make sure the building project is completed in accordance with the established rules and specifications

2.4.6 Project Process Management

This Factor Comprise of Planning, Quality Management, Changes and Change Control Management, and Contract Closure. This factor includes the establishment of a quality management system and a project management plan (with a focus on contract administration), project audits, a review of the contractor's systems and plans, corrective actions, project ground roles, the issuance of instructions to begin subletting and specialist work, the authority-process, and approvals of the contractor's employees and subcontractors. The project management process begins with creating the governance plans (Ahmed, 2020).

2.4.6.1 Planning

Planning is a rational approach to the future. It involves selecting in advance from courses of action, what to do, when to do it, and who is to do it. Planning bridges the gap from where we are to where we want to go and helps ensure that we reach our goal economically and on a desired and predetermined time scale, making the most effective use of the resources available. Project Planning involves a series of actions required to properly define, charter, organize, and staff a designated project. It includes establishing sequence of works, estimate of resources needed, estimate of costs, and estimate of durations. This factor includes the project management plan (with a focus on contract administration), project audits, reviews of the systems and plans of the contractor, corrective measures, project ground

roles, issuing instructions to begin subletting/specialist works, authorities process, and approvals of the contractor's personnel and subcontractors (Ahmed, 2020).

2.4.6.2 Quality Management

Assuring that quality standards are met in producing the deliverable required at each work activity throughout the project life cycle is one of the most crucial aspects of the triple constraint that project managers need to address. This will ensure that the finished project deliverable will be acceptable to the client. This book also provides a number of places where data can be obtained to specify the standards and expectations for a project deliverable's quality. Sometimes a project deliverable is finished, but the customer rejects it because some of the form, fit, or function does not satisfy his standards.

Make sure the project manager is aware of the client's expectations as the first step in managing quality. It can be difficult for the project manager and project team to complete a project deliverable since customers don't always state all of their precise requirements at the beginning of a project. To minimize problems with quality expectations once the project is over, project managers and other project workers should be proactive in making sure they grasp as much detail about the project deliverable as feasible at the beginning. Additionally, it is crucial for the project manager to comprehend the distinction between a customer's quality standards and expectations (Randal Wilson, 2015).

According to Ahmed (2020), this element includes daily site operations, acceptance of completed work, and the quality control and assurance procedure. It includes enough supervision staff, prompt design/additional information release to the contractor, resolution of contract document issues, prompt engineering document review, detection of defects, corrective and preventative measures, issuance of certificates, and assurance of adherence to Health, Safety, and Environmental requirements.

2.4.6.3 Changes and Change Order Management

Any deviation from an established, well defined scope and timeline is referred to as a change in the literature. To put it another way, a change is commonly defined as the distinction between the contractual requirements outlined in the parties' initial agreement and the obligations imposed after that agreement (Fisk, 1988). Construction contracts are implemented with the understanding that they are finished. All parties involved in the construction process, however, have the authority to make alterations. The Owner must, however, approve all changes before they are put into effect. Ahmed (2020) states that this element encompasses the essential contract administration tasks of controlling changes and allowing only authorized changes in this context. These actions include creating a change management team, evaluating changes, urgent changes, evaluating various site circumstances, and value engineering.

A change order is a written directive to the contractor that is issued after the contract has been signed by the owner and authorizes a change in the scope of the work or an adjustment to the contract price or the

contract duration (Hester, 1991). Any changes that arise during the building phase must be communicated to the Consultant either verbally or in writing. If the change truly deviates from the original plan, the consultant will notify the contractor with a formal change order. However, these modifications take place after the initial contract has been awarded or possibly even after the start of work at the construction sites.

2.4.6.4 Project Closure

To achieve proper administrative and contractual closeout of the contract, Ahmed (2020) asserts that this component encompasses the essential contract administration tasks. It covers exceptional events like contract suspension and termination. The return of deployed resources, the final inspection process, completion certificates, closeout records, the defect liability period, defect rectification/compensation, and documenting and sharing lessons gained are some examples of these processes.

2.4.6.4.1 Contractual closure

The process of approving a project under the given terms and conditions is known as contractual closing. Verification of the finished project scope, contract audit, final payment, and release of retention will all be required in order to accomplish this. The contractual closure of a construction project should make sure that the following tasks are completed and approved by all parties, according to the FTA Construction Project Management Handbook (2006). Planning a punch list, preparing manuals and instructions, making assurances and pledges, allowing for beneficial occupancy, creating document drawings, conducting preliminary and final inspections, getting project approval from the project's major stakeholders, making the final payment, and commissioning are among the tasks.

2.4.6.4.2 Administrative Closure

In order to guarantee that project resources are distributed, the contractor engages in administrative closures (ITRM Guideline-Project Management Guideline, 2006). Demobilization of the project, closure of project finance and financing, gathering project records, evaluation of the project, and closure of stakeholders are among the tasks that were completed (Federal Transition Administration, 2006).Project demobilization, project financing and funding closure, project records disposal, project evaluation, and stakeholder closure are some of these tasks.

2.4.6.4.3 Project Closeout Challenges

Numerous things could go wrong when the project is being closed. Numerous elements, both internal and external to the body that oversees and carries out the project, have an impact on it. These include poor project management, a lack of external environment consideration during project design, insufficient incentives for possible beneficiaries to participate in project selection and design, improper relationships between project activities and project development, and project goal. The principal

difficulties of project closeout should be presented to the project manager at conclusion, suggest Spire and Hamburger (1988). According to Spire and Hamburger (1988), project termination should be handled as a project in and of itself in order to properly conclude the project. The role of project closure also fits the traditional description of a project as a one-of-a-kind activity with modest resource limits. Spire and Hamburger noted a number of potential issues during the close phase. These can be broken down into the intellectual and emotional components that management needs to address when the termination process starts.

The probable challenges during project closeout or some typical pitfalls that appear during project closeout are, according to Kirt Gilliland (2019);

Punch list Delays: can have issues getting the items on your punch list finished by carefully monitoring the project's closing procedure. A project's punch list is a list of things that need to be changed or finished before it can be said to be finished. The architect who worked on the project assists in the creation and generation of the punch list after the actual construction is finished. Any delays in making the required changes could result in expensive delays in the project's completion schedule.

Incomplete Document Production: As the project owner, will want to have all the project-related paperwork in your possession when the keys are turned over. There are many justifications for having a thorough collection of project documentation. In addition to keeping correct records, you may need paperwork for equipment maintenance and warranty services. Might also want paperwork in the future if a section of the construction does not adhere to the specifications stated in the contract. One problem that may not be immediately obvious when you take over a project is not having all the necessary papers. Too frequently, owners discover that they are missing a crucial piece of documentation months or even years after the project is finished. By that time, it could be difficult to locate the person or business that possesses the records you require. Due to potential issues, it is imperative to get all appropriate papers as part of the project's closing process and prior to taking possession of the property.

Communication Breakdown: Any project that is successful must have effective communication. This is applicable throughout the duration of the project, up until its conclusion. Communication gets more challenging as each organisation involved in a project starts to demobilise. As time passes and those involved in the project go on to other careers, it becomes more challenging to gather the essential paperwork from each activity. Significant delays will be experienced in each stage of the project's completion as a result of the slowing and eventual worsening of communication between project stakeholders. On the punch list, changing orders may take longer, and papers may not be created. The overall difficulties associated with project completion can be either internal or external to the project. These internal and external challenges of project closeout that possibly affect the project are:

2.4.6.4.3.1 Internal Challenges

Owners/clients, contractors, and consultants have power over these difficulties. Kual (2014) pointed out

Project closeout internal problems can be caused by administrative, technical, financial, or psychological issues.

2.4.6.4.3.1.1 Contractor Related Challenges

In order to save overhead expenses and earn final contract payments, contractors typically feel pressured to finish projects as quickly as is reasonable (Rogers, 2012). Due to the contractor's poor management of crucial construction project tasks, issues relating to the contractor develop. Therefore, according to Archarya et al. (2006), the contractor is in charge of carrying out the construction design successfully; they are also to blame for the majority of the delays. According to them, the contractor oversees the financial aspects of construction, plans and schedules jobs, maintains the job site, handles supply management, and coordinates, among other things, between the workers. As a result, if these are not properly addressed, the project may be delayed or even fail. Project closing difficulties that pertain to contractors may be caused by administrative, technical, financial, or psychological causes

Technical: Heerkens (2002) asserts that the majority of technical issues and issues that may be resolved during the project's execution and control phases will surface during the last phase of closure in order to guarantee that the project delivers what has been promised. Excessive/multiple punch lists, a lack of a clear handover strategy, a delay in testing equipment and engineering systems after substantial completion, errors and discrepancies in design documents, ambiguous details in drawings, contractor (subcontractor personnel transferring to new projects), a shortage of staff during the closeout stage, and a thorough/detailed identification and agreement on all outstanding deliverables are among the technical challenges brought on by clients

Psychological: The team's performance deteriorates as the project nears its conclusion. Some team members left after completing their research, while those who are still there might be concerned about "life after this project." Members of the team (or those still present) are working hard to finish the last few tasks, which may not have been part of the original plan. Fighting the team's disinterest or search for the next task at this point is challenging for the project manager. According to Kual (2014), the psychological difficulties that exist at the closer out stage include: Lack of urgency in approach, lack of enthusiasm and motivation of parties involved due to achieving substantial completion, fear of no future work, loss of team functionality as some members complete their tasks, loss of interest in tasks like documentation, attention being diverted as members transition into new projects or other work.

Administrative: Challenges including insufficient contractor planning and insufficient contractor experience are identified by Murali et al. (2007) as contributing to delays. Examples of poor administration include the contractor's lack of closeout planning and preparation, the completion of punch lists in occupied spaces, faulty or tardy contractual closeout documents, and the contractor's unwillingness to fulfill contractual obligations (such as providing replacement parts).

Financial: Essam (2006) highlighted the subcontracting issues, the poorly structured contractor, the

contractor's financial issues, and the contractor's poor work quality as the root causes of delays. Project delays may result from the conflict between the contractor and the other parties Sadi et al. (2006) described. For instance, a contractor's inadequate financial control system and disagreements with the client on the cost of additional work can both make project closure difficult.

2.4.6.4.3.1.2 Client Related Challenges

There have been numerous studies conducted by various academics that have linked client-related variables to delays in project completion. Project closeout issues that are client-related may be caused by administrative, technical, financial, or psychological factors. According to Archarya et al. (2006), the person who initiates and finances the building project is what causes owner-caused delays. Owners and clients can decide the project's scope and order because they are responsible for its financial support. Shewaferahu (2016), highlighted the owner change order; the owner's poor decision-making and payment delays cause the project's execution to be delayed. Meaza (2015) identified factors that contribute to delays as owner influence, sluggish decision-making, unrealistic contract term, and requirements imposed. According to Fong et al. (2006), delays can be attributed to the type of client, a lack of prompt decision-making, an unrealistically strict contract, and client-initiated changes. Essam (2006) classified the sources of delays as change or variation orders, owner-induced delays, and owner-induced oral change orders. According to Sadi et al. (2006), the owner's failure to furnish and deliver the site to the contractor on time, change orders made by the owner while the project is being built, poor communication and coordination between the owner and other parties, the owner's slow decision-making process, the lack of incentives for the contractor to finish ahead of schedule, and the owner's suspension of work are all factors that contribute to delays. According to Abdalla et al. (2002), the owner's meddling, the owner's delayed decision-making, and the unrealistically long contract period all lead to delays. Sweis et al. (2007) noted delays in site preparation, delays in contractor claim settlements, owner work suspension, excessive owner change orders, owner decision-making that was delayed, owner interference in the construction operations, and owner delays in progress payments. Numerous factors that contributed to construction project delays were discovered in earlier studies.

The majority of researchers concur that the following factors always involve the client: the owner's interference in building work alters the owner's instructions during construction, Owner ineffective cooperation and communication with other parties, Owner makes decisions slowly and pays late.

2.4.6.4.3.1.3 Consultant Related Factors

Project implementation delays have been linked to consultant-related variables in earlier study studies by various academics. Project closeout issues that pertain to consultants may be caused by administrative, financial, administrative, or psychological factors. Shewaferahu (2016) identified the contribution of inspection and consultant-related factors to the delay. According to Divya.R and S.Ramya (2015),

insufficient consulting experience and poor coordination and communication are likely problems associated to consultants that are delaying building projects in Malaysia. Poor coordination and communication among consultants was cited by F. K. Ziddah (2016) as a contributing factor to delays.

2.4.6.4.3.2 External Challenges

David (2016) study found that the political environment affects the construction of a project and changes in government actions are a major external risk factor militating against the success of projects. An external challenge includes federal regulatory requirement (government interest in early completion of the project), weather effect on construction activities, and accidence. Unfavorable weather conditions have been noted as project delay causes in Meaza (2015) and Kual (2014). An action that has the potential to influence administrative procedures and government policy. The majority of business owners will monitor any political developments, such as new laws or regulatory changes that might significantly affect how their organization operates and its financial results. Government employs personnel to carry out these programmes, while citizens elect politicians to make decisions about public policy, including the implementation of public projects. When under intense political pressure in their own districts, legislators may be driven to raise the calibre of public initiatives that could increase their chances of winning votes. As a result, they might try to get over obstacles like the offensiveness, inaction, or dishonesty of bureaucrats. There is proof that political competition can improve the quality of public projects. According to David (2016), political involvement plays a crucial but underappreciated role in determining the success or failure of the project management procedures that drive efforts to create international regimes or, more broadly, institutional arrangements in international society. In order to distinguish between the three types of leadership that frequently participate in efforts to establish international institutions, structural leadership, entrepreneurial leadership, and intellectual leadership, an analysis of the nature of project management serves as a springboard, Holland et al.(, 2009). The study of interactions between individual leaders is a top priority for those who want to shed light on the steps involved in the formation of political movements since it is in these contacts that the real work of the development of the regime occurs. Such a study not only aids in the explanation of the circumstances under which regimes form or do not form, but also offers a chance to reacquaint the person with a significant field of international politics (Migai, 2008 referenced by David (2016)). Politics manifests itself in all organizations through the beliefs and behaviours of the various stakeholders therein. Additionally, the project's stakeholders may have their own objectives and preferences for taking part in the project. These stakeholders' relationships to the project might range from being very supportive to being adversarial, but depending on their sphere of influence, these interactions need to be taken into account and handled. However, external politics, such as political unrest that may derail the project, are beyond the control of either the sponsor or the project manager.

Public initiatives are frequently abandoned or given to subpar organizations, according to World Bank,

2004 (quoted in David, 2016). Failure to complete these projects jeopardizes citizen wellbeing and costs the public sector an estimated US$150 billion annually. (2007) World Bank, referenced in David (2016).The severity of these failures varies within and between nations, fueling regional and international inequality. Politicians and bureaucrats are both seen as crucially important agents in the delivery of government programmes, according to Adrianse and Voordijk (2014). The unresolved issue is how politicians can influence the bureaucratic branch of the government and increase efficiency in order to appease immediate electoral concerns. Typically, politicians must assign these jobs to bureaucrats, whom they subsequently reward, rather than taking on government programmes themselves. We know very little about the origins and effects of the interactions between politicians and bureaucrats, according to David (2016). There is a limited empirical literature on bureaucrats in general, which is important considering their importance as the primary makers of public projects in many nations. To understand the delivery of public projects, it is crucial to comprehend the reward contexts in which bureaucrats work, including both formal incentives in a bureaucrat's contract and informal contacts

2.4.7 Project Risk Management

Risk management is seen as the processes related with identifying, analysing, and responding to uncertainty throughout the project's lifecycle, according to the Project Management Body of Knowledge (PMBOK, 2000). It entails maximising the outcomes of fortunate events and minimising the effects of unfortunate ones. Risk management, according to Shehu and Sommerville (2006), is the practise of reducing and controlling the degree of risk. Risk management was described as a systematic technique for recognising, evaluating, and responding to hazards faced in a project by (Nummedal et al., 1996), which was cited in Getachew (2009). Same was described by Kerzner (2003) as the process of recognising, deciphering, and assessing risk. According to Angelo and Rubin (2001), risk management is a crucial component of project management that helps to prevent delays, cost overruns, and disputes between partners. Clients and their project managers use risk management to make decisions based on the information produced by risk assessments. Making informed decisions regarding various configurations, construction situations, and operational characteristics is part of risk management. Ahmed (2020) says that this element encompasses the essential contract administration procedures in connection with risk management in order to lower contractual risks. Included in these are proactive measures to decrease design and construction-related risks, accountability for risk mitigation plans, risk identification and registration, contractor involvement in risk management, and ensuring enough.

Therefore, one of the most essential project management techniques to ensuring a project is effectively finished is risk management (Chapman, 1997). Thus, risk management is directly related to the execution of a project successfully. The risk management process described in project management literature is comprehensive and widely acknowledged. It is built primarily from four iterative phases: risk identification, risk estimation, risk response planning, and execution. Managing the risk

management process is frequently included in this process.

2.5 Research Gap

According to Abebe (2003), the Triple Constraints of managing Cost, Schedule (time), and Quality are crucial for a project to be managed effectively. Project management is therefore improved by balancing these restrictions. Among these, due to their capacity for performance monitoring, the majority of projects frequently concentrate on examining cost overruns and time delays. This study by Abebe (2003) concurs with Dereje's (2014) assertion that one of the reasons construction projects are delayed is the way clients, contractors, and consultants now plan and schedule the work. In addition, implementing the wrong work programme contributes to poor job quality and conflict. According to Abdissa Dessa (2003), poor risk management is one of the main reasons for claims and disputes in the construction industry, which in turn generates issues with the administration of contracts. For the majority of ERA asphalt concrete road projects, Tadesse (2009) found that executing projects on time and under budget has been a significant challenge because of revisions, which result in cost overruns. Tadesse (2009) emphasises further that "right of way or access to site problem, change in defined scope and order, lack of proper planning, lack of contractor evaluation of tender, document at tendering phase and contractor financial problems and failure due to the contractor's inability to undertake or complete the work and problems related to procurement such as project packaging, invitation, pre-qualification, short listing and bid evaluation and process control from" are all issues that can occur".

In the Humbo - Arbaminch upgrading road project, Anteneh (2010) also noted a 10.75% rise in contract amount due to a change in sequence. These adjustments to Humbo - Arbaminch projects are brought on by mistakes in design, a lack of cooperation and communication, an inadequate scope, weather-related damages, and other factors. Additionally, the study by Getu (2014) that examined the 16-year performance assessment report for design management for the ERA road sector development programme found that more than 40% of the projects had time overruns for the consultancy contract and that the engineers' cost estimates varied by ± 15% from the contract document. Getu's (2014) study also showed that changes of 8% in cost resulted in 22% time overrun from the contract amount and changes of 7% in quantity resulted in 22% time overrun. The study also shows that claims and disputes have 2% cost overruns from the contract value, which results in another departure in the contra document. When we analyse the situation of contract administration in Ethiopia's construction industry, the contract's components are not adequately managed, planned, and monitored, which causes issues with contract administration. The two most crucial elements for project success and administration are on-time project completion and minimizing cost overruns; consequently, this study will analyze and evaluate the impact of those combined variables on the contract administration of ERA Gambela Area Construction Projects Management Office based on the aforementioned factors and parameters that have been taken into account by various scholars.

2.6 Meta-analysis

Meta-analysis is that combines the results of multiple scientific studies addressing the same question.

2.6.1 Data entry and standard error of each study considered in the Meta-analysis

Table 2-2: Data entry and standard error of each study considered in the Meta-analysis

Study name	Pooled Mean	Pooled SD	Sample size	Std Err
Ahmed, 2020	4.589	0.458	366	0.024
Lemi, 2022	3.520	0.605	37	0.099
Gebremedhin, 2019	3.895	0.975	89	0.103
Katasube, 2018	3.600	1.020	48	0.147
Gatari, 2021	3.510	0.943	384	0.057
Mulyungi, 2016	2.265	0.943	62	0.120
Syombua, 2017	3.430	0.938	137	0.080

Source: CMA and own survey (2023)

Pooled mean, standard deviation and sample size of each study were collected by the researcher and were used as an input for the comprehensive meta-analysis version three software and the pooled mean were the average mean of each studies for each variable they considered in their respective studies discussed below

When we see the study of Ahmed, 2020 which is about the critical assessment of post-award contract administration performance in construction projects in his dissertation paper considered the variables like Governance and startup, team management, communication and relationship, quality and acceptance, performance monitoring, documentation, financial management, change and change control management, claim an dispute resolution management and contract close out management (pooled mean=4.589) found out that communication and relationship; performance monitoring and reporting; and quality and acceptance management were found to be the most critical factors in determining the performance of contract administration, but from the meta-analysis as it can be seen from the table the number of sample population considered and the effect size of 69.32% indicates that the study of Ahmed (2020) from the perspective contract administration is very important and as of Lemi (2020) contract administration was considered from the perspective the effectiveness of the contract based on the Ajamba condominium site. In her studies she considered factors like purposes and scope of the contracts, communication, time, resources, documentation, procurement and reworks (pooled mean=3.52). From her studies she found out that reworks, resources, schedule (time) and delay in payment were the main challenges that affected the contract of the site. On the other hand, when we consider the study of Gebremedhin (2019) it considered factors like resource, procurement, stake holders and quality(pooled mean=3.895). Cash flow and financial issues, price increases for construction materials on the market, material waste on projects, equipment breakdowns and failures in the enterprise, changes in material

types and specifications during construction, and an absence of construction materials on the market are the main resource management-related factors that have an impact on the performance of the contracts. Lack of an effective and efficient procurement planning, procurement control system, and contract management in the enterprise are the main procurement management-related factors that affect the execution of the projects. Lack of stakeholder attribute evaluation, lack of stakeholder participation in decision-making, lack of stakeholder identification, and lack of stakeholder communication and engagement are the main stakeholder management-related factors that have an impact on the project's performance. Lack of a quality management system and a lack of management commitment and leadership to quality were the two most significant factors that affect the performance of projects among quality management related factors. Also the study of katasube (2018) which considered monitoring and risk mangement (pooled mean=3.6) implied that there is significant relation between effective contarct adminstation, monitoring and risk management. Gatari (2021) also found out from the study that contract administration was significantly affected by contract management; contract monitoring and contract documentation (pooled mean=3.51). The final paper considered for the Meta-analysis Syombua (2017) implied that prequalification, contractors' payment practices, contract change management and supervision significantly affected contract administration ((pooled mean=3.43).

2.6.2 Significance of Each Studies

Table 2-3: Significance of Each Study

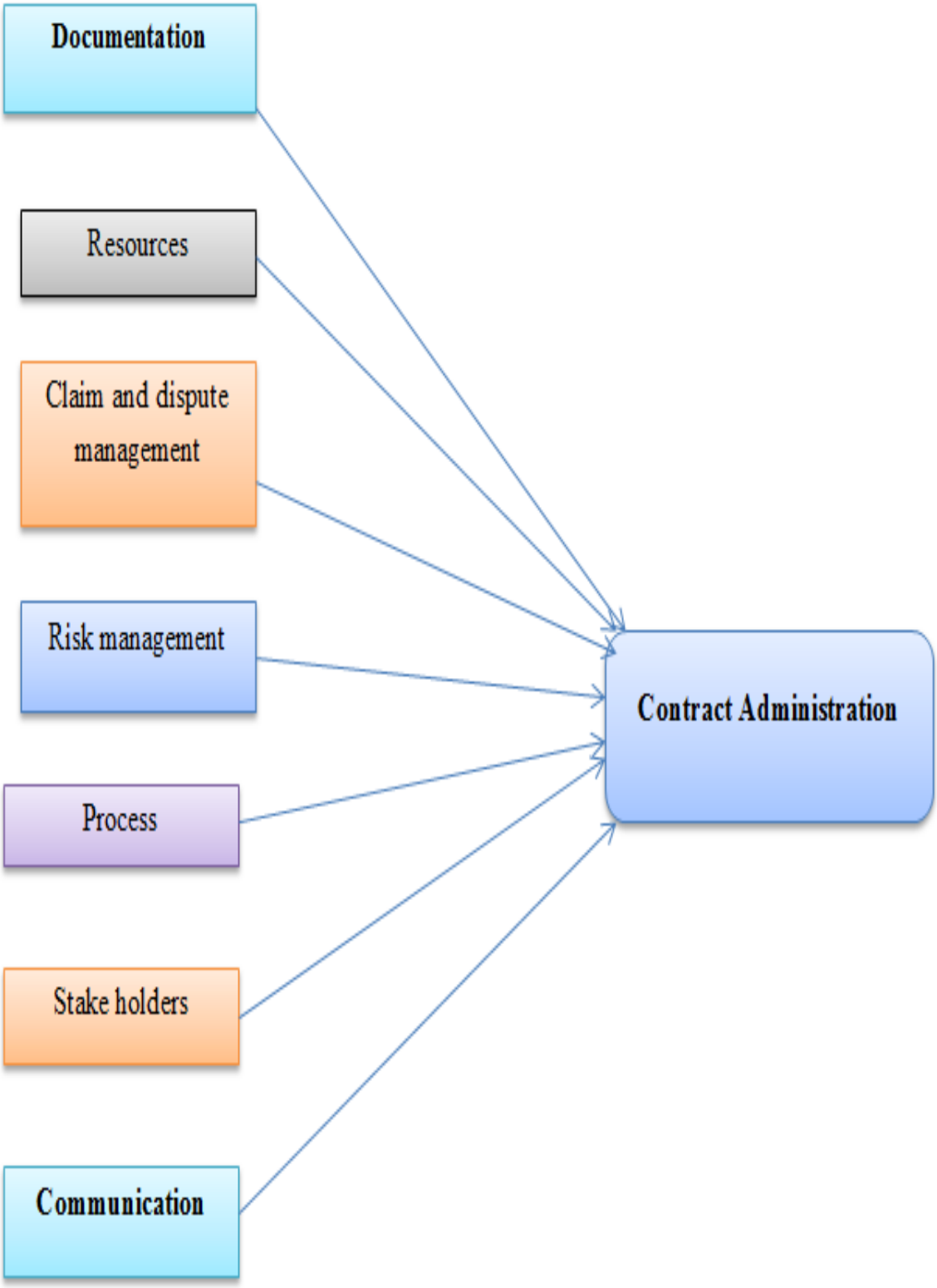
Study name	Mean	Std Err	Variance	Lower limit	Upper limit	Z-value	P-value	Relative weight
Ahmed, 2020	4.589	0.024	0.001	4.542	4.636	191.687	0.000	69.32
Lemi, 2022	3.520	0.099	0.01	3.325	3.715	35.391	0.000	4.02
G/medhin,2019	3.895	0.103	0.011	3.692	4.098	37.688	0.000	3.72
Katasube, 2018	3.600	0.147	0.022	3.311	3.889	24.452	0.000	1.83
Gatari, 2021	3.510	0.057	0.003	3.398	3.622	61.412	0.000	12.16
Mulyungi, 2016	2.265	0.120	0.014	2.030	2.500	18.913	0.000	2.77
Syombua, 2017	3.430	0.080	0.006	3.273	3.587	42.801	0.000	6.19
Fixed Model	4.235	0.020	0.000	4.196	4.274	212.470	0.000	

Source: CMA and own survey (2023)

Studies with smaller SDs are given a higher relative weight, whereas studies with bigger SDs are given a lower relative weight. This is acceptable if variation in SDs between studies represents variations in the accuracy of outcome measures, but it is probably not acceptable if the changes in SD reflect actual variations in the variability of outcomes in the research populations. But from the significances of p=000 for each studies and for 95% confidence interval each of the studies will be significant to adopt variables

from their conclusions and use it as an input for our study and use it in the researcher's study. Also the relative weight of each study being shown in the final row of the above table most of the variables for this study were considered form the study of Ahmed (2020) with a weight of 69.32%.

2.7 Conceptual Framework



Source: The Researcher 2023

CHAPTER THREE

3 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

A research problem can be methodically solved using research methodology. It is a branch of science that studies how scientific research is conducted. Basically, it describes how researchers approach their work of describing, assessing, and forecasting phenomena. It seeks to provide a research work plan. And this chapter discuss mainly about the component that this chapter basically gives emphasis about.

3.2 Research Design

A research design, according to Churchill (2002), is a master plan that outlines the procedures and methodologies to be used in gathering and analysing the necessary data. It is a strategy to use when finishing a study. The study design aids the researcher in gathering pertinent information to accomplish the objective. So, both descriptive and explanatory research design method employed by applying the dependent variable over the independent variables.

3.3 Research Approach

Both qualitative and quantitative research methods used. By using semi-structured questionnaires from the sample respondents in respect to the factor that affect the contract administration, the quantitative is utilized to obtain primary data.

3.4 Sample Design

3.4.1 Sampling Frame

For this study the projects managed by ERA in Gambella Area Construction Projects Management Office are frame of the study.

3.4.2 Population of the Study

Employees of the Contractors, Consultants, and ERA in the Gambela Area Construction Projects Management Office make up the study's population.

3.4.3 Sampling Unit

The sample unit, which is the smallest unit of observation for data on the operative variables, is a fundamental idea in sampling theory. The sample unit must be precisely described before the sampling frame can be built. In statistics, it is customary to refer to the total number of sampling units in the universe with a capital "N" and the total number of sampling units in the sample itself with a lowercase "n". The unit sample in this thesis serves as a person-sized sampling unit or unit of analysis.

3.4.4 Sampling Technique

Burns and Bush (2006) claimed that although convenient sampling would be ideal for testing the complete population, in most circumstances the population is simply too huge to include every single person. This is the rationale behind why the majority of researchers use simple random sampling, the most widely used sampling approach. This sampling method is popular among academics since it is quick, affordable, simple, and it can employ a variety of individuals. Therefore, the researcher purposefully selected sample for the questionnaire and simply released the questionnaires for those of the list of above stated sample frame, which selected using systematic random sampling.

3.4.5 Sample Size

Samples from the research populations chosen using a straightforward random sampling method. The researcher has more accurate information about the variables he is researching inside the sub-population, which is why simple random sampling is used. According to Taro (1973), the research is used as a simplified formula to calculate the necessary sample size at a 95% confidence level, with an admissible error of 5% and from the total of 212 experts (207 Contractors' and Consultants' employees which are selected using random sampling and 5 Ethiopian Roads Administration employees selected using purposive sampling) involved in ERA Gambella Area Construction Projects Management Office:

$$n = \frac{N}{1 + N(e)^2} \qquad n = \frac{207}{1 + 207(0.05)^2} = 137$$

Where "n" is the sample size, N represented for the total number of professionals in ERA Gambella Area Construction Projects Management Office projects, and e is error.

Table 3-1: Sample Population and Method of Sampling

Projects	Main professional populations	Total professional populations under each project		Sample taken from each project	Sampling method for each parties involved in the study
Project 1	Client	1		1	Purposive sampling
	Consultant	29	14%	19	Stratified random sampling
	Contractor	16	7.73%	11	Stratified random sampling
Project 2	Client	1		1	Purposive sampling
	Consultant	30	14.5%	20	Stratified random sampling
	Contractor	14	6.76%	9	Stratified random

Projects	Main professional populations	Total professional populations under each project		Sample taken from each project	Sampling method for each parties involved in the study
					sampling
Project 3	Client	1		1	Purposive sampling
	Consultant	27	13.04%	18	Stratified random sampling
	Contractor	18	8.69%	12	Stratified random sampling
Project 4	Client	1		1	Purposive sampling
	Consultant	32	15.45%	19	Stratified random sampling
	Contractor	16	7.73%	11	Stratified random sampling
Project 5	Client	1		1	Purposive sampling
	Consultant	15	7.25%	10	Stratified random sampling
	Contractor	10	4.85%	7	Stratified random sampling
Total		212		141	

3.5 Source of Data

3.5.1 Primary Data Sources

Self-administrated questionnaires and interviews utilised as data collection strategies to gather first-hand information.

3.5.2 Secondary Data Sources

In order to strengthen the study, the researcher collected pertinent secondary data about the study's subject by critically analyzing various archival sources. Reports and other pertinent intellectual or academic papers represent the majority of these sources.

3.6 Data Collection Methods

3.6.1 Questionnaires

A closed-ended questionnaire will be created. Five Likert Scales used to create the closed-ended surveys so that employees can express their opinions on the scales. In most cases, questionnaires will be physically handed to the individuals in question, asking them to complete and return it. Informants are

expected to read the questions carefully, comprehend them, and respond in the area provided on the actual questionnaire.

3.6.2 Interview

According to Abiy Z. et al. (2009, 83), interviews can be conducted in one of two ways: in-person or over the phone. An in-person interview calls for a single interviewer or a group of interviewers to speak with the interviewee directly and pose questions. Direct or indirect, structured or semi-structured, unfocused or focused—the options are endless. With about 10 respondents who will be key players in the research field, the researcher conducted some semi-structured interviews.

3.6.3 Case Study

Case studies of four ongoing projects executed to investigate the practical implication of the determinant factors for contract administration in Ethiopian Roads Administration Gambella Area Construction Projects Management Office.

3.7 Validity and Reliability

There are two main standards that will be used to measure the study's level of quality. Validity and dependability are these. The validity of a claim can be evaluated using theoretical or empirical methods. The goal of theoretical validity assessment is to determine how effectively an operational measure captures the essence of a theoretical notion. In this sense, the current study's validity is addressed through a review of pertinent literature and the adaptation of instruments from earlier studies. According to Yin (2003), reliability is the absence of random error, which enables subsequent researchers to get the same conclusions if they repeat the study's procedures. When compared to a two-scale system, this scale has a higher level of reliability. Five is a good number to choose since, according to Hayes (1992), reliability drops off as the number of response alternatives increases. Cronbach's alpha is also used to assess internal consistency.

3.8 Methods of Data Analysis and Presentation

Data collected using various methodologies quantitatively analyzed and interpreted to meet the study's goals. Consequently, both quantitative and qualitative methodologies used in the data analysis. As a result, information received through a questionnaire statistically analyzed and displayed using tables that are both descriptive and inferential, while information gathered through an interview described. To this end, both descriptive and inferential analysis techniques employed. Descriptive analysis conducted using descriptive statistics including percentage, frequency, mean, and standard deviation. Inferential analysis will include Pearson correlation and multiple linear regressions.

Finally, linear multiple regression model will be used to show the effect of the independent variables on dependent variables and SPSS software will be used to analyze the data, like:

$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots\cdots\cdots + \beta_n X_{ni} + \varepsilon_i$

where: Y_i is dependent variable for i^{th} observation;

X_i is independent variables for i^{th} observation;

B_0 is the intercept;

B's are regression coefficients

ε_i is the error term for i^{th} observation

Data gathered by questionnaire will be used for the analysis through regression

3.9 Operationalization of Variables

- Contract Administration: the task of ensuring that any contractor and consultant fulfills their job to the terms and stipulations written in the contract.
- Resources Management: the process of managing the main inputs in construction
- Process: steps from planning to closure
- Communication: transferring information to produce greater understanding in between the main stake holders
- Documentation: the document retrieval scheme used in the projects
- Stake holders: the main parties in the construction
- Risk management: is concerned with all loss exposures.

3.10 Ethical Considerations

Without unethical methods, the researcher successfully acquired the data from respondents as desired. The study's findings or report may only be used for academic purposes, and participant responses are kept private and analyzed in aggregate by the researcher without alteration. Additionally, the researcher respects and honors the work of earlier research or study and correctly cited those works that served as a basis for their work.

CHAPTER FOUR

4 DATA ANALYSIS AND INTERPRETATIONS

4.1 Introductions

This chapter deals with the presentation, analysis and interpretation of the data on findings under each presentation, aimed at achieving the research objective. In this regard, the chapter discusses the result of descriptive (the mean, standard error and standard deviation) and frequency analysis on the Identification of Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Project Management Office and correlational and inferential analysis about the extent to which each of the independent variables: Documentation , Communication, Resources, Claim and Dispute Management, Stakeholders Management, Project Process Management, Project Risk Management and Project Closure are interrelated and affects Contract Administration. In addition to the descriptive, correlation and regression analysis there is also analysis of case studies of projects and qualitative analysis interview.

4.2 Response Rate

Table 4-1: Response Rate

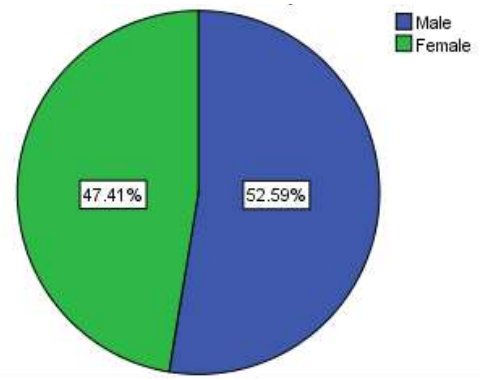
Projects	Main professional populations	Sample taken from each project	Issued questionnaire	Returned questionnaire	Response rate
Project 1	Client	1	1	1	$\mathbf{135/141 = 95.74\%}$
	Consultant	19	19	17	
	Contractor	11	11	10	
Project 2	Client	1	1	1	
	Consultant	20	20	19	
	Contractor	9	9	9	
Project 3	Client	1	1	1	
	Consultant	18	18	18	
	Contractor	12	12	12	
Project 4	Client	1	1	1	
	Consultant	19	19	19	
	Contractor	11	11	9	

Projects	Main professional populations	Sample taken from each project	Issued questionnaire	Returned questionnaire	Response rate
Project 5	Client	1	1	1	
	Consultant	10	10	10	
	Contractor	7	7	7	
Total		141	141	135	

4.3 Background of the respondents

- **Sex of the respondents**

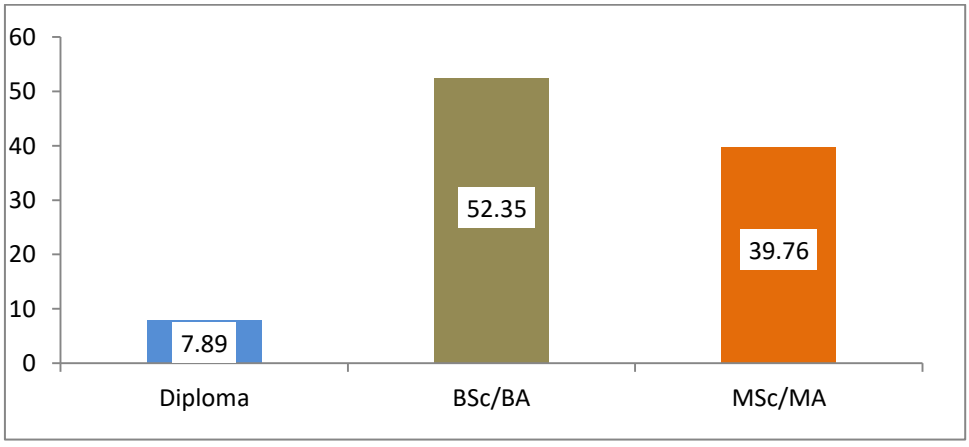
Pie chart 1: sex of the respondents



Out of the total 135 respondent that anonymously participated in this study were composed of 52.595 male and 47.41% female. The high number of female participants as male can be attribute to the fact that more female are given the opportunity and chance to advance in their knowledge and status in projects which brings them to the obvious contribution in any fields and allowing them to be a part of the function. It also shows that the male participants were densely located at the place where the survey was conducted.

- **Level of education**

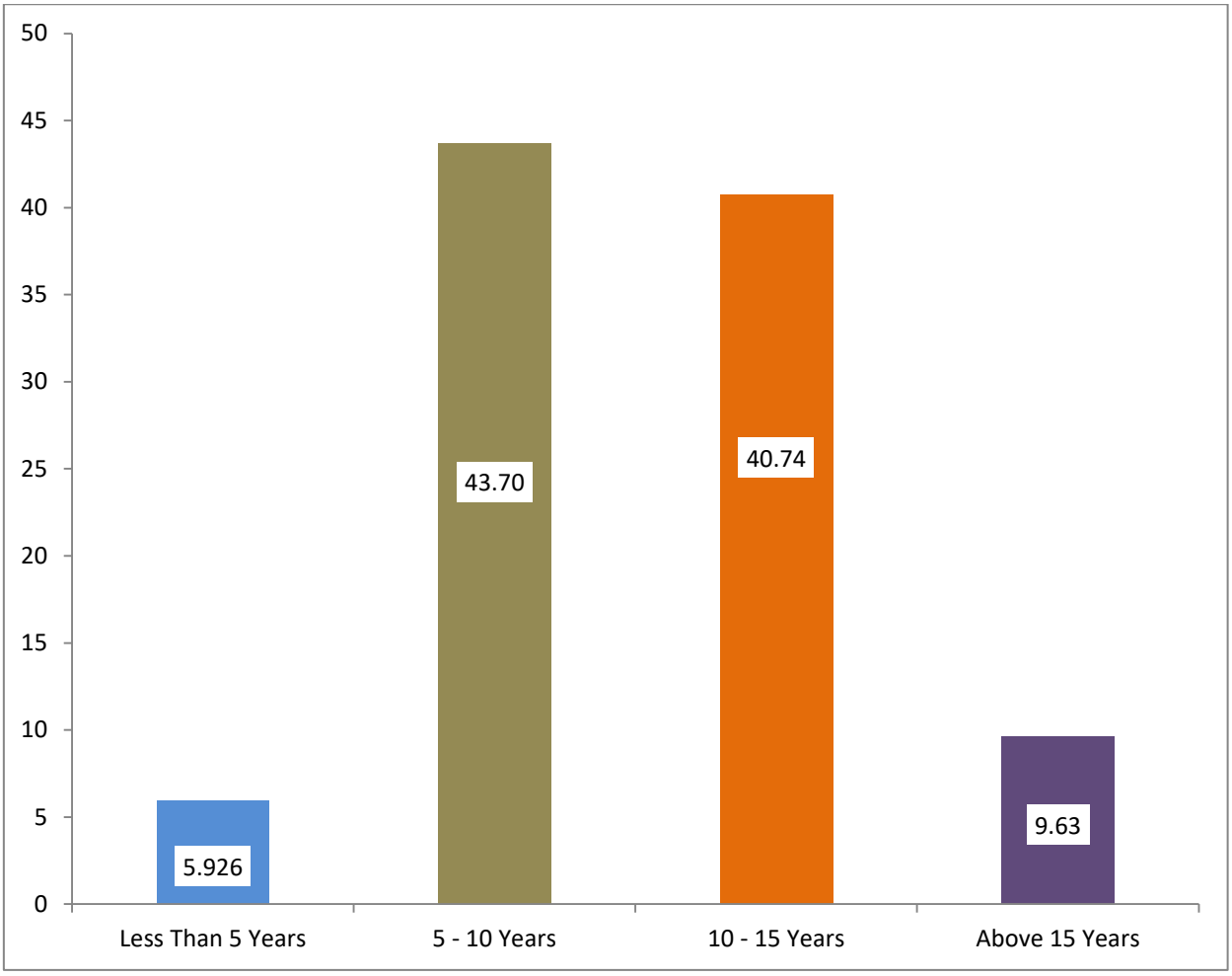
Bar chart 1: level of education of the respondents



It was also necessary for the study to know the academic qualification of respondents in order to determine their level understanding towards the contract administration and the variables of contract administration. From the data collected it is clearly seen that respondent's possess a range of educational qualifications from Diploma level to MSc/MA level. Majority of the respondents were Bachelor's degree holders which accounted to 52.35%. The other group of respondents was Master's degree holders that were 39.76%. The last group was Diploma holder which was 7.89% in number from the total respondent. This implies that all the respondents can understand interpret and conceptualize the contract administration variables that were expected to affect projects.

- **Experience**

Bar chart 2: experience of the respondents



From the above bar chart 2 we can see that most of the respondents have good experience the highest percentage being 43.70 which stands for the experience ranging from 5-10 years. The next second high percentage is 40.74 which is for the experience ranging from 10 to 15 years. Also 5.926% of the respondents have experiences from less than 5 years whereas 9.630% of the respondents have an experience of above 15. The researcher believes that Work experience is an understanding of the work environment and what employers expect of their workers and it is an opportunity to explore possible performance options and project variables that will affect contract administration.

4.4 Descriptive and Frequency Analysis of Documentation

Table 4-2: Descriptive and Frequency Analysis of Documentation

		Establishing a Document Management System	Using Information Communication Technology (ICT) in administering the contract	Maintaining Updated project documentation with registers	Supporting the Project Stakeholders with regular statistics
N	Valid	135	135	135	135
	Missing	0	0	0	0
Mean		4.64	4.33	3.96	4.35
Std. Error of Mean		.042	.045	.058	.044
Std. Deviation		.483	.518	.674	.508
In Significant					
Slightly Significant			0.7	4.4	
Significant				11.1	1.5
Very Significant		36.3	36.3	68.1	62.2
Extremely Significant		63.7	63.7	16.3	36.3
Total		100.0	100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

From the above Table 4.2 establishing a document management system are 100% significant in affecting the documentation. Also from the descriptive analysis the mean value of 4.64 shows that the average value is above the response which was assigned as very significant. The standard error, which tells how accurate the mean of any given sample from that population is likely to be compared to the true population mean, implies that the data's are more around the mean. When the standard error increases, i.e. the means are more spread out, it becomes more likely that any given mean is an inaccurate representation of the true population mean. Also the standard deviation which is related to how each value are dispersed from the mean shows that the values are not dispersed that much. Additionally when see the values of the response for each of the other statements under documentation it can also conclude that the respondents believe that using information communication technology in administering the contract (mean value 4.33, no response for insignificant implying that the response ranges from slightly significant (4.4%) to extremely significant (63.7%)), maintaining updated project documentation with registers (68.3% significant)and supporting the project stakeholders with regular statistics 98.5% cumulative very significant and extremely significant response shows that it is important to inform stake holders with regular statistical update.

4.5 Descriptive and Frequency Analysis of Communication

Table 4-3: Descriptive and Frequency Analysis of Communication

		Establishing a Communication Management System	Regular Meeting of the Contracting Parties	Effective Coordination with third parties	Compliance with the language of communication as stipulated in the contract	Establishment of Clients Project Management office near to the project vicinity for readily communication with the Contract parties and other stakeholders
N	Valid	135	135	135	135	135
	Missing	0	0	0	0	0
Mean		3.84	4.45	4.06	3.73	3.86
Std. E.		.047	.045	.057	.098	.089
Std. Deviation		.549	.529	.667	1.142	1.031
In Significant					3.7	2.2
Slightly Significant		3.0		1.5	14.1	11.1
Significant		15.6	1.5	14.8	17.8	14.1
Very Significant		76.3	51.9	60.0	34.8	43.7
Extremely Significant		5.2	46.7	23.7	29.6	28.9
Total		100.0	100.0	100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

Many elements that lead to better cost and quality outcomes in any project or programme have been identified by the author following discussions with key players in the construction, IT, and finance industries. The most commonly mentioned factor can be summed up as the ability of a single person or small working group to "own" the project and be able to involve the appropriate individuals at the appropriate times to carry out all of its phases. Even if the system is built on centralized procurement mechanisms, the local client level still needs to have active and knowledgeable client input. This local input is not meant to compete with or obstruct centralized decision-making, but it does help to increase user satisfaction by making it obvious what the projects' objectives are in order to prevent problems from becoming difficult. Such a local group has been given several names across several projects, but for simplicity, it can be referred to as the Core Working Group. Although the aforementioned guidance may seem obvious, there is evidence that, in the construction industries, the absence of such a person or group at the local level can lead to communication issues that allow costing and quality control to vary from the original plans. So as it can be seen from the response of the above table 76.3% of Reponses's with a mean value of 3.84 implies that establishing a Communication Management System is important and regular meeting of the contracting parties 51.9% very significant and 46.7% extremely significant is

important. Additionally the analysis also shows that effective Coordination with third parties (60% very significant, 23.7% extremely significant and 14% significant, mean value 4.06), compliance with the language of communication as stipulated in the contract (significant 17.8%, very significant 34.8% and extremely significant 29.6%) and establishment of Clients Project Management office near to the project vicinity for readily communication with the Contract parties and other stakeholders (significant 14.1%, very significant 43.7% and extremely significant 28.9%) communication important parts of the contract administration.

4.6 Descriptive and Frequency Analysis of Resources

Table 4-4: Descriptive and Frequency Analysis of Resources

		Assignment of technically competent, qualified and experienced Contract Administration Team	Clear Identification of individual roles and responsibilities within the Contract Administration team	Establishing training and development programs for Contract Administration Team	Mobilization of the Right Equipment's which commensurate with the actual workload	The readily availability of natural construction materials in the project vicinity	The readily availability of manufactured construction materials	Establishment of a Financial Management System	Timely Certification of Payments due to the Contractor and Consultant
N	Valid	135	135	135	135	135	135	135	135
	Missing	0	0	0	0	0	0	0	0
Mean		4.50	4.50	4.52	4.34	3.55	4.39	3.59	4.04
Std. Error of Mean		.051	.044	.046	.041	.104	.049	.103	.056
Std. Deviation		.597	.517	.530	.476	1.214	.574	1.199	.645
In Significant						5.2	.7	5.2	
Slightly Significant						17.0		14.8	
Significant		5.2	.7	1.5		23.7		24.4	18.5
Very Significant		39.3	48.1	45.2	65.9	25.9	57.8	26.7	58.5
Extremely Significant		55.6	51.1	53.3	34.1	28.1	41.5	28.9	23.0
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

A construction project is a high-stakes undertaking with a time-bound, predetermined performance objective, according to Mohsin et al. (2019). No activity may be carried out according to a set time schedule unless corresponding resources are planned for and obtained. Under various scheduling requirements (such as smooth resource utilisation profiles and resource limits) and under circumstances of uncertainty that can occasionally go beyond task durations, project managers must make difficult decisions. According to Jogi (2017), no activity can be completed in accordance with a predetermined time programme without the resources that are scheduled and purchased being levelled. Different types of resources, such as material, money, equipment, and space, are influencing the project's time and cost. Additionally, there will inevitably be some material, labour, and equipment waste during the construction process. This study considered resources by categorizing into three aspects: human resource, machineries, construction materials and financial managements. With regard to the human resources assigning of technically competent, qualified and experienced contract administration team by most of the respondents is significant which was implied by 39.3% very significant and 55.6% extremely significant response also clear identification of individual roles and responsibilities within the contract administration team is important (48.1% very significant, 51.1% extremely significant). Additionally as a resource, establishing training and development programs for contract administration team is significant in affecting contract administration (45.2% very significant, 53.3% extremely significant)

In any project it is also important to utilize machineries effectively and efficiently and here from the responses we can see that mobilization of the right equipment’s which commensurate with the actual workload is significant (65.9% very significant and 34.1% extremely significant). Construction materials proper use in construction industry is also inevitable so the readily availability of natural construction materials in the project vicinity is significant 23.1%, 25.9% very significant and 28.1% extremely significant and the readily availability of manufactured construction materials also important (57.8% very significant and 41.5% very significant). On the other hand finance is the core element of any project and establishment of a financial management system is 24.4% significant, 26.7% very significant and 28.9% extremely significant. Finally, timely Certification of payments due to the contractor and consultant is significant for the contract administration to be handled effectively (18.5% significant, 58.5% very significant and 23% extremely significant)

4.7 Descriptive and Frequency Analysis of Claims and Disputes Management

Table 4-5: Descriptive and Frequency Analysis of Claim and Dispute Management

		Establishment of a Claims and disputes resolution system	Proper assessment of Contractor's entitlement for extension of time for completion within timelines as set out in the contract	Proper assessment of Contractor's entitlement for additional payment	Existence of Claims and Disputes Management Guideline and proper utilization of the guidelines
N	Valid	135	135	135	135
	Missing	0	0	0	0
Mean		4.07	3.37	3.50	3.76
Std. Error of Mean		.074	.095	.093	.081
Std. Deviation		.866	1.105	1.078	.940
In Significant		.7	3.7	3.0	2.2
Slightly Significant		8.1	20.7	17.8	7.4
Significant		5.2	27.4	23.7	23.0
Very Significant		55.6	31.1	37.0	46.7
Extremely Significant		30.4	17.0	18.5	20.7
Total		100.0	100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

Construction projects are getting more and more complicated, which leads to complicated contract documents. Intricate claims and conflicts can also come from intricate construction. Regarding this, Chaitanya Khekale and Nityanand Futane (2013) in their study titled "Management of Claims and Disputes in Construction Industry" discussed that a claim is a legitimate request for achieving a contractual milestone or additional compensation on account of a change to the contract. If these claims made by the contractor are not managed clearly, it results in a disagreement or argument over the validity or quantum of a claim known as a dispute. The adoption of efficient construction claim and dispute management is required due to the noticeably rising number of construction claims nowadays. Construction industry disputes and their causes must be studied because disagreements between the parties to building projects are a major source of concern for the sector. Construction disputes are a source of worry for every construction project, and the solution to this issue is to prevent and delicately handle them for the smooth operation of the construction process. From the above table 4.5 to properly ensure resolution of claims and disputes that might be raised in the construction industries we can see that it is important to establish a claims and disputes resolution system (55.6% very significant and 30.4% extremely significant). Moreover, proper assessment of contractor's entitlement for extension of

time for completion within timelines as set out in the contract (27.4% significant, 31.1%% very significant and 17% extremely significant), proper assessment of contractor's entitlement for additional payment (17.8% slightly significant, 23.7% significant, 37% very significant and 18.5% extremely significant) and existence of claims and disputes management guideline and proper utilization of the guidelines is also important.

4.8 Descriptive and Frequency Analysis of Stakeholders Management

Table 4-6: Descriptive and Frequency Analysis of Stakeholders Management

		Effective Communication and Coordination with the Project Stakeholders	Timely Response to the Public Requests	Regularly Monitor the Stakeholders satisfaction level with respect to the project
N	Valid	135	135	135
	Missing	0	0	0
Mean		4.04	4.06	3.53
Std. Error of Mean		.084	.084	.092
Std. Deviation		.980	.976	1.071
In Significant		2.2	2.2	4.4
Slightly Significant		6.7	6.7	13.3
Significant		12.6	11.1	24.4
Very Significant		42.2	43.0	40.0
Extremely Significant		36.3	37.0	17.8
Total		100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

According to Molwus (2014), stakeholder interactions and relationships play a significant role in determining how well a construction project performs overall and are essential to its successful completion. Although it has long been understood that stakeholder management is essential to the successful completion of construction projects, its full potential has yet to be realized. As a result of the existing frameworks in construction either focusing on a specific construction stage or failing to include crucial factors like internal stakeholder collaboration, responsibility for stakeholder management, and project life cycle, previous research efforts indicate a lack of comprehensive stakeholder management processes. Therefore, it is important to consider the impact of effective communication and coordination with the project stakeholders for contract administration to be properly managed (6.7% slightly significant, 12.6% significant, 42.2% very significant, and 36.3% extremely significant), as shown in the above table. Moreover, since one of the stakeholders are the nearby people timely response to the public requests (6.7% slightly significant, 11.1% significant, 43% very significant and 37% extremely significant) also important. Regularly monitoring the stakeholders' satisfaction level with respect to the project is inevitable (13.3% slightly significant, 24.4% significant, 40% very significant and 17.8% extremely significant).

4.9 Descriptive and Frequency Analysis of Project Process Management

Table 4-7: Descriptive and Frequency Analysis of Project Process Management

		Establishment of an overall project management plan	Provision of Master Work Program	Conducting project kickoff meeting to discuss contract with	Timely Provision of Quality Control and Assurance Manuals	Systematic auditing of the Contractor's implementation of quality management system	Systematic auditing of the Contractor's Compliance with health, safety and environmental	Establishment of a change control system	Prompt assessment of the Consultant's recommendation on Contractor's proposals for changes inclusive value engineering	Proposing Financially Viable Solutions to avoid budget increase due to change requests
N	Valid	135	135	135	135	135	135	135	135	135
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.39	3.93	4.41	4.03	3.76	4.23	4.01	4.28	3.07
Std. E.		.085	.084	.042	.089	.086	.072	.059	.039	.078
Std. D		.985	.979	.493	1.029	1.003	.837	.686	.451	.908
In Significant		3.0	.7		3.0	1.5	1.5	.7		5.9
Slightly Significant		17.8	6.7		8.1	11.9	3.7			20.0
Significant		26.7	26.7		8.9	20.7	5.9	18.5		35.6
Very Significant		43.0	30.4	59.3	43.0	41.5	48.1	59.3	71.9	38.5
Extremely Significant		9.6	35.6	40.7	37.0	24.4	40.7	21.5	28.1	
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.	100.0	100.0

Source: SPSS Output and own survey (2023)

In any construction projects it is important to consider the effect of the construction process management. So based on the results of the analysis establishment of an overall project management plan (17.8% slightly significant, 26.7% significant, 43% very significant and 9.6% extremely significant and mean value 3.39) , provision of master work program (6.7% slightly significant, 26.7% significant, 30.4% very significant and 35.6% extremely significant and mean value 3.93), conducting project kickoff meeting to discuss the contract with related parties (59.3% very significant and 40.7% extremely significant and mean value 4.41), timely provision of quality control and assurance manuals (8.1% slightly significant, 8.9% significant, 43% very significant and 37% extremely significant and mean value 4.03), systematic auditing of the contractor's implementation of quality management system (11.9% slightly significant, 20.7% significant, 41.5% very significant and 24.4% extremely significant and mean value 3.76), systematic auditing of the contractor's compliance with health, safety and

environmental requirements on site(3.7% slightly significant, 5.9% significant, 48.1% very significant and 40.7% extremely significant and mean value 4.23), establishment of a change control system(18.5% significant, 59.3% very significant and 21.5% extremely significant and mean value 4.01), prompt assessment of the consultant's recommendation on contractor's proposals for changes inclusive value engineering (71.9 very significant and 28.1% extremely significant and mean value 4.28) and proposing financially viable solutions to avoid budget increase due to change requests (20% slightly significant, 35.6% significant, 38.5% very significant and mean value 3.07) shows how important project process management is.

4.10 Descriptive and Frequency Analysis of Project Risk Management

Table 4-8: Descriptive and Frequency Analysis of Project Risk Management

		Putting in place risk identification, analysis and management mechanism	Periodically assessing the contractual risks	Assignment of responsibility to the relevant party for each contractual risk expressed as a responsibility matrix	Monitoring the Contractor's financial status and bankruptcy potential
N	Valid	135	135	135	135
	Missing	0	0	0	0
Mean		3.86	4.16	3.71	3.30
Std. Error of Mean		.101	.068	.096	.094
Std. Deviation		1.179	.794	1.112	1.093
In Significant		2.2	.7	3.7	5.2
Slightly Significant		14.1	4.4	11.9	17.8
Significant		21.5	6.7	22.2	34.8
Very Significant		20.0	54.1	34.1	26.7
Extremely Significant		42.2	34.1	28.1	15.6
Total		100.0	100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

From the above table 4.8 we can see that all of the mean values are above three (mean values>3) implying that risk management is important in construction contract. When we see each of the statements listed, putting in place risk identification analysis and management mechanism (14.1% slightly significant, 21.5% significant, 20% very significant 42.2% extremely significant and mean value 3.86), periodically assessing the contractual risks (4.4% slightly significant, 6.7% significant, 54.1% very significant 34.1% extremely significant and mean value 4.16), assignment of responsibility to the relevant party for each contractual risk expressed as a responsibility matrix (11.9% slightly significant, 22.2% significant, 34.1% very significant 24.1% extremely significant and mean value 3.71), monitoring the contractor's financial status and bankruptcy potential (17.8% slightly significant, 34.8% significant, 26.7% very significant 15.6% extremely significant and mean value 3.86), implies that to mitigate risks

it is important to put in place risk identification, analysis and management mechanism , assessing the contractual risks and assigning proper responsibility to the relevant party for each contractual risk expressed as a responsibility matrix and monitoring the contractor's financial status and bankruptcy potential. Additionally, researchers like Petrovic (2017) suggested that the fragmented, transient, and complicated nature of construction projects inherently increases risk exposure. For decision-makers in the sector to manage risks adequately and systematically, they require dependable access to information and expertise. Therefore, successful construction project endeavours may be facilitated by the application of an effective risk management in regard to managing associated project risk knowledge. However, research findings imply that achieving project goals depends significantly on how industry actors perceive risk and the risk management process. Additionally, Petrovic's (2017) research shows that contractors and developers underuse the interactions between knowledge and risk management and the incorporation of these procedures.

4.11 Descriptive and Frequency Analysis of Project Closure

Bigrentz (2021) presented the seven steps to a successful project closeout as : collecting necessary documents, reviewing change orders and modifications, ensuring order specifications are met , present to client, address all client feedback, close any open contracts, gather project takeaways for future learning. The researcher believes that all projects end, but it is important to finish projects according to the contract specification and on time. From table 4.9 below establishment of a close-out system (8.1% slightly significant, 17% significant, 54.8% very significant, 18.5% extremely significant and mean value 3.81), communicating closeout activities to all stakeholders (10.4% slightly significant, 28.9% significant, 43.7% very significant,14.1% extremely significant and mean value 3.56), proper verification of physical works completion (9.6% slightly significant, 28.9% significant, 52.6% very significant, 6.7% extremely significant and mean value 3.52), proper review of contractor's closeout documentation (5.2% slightly significant,12.6% significant, 46.7% very significant, 34.1% extremely significant and mean value 4.07), timely issuance of taking-over certificate with associated snags (2.2% slightly significant, 8.1% significant, 31.1% very significant, 57.8% extremely significant and mean value 4.43), proper release of the due retention monies upon releasing relevant certificates (8.9% slightly significant, 13.3% significant, 40.7% very significant , 37% extremely significant and mean value 4.06), timely approving return of deployment of the contractor's resources upon the contractor's request (60.7% very significant , 39.3% extremely significant and mean value 4.39), periodic inspection of the works during defects notification period (2.2% significant, 46.7% very significant , 51.1% extremely significant and mean value 4.49),proper issuance of performance certificate when the contractor's maintenance obligations are fulfilled in accordance with timelines as set out in the contract (51.9% very significant , 48.1% extremely significant and mean value 4.48), documenting lessons learned and best practices (46.7% very significant , 53.3% extremely significant and mean value 4.53), proper processing

contractor's final account in accordance with the contract provision(11.1% slightly significant, 17.8% significant, 34.1% very significant , 37% extremely significant and mean value 3.97) and proper management of termination of contract process in compliance with the contract administrative procedures (58.5% very significant , 40% extremely significant and mean value 4.37) are important points to be considered when evaluating or considering project close out.

Table 4-9: Descriptive and Frequency Analysis of Project Closure

		close-out system	Communicating closeout	Proper verification	Proper review of documentation	Timely issuance	Proper release of the due retention	Timely approving return of deployment	Periodic inspection of defects	Proper Issuance of performance certificate	Documenting lessons	Proper processing	Proper management of termination
N	Valid	135	135	135	135	135	135	135	135	135	135	135	135
	Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3.81	3.56	3.52	4.07	4.43	4.06	4.39	4.49	4.48	4.53	3.97	4.37
Std. Error of Mean		.076	.083	.073	.077	.069	.080	.042	.047	.043	.043	.086	.049
Std. Deviation		.885	.959	.845	.899	.797	.929	.490	.545	.502	.501	1.000	.570
In Significant		1.5	3.0	2.2	1.5	.7							
Slightly Significant		8.1	10.4	9.6	5.2	2.2	8.9					11.1	1.5
Significant		17.0	28.9	28.9	12.6	8.1	13.3		2.2			17.8	
Very Significant		54.8	43.7	52.6	46.7	31.1	40.7	60.7	46.7	51.9	46.7	34.1	58.5
Extremely Significant		18.5	14.1	6.7	34.1	57.8	37.0	39.3	51.1	48.1	53.3	37.0	40.0
Total		100	100	100	100	100	100	100	100	100	100	100	100

Source: SPSS Output and own survey (2023)

4.12 Descriptive and Frequency Analysis of Significance of Good Contract Administration on Elements of Projects

Table 4-10: Descriptive and Frequency Analysis of Significance of Good Contract Administration on Elements of Projects

		Enhanced performance	On time project closure	Economical resource utilization	Effective process and risk management	Enhancing good relation with stakeholders	Avoids claims and disputes
N	Valid	135	135	135	135	135	135
	Missing	0	0	0	0	0	0
Mean		4.52	4.39	3.19	3.37	3.56	3.39
Std. Error of Mean		.048	.042	.097	.101	.092	.073
Std. Deviation		.558	.488	1.123	1.170	1.069	.847
In Significant				5.9	4.4	3.7	3.0
Slightly Significant				20.7	22.2	14.8	11.9
Significant		3.0		37.8	25.9	21.5	31.1
Very Significant		42.2	61.5	19.3	26.7	41.5	51.1
Extremely Significant		54.8	38.5	16.3	20.7	18.5	3.0
Total		100.0	100.0	100.0	100.0	100.0	100.0

Source: SPSS Output and own survey (2023)

It is evident managing projects according to the contract is essential and the respondents also showed from their response that good contract administration enhances performance (3.0% significant, 42.2% very significant, and 54.8% extremely significant and mean value 4.52), good for on time project closure(61.5% very significant, 38.5% extremely significant and mean value 4.39), for economical resource utilization (20.7% slightly significant, 37.8% significant, 19.3% very significant, 16.3% extremely significant and mean value 3.19), for effective process and risk management (22.2% slightly significant, 25.9% significant, 26.7% very significant, 20.7% extremely significant and mean value 3.37), to enhance good relation with stakeholders (14.8% slightly significant, 21.5% significant, 41.5% very significant, 18.5% extremely significant and mean value 3.56) and to avoid claims and disputes.

4.13 Inferential Statistics

4.13.1 Correlation

Table 4-11: Correlation Table

		risk_management	documentation	contract_adminstartion	proect_closure	communication	Resource	claim_and_dispute_management	stake_holders	project_process_management
risk_management	Pearson	1	.492**	.616**	.520**	.497	.482**	.580**	-.202*	.480**
	Sig.		.000	.000	.000	.000	.000	.000	.019	.000
	N	135	135	135	135	135	135	135	135	135
Documentation	Pearson	.492**	1	.651**	.414**	.330**	.365**	.575**	.205*	.339**
	Sig.	.000		.000	.000	.000	.000	.000	.017	.000
	N	135	135	135	135	135	135	135	135	135
contract_adminstartion	Pearson	.616**	.651**	1	.622**	.488**	.398**	.769**	.052	.543**
	Sig.	.000	.000		.000	.000	.000	.000	.549	.000
	N	135	135	135	135	135	135	135	135	135
proect_closure	Pearson	.520**	.414**	.622**	1	.340**	.252**	.565**	-.199*	.324**
	Sig	.000	.000	.000		.000	.003	.000	.021	.000
	N	135	135	135	135	135	135	135	135	135
Communication	Pearson	.497**	.330**	.488**	.340**	1	.130	.478**	-.187*	.454**
	Sig.	.000	.000	.000	.000		.132	.000	.030	.000
	N	135	135	135	135	135	135	135	135	135
Resource	Pearson	.482**	.365**	.398**	.252**	.130	1	.356**	.141	.073
	Sig.	.000	.000	.000	.003	.132		.000	.102	.401
	N	135	135	135	135	135	135	135	135	135
claim_and_dispute_man	Pearson	.580**	.575**	.769**	.565**	.478**	.356**	1	.010	.519**
	Sig.	.000	.000	.000	.000	.000	.000		.912	.000
	N	135	135	135	135	135	135	135	135	135
stake_holders	Pearson	-.202*	.205*	.052	-.199*	-.187*	.141	.010	1	-.107
	Sig.	.019	.017	.549	.021	.030	.102	.912		.216
	N	135	135	135	135	135	135	135	135	135
project_process_manage	Pearson	.480**	.339**	.543**	.324**	.454**	.073	.519**	-.107	1
	Sig.	.000	.000	.000	.000	.000	.401	.000	.216	
	N	135	135	135	135	135	135	135	135	135
**. Correlation is significant at the 0.01 level (2-tailed).										
*. Correlation is significant at the 0.05 level (2-tailed).										

Source: SPSS Output and own survey (2023)

According to Mohamed (2015), who wrote for the Accreditation Certification Programme for Official

Statistics, correlation measures the strength and direction of a relationship between two variables. A line drawn through the data points in a correlation does not fit. However, the simplest method is to calculate a correlation coefficient, which indicates how much one variable changes when the other one does. There is no association when r = 0.0. When r is positive, there is a tendency for one variable to rise along with the other. One variable tends to increase while the other decreases when r is negative. It is not required to consider cause and effect when using correlation. No matter which of the two variables is referred to as dependent and which as independent, the degree of correlation coefficient would remain the same if the two variables were switched. The correlation coefficient's sign (+, -) denotes the association's direction. The size of the correlation coefficient, for example, reveals the degree of link. A correlation of r = 0.4 shows a mild, positive link between two variables, while r = -0.8 suggests a significant, negative association (reverse trend). A correlation that is nearly 0 implies that there is no linear relationship between two continuous variables.

Table 4-12: Rule of Thumb for Interpreting the Size of a Correlation Coefficient
(Hinkle DE, Wiersma W, Jurs SG. Applied Statistics for the Behavioral Sciences. 5th ed. Boston: Houghton Mifflin; 2003.)

Size of Correlation	Interpretation
.90 to 1.00 (−.90 to −1.00)	Very high positive (negative) correlation
.70 to .90 (−.70 to −.90)	High positive (negative) correlation
.50 to .70 (−.50 to −.70)	Moderate positive (negative) correlation
.30 to .50 (−.30 to −.50)	Low positive (negative) correlation
.00 to .30 (.00 to −.30)	negligible correlation

Based on the recommendation of Mohamed (2015) the correlation table shows that at significance level of 0.000 contract administration has high positive correlation with claim and dispute management (.769), moderate positive correlation with documentation (.651), project closure (.622), Risk Management (0.616) and project process management (.543) and low positive correlation with communication (.488), resource (.398) and stakeholder management (0.052).

4.13.2 Regression

This section conducted the regression analysis. In order to achieve this, the analysis, R^2 results, and interpretation of the regression coefficient results were presented.

- **Assumption**

Explanatory variables will be examined for multicollinearity prior to running a model, in this case the multiple regressions (Verbeek, 2008). Multicollinearity is the term used to describe the problem that arises when the independent variables are correlated. Multicollinearity is a concern because it offers redundant information about the response when the explanatory variables in multiple regression models are highly connected. According to Hosmer and Lemeshow (1980), the presence of multicollinearity in

the model could lead to high variance, a high t-value, and false results. Therefore, a TOL of 0.10 or less and a Variance Inflation Factor (VIF) value of 10 or greater than 10 are the two widely used techniques to identify the presence of multicollinearity. As a result, multicolinearity tests were performed and all requirements were satisfied (see as specified below in details).

4.13.2.1 Model summary, ANOVA and Muticollinearity,

- **Model summary**

From this table of the adjusted r-square 71.9% of the variables are accountable or have effects on the contract administration, and the rest 28.1% will be other related factors which were not considered here.

Table 4-13: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.858[a]	.736	.719	.31158
a. Predictors: (Constant), project process management, resource, stake holders, project closure, communication, documentation, claim and dispute management, risk management				

Source: SPSS Output and own survey (2023)

- **ANOVA**

As per ANOVA results indicated on Table 4.13 below there was a statistical significant correlation between dependent and independent variable at 1% significant level due to the sig value 0.000. This reveals that the explanatory variables; project process management, resource, stake holders, project closure, communication, documentation, claim and dispute management and risk management have significant effects but not at equal rates.

Table 4-14: ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.072	8	4.259	43.870	.000[b]
	Residual	12.232	126	.097		
	Total	46.304	134			
a. Dependent Variable: contract administration						
b. Predictors: (Constant), project process management, resource, stake holders, project closure, communication, documentation, claim and dispute management, risk management						

Source: SPSS Output and own survey (2023)

- **Multicollinearity**

As the common rule of Verbeek indicates that if VIF is 10 or greater than 10 and a TOL of 0.10 or less it may indicate the presence of multicollinearity otherwise free from the problem. According to the model 4.15 below the VIF (<10) and TOL (>0.1) were free from multicollinearity respectively.

Table 4-15: Multicollinearity Table

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Risk management	.398	2.513
	Documentation	.549	1.820
	Project closure	.590	1.696
	Communication	.645	1.551
	Resource	.651	1.536
	Claim and dispute management	.421	2.376
	Stake holders	.740	1.351
	Project process management	.616	1.623
a. Dependent Variable: contract administration			

Source: SPSS Output and own survey (2023)

4.13.2.2 Regression Coefficients

Table 4-16: Regression Model

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.637	.604		-4.367	.000
	Risk management	.050	.061	.059	.817	.416
	Documentation	.281	.085	.204	3.305	.001
	Project closure	.457	.115	.236	3.960	.000
	Communication	.109	.072	.086	1.507	.134
	Resource	.123	.084	.083	1.460	.147
	Claim and dispute management	.265	.057	.328	4.643	.000
	Stake holders	.071	.043	.088	1.652	.101
	Project process management	.226	.081	.163	2.789	.006
a. Dependent Variable: contract administration						

Source: SPSS Output and own survey (2023)

Based on the methods stated in the methodology with linear multiple regression model which will be used to show the effect of independent variables on contract administration as:

$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots\ldots\ldots + \beta_n X_{ni} + \varepsilon_i$

So based on the regression results the following regression model can be developed:

$Y = -2.637 + 0.059\ X_{1i} + 0.204 X_{2i} + 0.236 X_{3i} + 0.086 X_{4i} + 0.083 X_{5i} + 0.328 X_{6i} + 0.088 X_{7i} + 0.163 X_{8i}$

Where Y = contract administration, X_{1i} = Risk management, X_{2i} = documentation, X_{3i} = Project closure, X_{4i}= communication, X_{5i} = resource, X_{6i} = Claim and dispute management, X_{7i} =Stake holders and X_{8i}= Project process management.

In identifying of the determinant factors for contract administrations the findings based on the results of regression analysis for risk management with 0.059 standardized beta coefficient and sig value of 0.416 shows that at 1% significant value risk management does not have effects on the contract administration.

Whereas documentation and project closure with standardized value of beta's 0.204 and 0.236 and sig value of 0.001 and 0.000 implies that of 1% change in documentation and project closure leads to 20.4% and 23.6% change in contract administration respectively. Moreover, claim and dispute management and project process management with beta values of 0.328 and 0.163 and with sig value of 0.000 and 0.006 interpreted to 1% change in claim and dispute management and project process management leads to 32.8% and 16.3% change in contract administration respectively.

The result of regression model reveals that the coefficient of analysis shows the relationship between contract administration and listed determinant factors in which the coefficient sig value of 0.000 implies that the determining factors are significant at 1% significant level which indicates that there is relationship in between contract administration and listed determinant factors. So as we can see the results contract administration is highly determined by claim and dispute management, project process management, documentation, project closure.

On the other hand, the coefficient sig value of communication (.134), resource (.147) and stake holders (.101) are significant at above 10% significant level in which the variable has a significant relation with contract administration. Finally, based on the finding, almost only four of the eight variables were found to have effects on contract administration at 1% level and the rest four at above 10% significance level.

4.14 Qualitative Analysis

In this section the interview analysis was conducted for interviewees. The analysis was conducted face to face in Amharic and interpreted without changing the main points of the interviewee. The interviewer was the researcher of this study and started by introducing the title and purpose of the study.

Respondent 1 (from ERA Row Lead Agent with 6 years' experience):

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 1:

> "*According to our organization, the most frequently occurring problem is overrated compensation rate which will be unexpected by the government. Of course this will affect the positive aspects of the stake holders which I believe that stake holders have both negative and positive effect.*"

Researcher: how do describe the effect utility intervention of EEPCO, ETC, WSS?

Respondent 1:

> "*Those utility organizations professional sometimes makes vast estimation of the relocation cost which is more than expected. Even if the client pays they still do not make on time relocation in which they sometime ask for extension time. This extension time will cause induction of extra cost."*

Researcher: from the engineering perspective how do you describe the effect factors that affect contract administration?

Respondent 1:

> "*There are resource related factors which will affect contract administration. Especially when the contract does not have his own resources specially machine rather relies on rents it is difficult to always find the right machines at the right time*"

Respondent 2 (from Project 2 Consultant Construction Supervision and Contract Administration Head with 20 years' experience)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 2:

> "*First of all there is documentation; then project management. Resource utilization and communication between the three main parties which are consultant, client and contractor and implementation of drawings as well as there needs to be common goal."*

Researcher: how do you describe the effect of stakeholders, securities effect in contract administration?

Respondent 2:

> "*If we consider other third parties in the construction stakeholders play great role and their intervention happens in each projects hence it will affects contract administration. When there is security issue it is not only suspension and termination also since they are unexpected data's will be an available. When this happens it is always difficult even to restart so it is important to take care of the available data's to either restart the work or even transfer the work."*

Respondent 3 (From Project 2 Resident Engineer with 15 years' experience)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 3:

> "*From my experience what I encountered so far as problem in the contract administration are the main parties in the contract do not understand the details in the contract document and the contractor doesn't even considers the service contract. The stakeholders, most of the time back refer the contract document after problems were occurred for justification or reference. The other problem is copy pasting projects, for example in the case of lare projects there should be a consideration of climate condition and material availability."*

Researcher: how do you describe the effect of stakeholders especially with respect of the right of way in contract administration?

Respondent 3:

> "*Whenever there is a problem of right way the contractor in his master plan is expected to submit the problem before four months in rural area and six months in urban area. However, the dislocation can't be completed as planned which will affect*

the master plan of the contractor. This result in idle machines, delay then claim; additionally, those stake holders which are not specified in the contract are unaware of the effects the right of way and related problems cause on the project and they need informal communication."

Researcher: how do you describe the effect of securities, resources in contract administration?

Respondent 3:

"*most of the time in the projects I worked I did not faced security challenges but I expect that in the areas where there are such problems it is clear that security issue causes suspension of projects. With respect to man power (skilled and unskilled) and resource utilization contractor is the main party next to the client but the problem with contractors is in their list bids they submit a lesser cost than the actual market cost. So when the contract is awarded it is difficult to find materials, skilled and unskilled man power based on their bids which in turn causes suffering of projects due to delay and quality problem.* "

Researcher: are there proper record and documentation of contracts which includes communications, drawings etc.?

Respondent 3:

"*I was the second RE in the lare project and every file was recorded and documented which was easy for me to access the progress and files of the project. Moreover this helped us to easily administer the contract and when other stakeholders like government and right of ways officials visit it is simplifies the ease of access.*"

Researcher: how do you describe the communication between different stakeholders and how do you see the communication trends and master schedule use?

Respondent 3:

"*Unless and otherwise there is a different like quality compromise every stakeholders are up to on time completion of the projects. The problem that should be described in here my project the Chinese contractor do not understand English and they do not fulfill the academic qualification requirements so there is a technical communication gap. Generally, in our site, language and technical gaps are significant. Regarding the master schedule, for any construction it is a bottom line means very important and if there is no master schedule you cannot determine where the contract and construction is heading to.*"

Researcher: how do you describe effect of financial management (payment delay) and foreign currency?

Respondent 3:

"*In our case the contractor is international and it has submitted turnover. For example the turnover cost of 140 billion birr for cumulative annual five years is*

expected to cover the cost of the project even if the contractor is not paid on time. The other expectation is since the contractor is international contractor we do not expect the problem of foreign currency."

Respondent 4 (From ERA project engineer with 10 years' experience)

Researcher: What, in your opinion, are the influencing factors in contract administration for example resources?

Respondent 4:

"*It is important to consider this from two perspectives: internally and externally; internally when the owner does not arrange finance and communication gap in between the main stakeholders. Externally issues like securities, government officials, right of ways problems are factors that affect contract administration. Resource utilization is important specifically by recruiting the right machine at the right time.* "

Researcher: how do describe the effect of master work program and different stakeholders you described them as external?

Respondent 4:

"*If well implemented master work program is very important and it is a determining factor. With respect to the right of way, now days, right of way is the most challenging problem in road project.* "

Researcher: how do you describe the documentation retrieval system in ERA and the importance of communication?

Respondent 4:

"*Since I am working in it there is a problem recording and it is not sufficient so to get access to the files you either have to ask each individual who even changed site or you have to go to the manual record office. Communication is vital especially between the main three construction parties, so it is important to communicate in possible ways and meetings."*

Researcher: how do describe the effect of claim and dispute management in contract administration?

Respondent 4:

"*Unless and otherwise resolved on time claim and dispute causes delay of projects which in turn make the contract difficult to administer."*

Respondent 5 (From Project 2 Consultant Material Engineer with experience above 15 years)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 5:

"*There are things that should be considered such as material availability and construction time. Additionally, design related factors such as terrain characteristics*

and materials for embankment and abutments exposed to flood should be considered properly."

Researcher: how do you describe the effect of right of way and security on the contract administration?

Respondent 5:

"*The right of way definitely will have effect on the contract administration so should be cleared on time. Regarding security, if there projects with problems of security it is quite clear that there is suspension of contract, machines will be either damaged or stolen so it will have definite effect on the contracts."*

Respondent 6 (From Project 1 Assistant Resident Engineer with experience above 10years)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 6:

"*Every elements of construction starting from design stage, procurement, bidding process, the capacity of the awarded contractor, the capacity of the selected consultant, the availability of master work schedule, the extent of resource mobilization, the collaboration of the stakeholders including the government officials etc. if not appropriately managed will definitely affect contract administration."*

Researcher: how can you describe the effect of official communications in between the main parties' and recording documents that are vital to all parties on the contract administration?

Respondent 6:

"*Not only will the official communications but also those unofficial and informal communications have affected the contract administration. In administering any project it is always important to document and record test results, correspondences, reports, accident reports etc."*

Researcher: how can you relate the effect of stakeholders such as EEPCO, ETC and security on the contract administration?

Respondent 6:

"Based on their significance and importance it is always important to engage every stakeholders. In addition, regarding the importance of e security, first, for the contract administration to exist there should be security. "

Researcher: how can you describe the effect of resources and claim management on the contract administration?

Respondent 6:

"Now days the most common problem in implementing contract administration is man power dissatisfaction which starts from the bidding process. Whether they are consultants or contractors, their focus is on their profit than the employee. For instance, there are situations where supervisor's salary is less than the driver's

salary. When I say this, it does not mean I am disrespecting driving but the role of the driver and the site supervisor with respect to a project are different. On the other hand claim as long as handled on time it does not have exaggerated effect."

Respondent 7 (From ERA project engineer with experience above 8 years)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 7:

"There are different factors which will affect the project and among these from the contractor perspective it is resource. Gaps like payment delay, right of way, and compensation payment delay for dislocating obstructions are among the factors that cause project delay. Based on the specified scopes on the work schedule of the contractor, which shows what when and how resources deployed, the contract will be easy to manage. Moreover, it is also important to utilize the machines appropriately."

Researcher: how can you relate the effect of communications, claim and dispute management and security challenges on the contract administration?

Respondent 7:

"Incase disputes and other security issues arise during construction stage there are section in the contract documents about what to do. Therefore, when they arise and cannot solved and when they grow to dispute, they might cause suspension and termination of projects. For a project to succeed there has to be proper communication in between the main parties. There are formats of formal communication so it is easy to communicate genuinely, and it is important to take care of the informal communications. On the other hand preventing claims from happening very important but once they happened it is advisable to solve it in a cost effective way. "

Researcher: how do you describe the effect of documentation retrieval system on the contract administration?

Respondent 7:

"Documents contain the main construction parties' status information about the stage of the construction starting from the beginning to where it is now. So it is essential to document everything and if they are not appropriately documented their effect is obvious"

Respondent 8 (From ERA project engineer with 8 years' experience)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 8:

"The main problem most of the contractors facing is cash flow problem and most of them are writing notes to suspend the project due to payment delay. The problems in

the construction industries each problems are interrelated, when the contractors confirm during the bidding stage to fulfill the machine requirements either on rental basis or on their own machines they do not fulfill their duty during the implementation stage even sometimes the rented machine will withdraw or quits the contract. The other problem is now days both cost and the availability of the cement is beyond anticipated and it is causing discrepancies in the contract administration."

Researcher: how do you describe the effect of documentation retrieval system, communication and security on the contract administration?

Respondent 8:

"Documentation is very important and as you know ERA is practicing electronic data's at the office level and each engineer is expected to record each of his/her own data for substantiation. Communication is important to every parties and they have to be available to the right party at the right time. In addition, as you know in Gambela there is a suspended project due to frustration of the contractor due to security issues. So security has an immediate effect on the contract administration"

Researcher: how do you describe the effect of claim and dispute management on the contract administration?

Respondent 8:

"Always by using the possible dispute and claim resolving mechanisms it is important to solve claims and disputes"

Respondent 9 (From ERA project engineer with 7 years' experience)

Researcher: What, in your opinion, are the influencing factors in contract administration?

Respondent 9:

"Formulation of fully and sufficiently described contract is important. This determines the healthiness of the contract and next to this the structure of the main parties is important, additionally, the academic qualification of the employee on every parties side, formal communication in between each parties and informal communication between stakeholders. In addition, the contractor should utilize each work force economically, avoiding substandard work force since it results in reworks and defects."

Researcher: how do you describe the effect of documentation and recording as well as claim and dispute management on the contract administration?

Respondent 9:

"Based on FIDIC there are methods on how to solve the security issues if they happen so it is important to refer to those contracts. Regarding documentation since oral information are less evident it is important to record and document information

for back referring history of projects and lesson to learn."

Respondent 10 (From Project 3 Assistant Resident Engineer with 14 years' experience)

Researcher: What, in your opinion, are the influencing factors in contract administration?
Respondent 10:

"There are different factors which will affect contract administration. For example if we consider from general to specific; generally inflation and securities, less availability of materials and logistics problem are some. Construction material mobilization is difficult in remote projects like our case, which is Gambela site. Moreover, formal and informal communications are determining factors of contract administration. Documents on the other hand is becoming easy to handle due to the advanced technologies, it is important to consider the effect of documentation. The other problem is regarding the equipment schedule; this is due to the presence of poor schedule during bidding stage just for the sake of award. Stake holders of different parties are also determining factor of the contract administration as they will challenge the client by creating different situational factors."

4.15 Case Study

4.15.1 Introduction

The title of the thesis is entitled as "Identification of Determinant Factors for Contract Administration in ERA Gambella Area Projects Management Office [ERA GPMO]". Here the researcher prefer the term "Determinant Factors" as it can include both terms of "Success Factors" & "Failure Factors". Hereby, as it is identified in the Literature Review & Meta-Analysis and further verified by Descriptive and Frequency Analysis, correlation, and regression the determinant factors are; Documentation, Resources (Financial Management, Human Resource & Machineries, and Construction Materials), Claims & Dispute Management, Risk Management, Process Management (Planning, Quality Management, Changes and Change Order Management, and Project Closure), Stakeholder Management, and Communication. Case Study presented in support of Questioner and Interview. In this regard, ongoing projects under ERA GPMO are evaluated based on each of the above determinant factors through various document reviews of the projects;

4.15.2 Project 1

The works Contract was signed between the Employer and the Contractor on May 23, 2017 and then the Works Commenced on October 17, 2017. On the other hand the agreements for the Continuation of Consultancy Services Contract was signed between the Employer and the Engineer or Consultant on the May 27, 2022, and the services commenced on August 1, 2022. 4.15.2 Project 1 is located in the western part of the country and lies entirely in the Gambela Regional State of the federal Democratic Republic of Ethiopia, particularly in Agniwah Zone. The project Road starts at Gambela Town

especially at Gillo square on the road to airport and ends at Pugnido town of Gog Wereda of Agniwah National zone after passing Abol and Abobo Weredas in the same Zone.

4.15.2.1 Documentation

Maintenance of well-organized contract files is fundamental to effective contact monitoring. Contract files should be organized in a manner that allows someone to reconstruct the contract and understand its history in the absence of the contract manager. Ethiopian Roads Administration the then Authority uses uniform Documentation system for the all road projects administered under it. The same is dispatched to the Contractors' and Consultants' to adopt their own accordingly. In addition to this, ERA uses Electronic-Filing (Record & Documentation) System at the head office level which offers an electronic document archiving, sending, tracking and monitoring services. This Electronic Filing system is now also starts implementation at the project level by client. and the Whether moving to electronic document management to improve productivity or just to save Printing expense, Copying Expense, Physical Storage and retrieval costs, and this system offers substantial benefits. This allow employees to instantly add, receive, search, track and send/Forward Incoming and Outgoing Letters, Memos, and Documents anywhere any time, Implement an electronic workflow, Improve time management, Improve search and retrieval capabilities, Increase efficiency and productivity, Cut Expenses for Printing and Copying, Clean working environment, Document recovery in the event of a disaster. The Document retrieval System ERA adopts is: Design Documents, Contract Document, Correspondences, Quality Assurance and Control Manual, Design Review Document, Environmental, Social, Health and Safety Related Documents, Monthly Reports, Minuit of Meetings, Works Programs, Payment Certificates, Bonds and Guarantee, Variation Orders, Claims and Disputes and Closeout Documents.

4.15.2.2 Claim and Dispute Management

The details of the time extension claim by the contractor, ER determination, Employer's decision and response to the contractor stipulated in the table below;

Table 4-17: Extension of Time Claim for Project 1

EOT No	Contractor			ER Determination		Employer Approval		Info to CRCC21
	Request Dat	Reasons	Days	Date	Days	Date	Days granted	
1	July 3, 2021	Delay in design approval maximum tangent length, employer's risk/ inundation at borrow pits and the outbreak of the pandemic, covid-19	450	August 26,2021	202	October 3,2021	202	October 19, 2021
2	February 23, 2022	Delay by the employer in granting possession of site/land, employer's risk/ inundation at borrow pits, the outbreak of the pandemic, covid-19, delay in design approval maximum tangent	458	March 31, 2022	258	August 1, 2022	258	August 8, 2022
3	February 26, 2023	Delay in possession of site, delay in release of IPCs, shortage of construction materials caused by force majeure , reconsideration for EoT No. 2 claim	904	March 21, 2023	428	Under Review		

The Construction works of the project in caption commenced on October 17, 2017; the original completion period is 1460 Calendar Days which makes the original completion time to be October 16, 2021. In this regard, the Contractor has requested 1812 Calendar Days of Extension of time and subsequently, the Employer's Representative has determined 888 Calendar Days of Extension of time and the Employer approve 460 Calendar Days of Extension of time. Accordingly, the revised completion time was on January 19, 2023 and the Employer's Representative is monthly giving an interim extension of time up till the EoT No.3 is approved by the Employer.

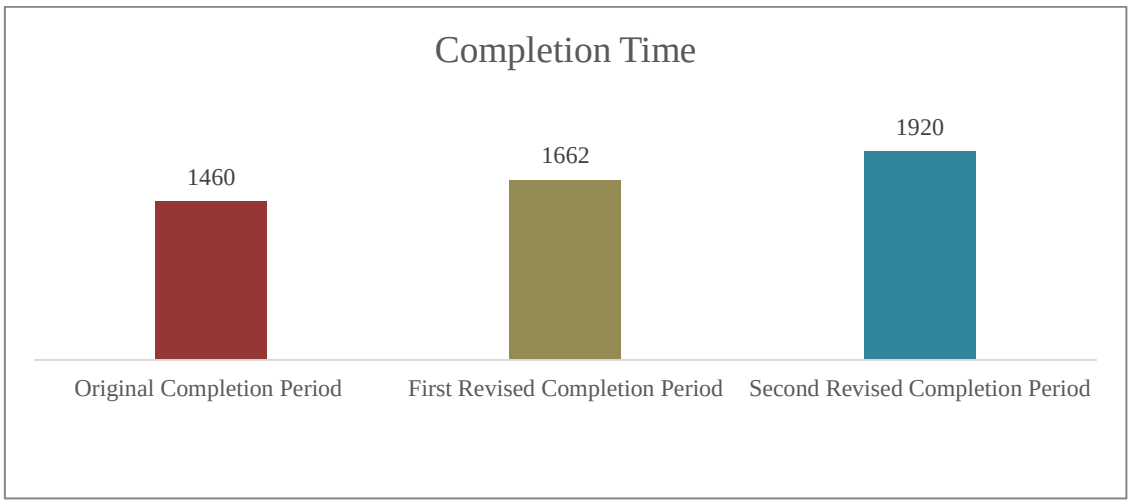


Figure 4-1: Original and Revised Contract Periods of Project 1

4.15.2.3 Resources (Equipment)

Status of major equipment mobilization to the site compared to the planned for the month of September 2023 described as follows;

Table 4-18: Equipment Mobilization for Project 1

Sr. No.	Equipment Description	Planned (No.)	Actual (No.)	Difference
1	Crusher	1	1	0
2	Asphalt Plant	1	1	0
3	Paver	0	1	-1
4	Bitumen and Chip Spreader	0	1	-1
5	Dozer	1	3	-2
6	Grader	2	2	0
7	Chain Excavator	4	8	-4
8	Single Drum Roller	2	1	1
9	Double Drum Roller	0	1	-1
10	Pneumatic Roller	0	1	-1
11	Loader	3	3	0
12	Tire Excavator	0	0	0
13	Dump Truck	13	20	-7
14	Shower Truck	3	4	-1
15	Crane	1	1	0
16	Wagon Drill	1	1	0
17	Heavy Carrier Truck	1	1	0
18	Medium Carrier Truck	1	0	1
19	Light Vehicle	7	1	6
20	Generator	2	3	-1
21	Compressor	2	1	1
22	Fuel Truck	1	1	0
23	Mixer	5	5	0

As shown on the above table most of the equipment demand is met and there are backlogs in equipment like Single Drum Roller, Medium Carrier Truck, Light Vehicle and Compressor.

4.15.2.4 Resources (Manpower)

The Employer's Representative and the Contractor have mobilized the following manpower during the month of September 2023;

Table 4-19: Employments Opportunity by Contractor and Consultant for Project 1

Description	**Employment Opportunity**									**Total Sum**		
	Skilled			Semi-skilled			Non-skilled					
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Contractor's staffs	6		6	37	3	40	47	10	57	90	13	103
Consultant's Staff	15	4	19	6	2	8	-	-	-	21	6	27

4.15.2.5 Resources (Financial Management)

In the monthly report of September 2023 the Employer's Representative has stated that some of the certified IPCs are not paid to the Contractor as per the time stated in the contract document. Especially, the foreign portion of the respective IPCs not paid for significant period of time. In this regard, to see the effect of delay in payment certification the last 10 Interim Payment Certificates of the project are taken by the researcher and evaluated based on the Contractor's request dates and Employer's certification dates as tabulated below;

Table 4-20: Time Frame of Interim Payment Certificates for Project 1

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date		Delay in Calendar Days Until September 25, 2023	
		A	B	C=A+42 Calendar Days	ETB	USD	ETB	USD
37	September, October & November 2022	30-Nov-22	5-Dec-22	16-Dec-22	03-Jan23	Not Paid	18	283
38	Dec-22	28-Dec-22	3-Jan-23	8-Feb-23	13-Feb-23	Not Paid	5	229
39	Jan-23	31-Jan-23	6-Feb-23	14-Mar-23	04-Apr-23	Not Paid	21	195

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date		Delay in Calendar Days Until September 25, 2023	
40	Feb-23	28-Feb-23		11-Apr-23	27-Apr-23	Not Paid	16	167
41	Mar-23	4-Apr-23	12-Apr-23	16-May-23	22-Jun-23	Not Paid	37	132
42	Apr-23	30-Apr-23	9-May-23	11-Jun-23	21-Jun-23	Not Paid	10	106
43	May-23	30-May-23	7-Jun-23	12-Jun-23	24-Jul-23	Not Paid	42	105
44	May-23	14-Jun-23	22-Jun-23	26-Jul-23	24-Jul-23	Not Paid	0	61
45	Jun-23	5-Jul-23	13-Jul-23	16-Aug-23	22-Sep-23	Not Paid	37	40
46	Jul-23	28-Jul-23	7-Aug-23	8-Sep-23	Not Paid	Not Paid	17	17

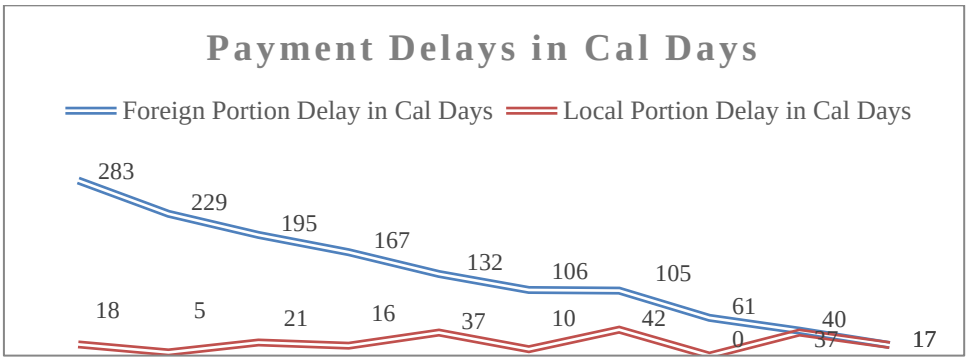


Figure 4-2: Delay of Payment Certification for Project 1

As we can see from the above table and figure the Contractor's Interim Payment Certificates has an average delay of 20.30 calendar days for local portion and 133.50 calendar days for foreign portion with which we can draw a conclusion that Payment Delay is affecting the Contractor's cash flow program.

4.15.2.6 Resources (Construction Materials)

From the indications observed within the accessible project stretch and from the Investigation reports, it is expected that borrow material is abundantly available along the entire project route. Most of the

borrow material in the project route are silt and clay sand soil mixed with gravel. Up to September 2023 the project has identified and approved various sources for constructions of embankment, natural sub-base, base-course, DBST, asphalt concrete and structural works. Potential sources of borrow materials required for the construction of embankment, capping layer, and for bedding and backfill works at the culvert locations have been identified by the Contractor, and sampled jointly, and all borrow samples are subjected to the respective quality tests in the central laboratory. Up to end of this reporting period, the borrow sources below were identified, investigated and conducted at project laboratory and found acceptable as per the project requirement for fill and capping material source. The table below show the project requirement and the test result of each borrow pit for embankment and capping layer.

Table 4-21: The borrow material sources for Embankment in Project 1

It. No	Location	Offset Distance	Visual Description	Classification	Status
1	8+600 LHS	offset 100m	Light Reddish semi gravel sandy soil	A-2-4	Approved
2	17+700 RHS	offset 100m	Light Reddish Silty clay soil	A-1-b	Approved
3	18+820 RHS	offset 170m	Light Reddish Silty clay soil	A-2-6	Approved
4	30+500 RHS	offset 700m	Light Reddish Silty clay soil	A-2-5	Approved
5	33+600 RHS	offset 800m	Light Reddish Silty clay soil	A-2-7	Approved
6	34+800 LHS	offset 800m	Reddish gravel with Silty clay soil	A-2-7	Approved
7	38+800 LHS	offset 600m	Yellowish silty Sandy soil	A-2-7	Approved
8	50+600 LHS	offset 70m	Reddish gravel with Silty clay soil	A-2-7	Approved
9	52+500 LHS	offset 100m	Reddish gravel sandy Silty soil	A-2-7	Approved
10	54+600 LHS	offset 100m	Reddish gravel sandy Silty soil	A-2-7	Approved
11	58+600 LHS	offset 100m	Reddish gravel sandy Silty soil	A-2-6	Approved
12	67+900 RHS	offset 200m	Reddish gravel with sandy silty	A-2-6	Approved

It. No	Location	Offset Distance	Visual Description	Classification	Status
13	71+500 RHS	offset 100m	Reddish gravel with sandy silty	A-2-7	Approved
14	74+400 LHS	offset 200m	Reddish gravel with silty clay	A-2-6	Approved
15	76+600 LHS	offset 100m	Reddish gravelly soil	A-2-4	Approved
16	78+150 RHS	offset 100m	Yellowish silty Sandy soil	A-2-6	Approved
17	78+800 LHS	offset 100m	Dark brown silty clay soil	A-2-6	Approved
18	81+150 RHS	offset 200m	Greyish gravel Silty Sandy soil	A-2-4	Approved
19	81+150 RHS	offset 200m	Greyish gravel Silty Sandy soil	A-2-4	Approved
20	88+400 RHS		Greyish gravel silty Sandy Soil	A-2-6 (0)	Approved
21	88+700 RHS pit	offset 50m	Greyish gravel with Sandy clay soil	A-2-6	Approved
22	93+500 RHS	offset 50m	Reddish Silty Clay Some Gravel	A-2-4	Approved
23	94+100 LHS pit	offset 150m	Reddish gravel with Silty sandy soil	A-2-4	Approved
24	97+700 LHS pit	offset 150m	Light reddish gravel with Sandy soil	A-2-6	Approved

Table 4-22: Summary of Approved Capping Material Sources in Project 1

It. No	Location	Offset Distance	Visual Description	Classification	Status
1	17+700	700m	Light reddish gravel with Sandy soil	A-2-4	Approved
2	34+800 LHS	4KM	Light reddish gravel with Sandy soil	A-2-7	Approved
3	39+800 LHS	800m	reddish laterite gravel	A-2-7	Approved
4	38+800 LHS	800m	Reddish lateritic gravel with sandy soil 0.2-0.7m depth	A-2-4	Approved
5	74+600 RHS	200m	reddish laterite gravel	A-2-4	Approved

Table 4-23: Summary of Approved Sub Base Material Sources in Project 1

It. No	Location	Offset Distance	Visual Description	Status
1	5+100 LHS	100m	Quartzite	Approved
2	8+600 LHS	100m	Whitish gravel silty sand soil	Approved
3	13+400 RHS	100m	Whitish gravel silty sand soil	Approved
4	17+700 RHS	700m	Light reddish gravel with Sandy soil	Approved
5	19+200 RHS	100m	Whitish to reddish grey sandy soil blending of (1:2) Whitish silty sand soil with Reddish sand soil	Approved
6	19+200 RHS	200m	Reddish sand soil	Approved
7	19+200 RHS	200m	Whitish silty sand soil	Approved
8	19+200 RHS	100m	Whitish to reddish sandy soil blending of (1:1) Whitish silty sand soil	Approved
9	19+200 RHS blend with 38+800 LHS		Whitish sandy soil blending of (1:2)	Approved
10	58+600 LHS	100m	Reddish gravel sandy silty clay l soil	Approved
11	71+250 RHS	100m	Reddish gravel sandy silty clay l soil	Indicative
12	74+600 LHS	100m	Reddish gravel sandy silty clay l soil	Indicative

Potential rock quarry source for production base course material has been identified at 21+200 LHS offset 8Km. also the identified quarry source around km 25+600 RHS offset 1kmm can be used for base course material if the source is exceeding the requirement for aggregate production for asphalt and concrete. Moreover, the Contractor has commenced quarry production for base-coarse aggregate at km 24+020 on LHS. The corresponding quality tests has been checking together at project laboratory during Production and after compaction and found satisfactory. In addition, the contractor has mobilized and stockpiled at Km 22 +220 LHS and km 29+500 LHS for the purpose of reducing haul distance to help progress.

Table 4-24: Base Course Source in Project 1

Location	Visual Description
22+200 LHS offset 8km	Crushed stone
25+600 RHS	Crushed stone
24+020 LHS	Crushed stone
58+600 LHS	Blended base course of Crushed stone from 24+000 LHS and 58+600 LHS Natural Gravel Soil (5:2)
74+500 LHS	74+500 Gravel Soil blended with 24+000 5:2 a Ratio (5:2)

In view of the forgoing sources of materials for Embankment, Capping, Sub-base, Base Course, Concrete and Asphalt Aggregate we can say that at this project there is no natural material sources shortage. In addition to this, following the Contractor's request Sub-base material specification has been adjusted to use the materials that exist in the project vicinities and further to this for some part of the roadway Base course material blending with the natural material is under use.

Concerning Cement, Fuel, Explosive and Reinforcement Bar shortage they are a national issue and the impact of which are observed in this project as well. Notably to show some of them the last three month cement and fuel demand and supply is presented in the table at the end of this section for all the projects under the case study.

4.15.2.7 Process Management

In connection with Process Management review of the project documents was undertaken by the researcher and found out that Master Work Program was submitted by the Contractor on December 5, 2017 and it has been commented by Employer's Representative for his final consideration. The Contractor had submitted the final work program on July 4, 2018 and the ERA approved with reservation on July 12, 2018. Annual action plan have been submitted by the Contractor for each fiscal year. The project is Design and Build type of project there is only one change order request which is access road construction towards the Gambella airport whose cost not yet confirmed. The project is still ongoing and 36km sectional handover is carried out and hence project closure related tasks are not undertaken. The Quality Control Manual of the project was submitted on July 2018. To ensure and maintain the quality of the completed construction works as prescribed in the contract specification, the materials strictly subjected to quality control (process control) tests during the production/manufacturing and construction stage in addition to the regular test conducted on the completed works. The frequency of the tests is in line with Standard Technical Specification, 2013 issued by ERA. The procedures for

testing different materials and works shall be in accordance with AASHTO/ASTM or BS standards. The Project Laboratory is the main instrument to perform most of all quality material tests. However, the project may use external laboratories to conduct tests which could not be conducted at project level.

4.15.2.8 Risk Management

Identification of Risk categories, the risk name, description, risk owner, and the impact of the risks are executed for all Gambella Projects Management Office Projects and discussed at the end of this section.

4.15.2.9 Stakeholder Management

For this Project since the establishment of Gambella Projects Management Office in Gambella Region better Stakeholder Management is observed notably close liaison with Regional Government and other stakeholders created and problems are resolving accordingly.

4.15.2.10 Communication

The Language of Communication for the Contract parties is English. Monthly Progress meeting have been holding among the Contract Parties and meeting with other Stakeholders including Regional Government, Ethiopian Electric Utility, Ethiotelecom, and Water Supply Authority is holding as it deems necessary. For this particular project daily activities communication is exchanged via the telegram group created jointly. In connection with the contracting parties communication with regard to the tasks of works and service contract administrations most of the exchanged correspondences that were previously sent to the Regional Construction Projects Management Directorate have been presenting to the Gambella Area Projects Management Office which creates readily communication mechanism for the parties in the contract.

4.15.3 Project 2

Project 2 is situated in the western part of the country in the Gambella National regional State near the Ethio-Sudan border. The work Contract agreement was signed on 13rd of December 2018 between Ethiopian Roads Administration (the Client) and the Contractor and notice to commence for works contract was issued to be on May 02, 2019. The project beginning location is at the out skirt of Lare town on the way to Jikawo gravel road segment and ends at Ninighang town, which is the administration town for both JikawoWoreda and Nuer zone. The project has an existing gravel road segment from km 0+000 till about 17+100 km and literally, there is no existing road on remaining section from km 17 to 34.405 km.

4.15.3.1 Documentation

Through Review of the Document retrieval System that this project adopts is organized like: Design Documents, Contract Document, Correspondences, Quality Assurance and Control Manual, Design Review Document, Environmental, Social, Health and Safety Related Documents, Monthly Reports,

Minuit of Meetings, Works Programs, Payment Certificates, Bonds and Guarantee, Variation Orders, Claims and Disputes and Closeout Documents. Both hard copy and softcopy files are retrieved properly. This method of document handling assists the newly replaced Consultant's staffs to access the data easily.

4.15.3.2 Claim and Dispute Management

The details of the time extension claim by the contractor, ER determination, Employer's decision and response to the contractor stipulated in the table below;

Table 4-25: Extension of Time Claim for Project 2

EOT No	Contractor			Engineer Determination		Employer Approval		Info to Contractor
	Request Date	Reasons	Days	Date	Days	Date	Days granted	
1	November 18, 2023	Additional time required for the works under VO No. 01, Delay in the removal of RoW of Obstruction, , Delay due to shortage of cement in the market, Delay due to COVID-19 and Delay in effecting payments	1,295	February 22, 2023	708	October 10, 2023	469	October 12, 2023

The Construction works of the project in caption commenced on May 02, 2019; the original completion period is 1460 Calendar Days which makes the original completion time to be May 01, 2023. In this regard, the Contractor has requested 1,295 Calendar Days of Extension of time and subsequently, the Engineer has determined 708 Calendar Days of Extension of time and the Employer approves the 469 Calendar Days of Extension of time. Accordingly, the revised completion time is August 12, 2024.

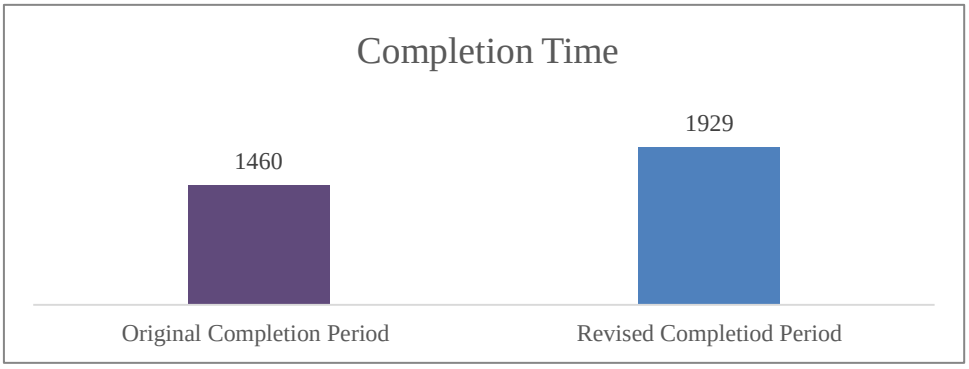


Figure 4-3: Original and Revised Contract Periods for Project 2

4.15.3.3 Resources (Equipment)

Status of major equipment mobilization to the site compared to the planned for the month of September 2023 described as follows;

Table 4-26: Equipment Mobilization for Project 2

Sr. No.	Equipment	Planned (No.)	Actual (No.)	Difference	Remark
1	Dozer	1	2	-1	
2	Grader	3	4	-1	1 broken down
3	Excavator	5	5	0	2 broken down
4	Excavator with Jack hammer	1	1	0	
5	Loader	2	2	0	
6	Steel drum Roller	3	2	1	
7	Dump Truck	23	14	9	3 broken down
8	Quarry Truck	1	0	1	
9	Water Truck	3	2	1	Critical
10	Fuel Truck	2	1	1	
11	Wagon driller with compressor	1	1	0	
12	Crusher Plant	1	1	0	
13	Concrete batching Plant	1	1	0	
14	Asphalt Plant	1	1	0	
15	Blasting Machine	1	1	0	
16	Bar bending & Cutting machine	2	2	0	
17	Carrier Truck	1	0	1	
18	Truck Mixer	2	2	0	
19	Concrete Mixer,500lits	2	1	1	
20	Concrete Vibrator	10	10	0	
21	Plate Compactor	1	0	1	
22	Mini Roller	4	1	3	
23	Low bed Trailer	1	1	0	
24	Punching Pile Driven	4	4	0	

Sr. No.	Equipment	Planned (No.)	Actual (No.)	Difference	Remark
	Machine				
25	Generator	7	9	-2	
26	Crane	1	1	0	
27	Crawler Crane	1	1	0	
28	Impact Hammer Roller	1	1	0	
29	Tamping Roller	0	1	-1	
30	Asphalt paver	1	1	0	
31	Double steel drum roller	2	1	1	
32	Pneumatic tyre roller	2	1	1	
33	Asphalt distributor truck	1	1	0	

As shown on the above table there is backlogs and breakdown of critical construction equipment like Grader, Excavator, Dump truck and Water truck which needs attention.

4.15.3.4 Resources (Manpower)

The contractor is administering 24 Expatriate staffs and 128 Local staffs in the month of September 2023. The Contractor and Engineer have mobilized the following manpower during the month of September 2023;

Table 4-27: Employments Opportunity by Contractor for Project 2

Employment by Skill	**T**	**Employment & Gender Based**						**Grand Total (Permanent + Temporary)**			**Youth & Above Gender Based Beneficiaries Report**					
		Permanent			**Temporary**						**Age ≤ 29**			**Age ≥ 30**		
		F	**M**	**T**	**F**	**M**	**T**	**F**	**M**	**T**	**F**	**M**	**T**	**F**	**M**	**T**
Skilled	52	5	40	45	1	6	7	6	46	52	5	26	31	1	20	21
Semi-Skilled	27	0	0	0	12	15	27	12	15	27	5	5	10	7	10	17
Unskilled	49	0	0	0	2	47	49	2	47	49	2	39	41	0	8	8
Total	128	5	40	45	15	68	83	20	108	128	12	70	82	8	38	46

Table 4-28: Employments Opportunity by Consultant for Project 2

Employment by Skill	T	Employment & Gender Based						Grand Total (Permanent + Intermittent)			Youth & Above Gender Based Beneficiaries Report					
		Permanent			Intermittent						Age ≤ 29			Age ≥ 30		
		F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
Skilled	26	1	19	20	2	4	6	3	23	26	1	9	10	2	14	16
Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unskilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	26	1	19	20	2	4	6	3	23	26	1	9	10	2	14	16

4.15.3.5 Resources (Financial Management)

In the monthly report of September 2023 the Consultant has stated that the contractor has a serious cash flow problem to supply important construction material like fuel, cement and reinforcement, because of the outstanding certified interim payments and the he suggest for effecting the certified interim payments within the time Specified in the Contract. To see the effect of delay in payment certifications on the project the researcher has taken the last ten IPCs of the project as tabulated below;

Table 4-29: Time Frame of Interim Payment Certificates for Project 2

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date		Delay in Calendar Days Until September 25, 2023	
		A	B	C=A+21 Calendar Days	ETB	USD	ETB	USD
22	Dec-22	2-Jan-23	12-Jan-23	23-Jan-23	21-Feb-23	Not Paid	29	245
23	Jan-23	18-Feb-23	3-Mar-23	11-Mar-23	5-Apr-23	Not Paid	25	198
24	Feb-23	9-Mar-23	11-Mar-23	30-Mar-23	5-Apr-23	Not Paid	6	179
25	Mar-23	6-Apr-23	12-Apr-23	27-Apr-23	19-May-23	Not Paid	22	151

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date		Delay in Calendar Days Until September 25, 2023	
26	Apr-23	8-May-23	16-May-23	29-May-23	31-Jul-23	Not Paid	63	119
27	May-23	6-Jun-23	16-Jun-23	27-Jun-23	27-Sep-23	Not Paid	92	90
28	Jun-23	5-Jul-23	25-Jun-23	26-Jul-23	16-Oct-23	Not Paid	82	61
29	Jul-23	9-Aug-23	25-Aug-23	30-Aug-23	16-Oct-23	Not Paid	47	26
30	Aug-23	3-Sep-23	14-Sep-23	24-Sep-23		Not Paid	1	1
31	Sep-23	2-Oct-23	12-Oct-23	23-Oct-23		Not Paid	0	0

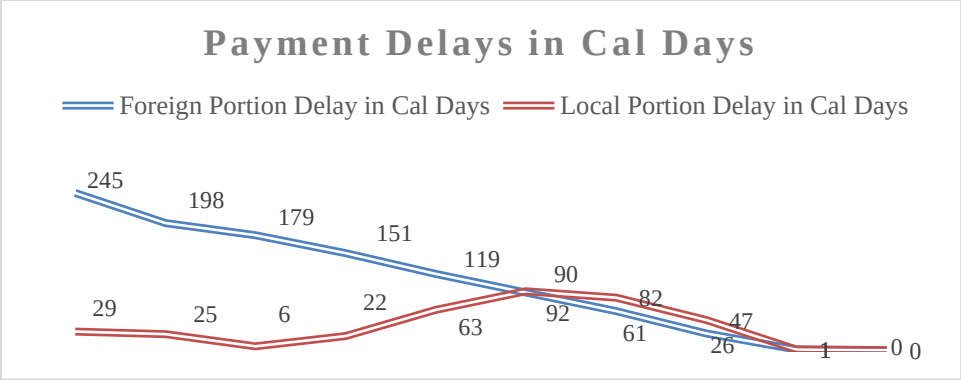


Figure 4-4: Delay of Payment Certification for Project 2

From the above table and figure the Contractor's Interim Payment Certificates has an average delay of 36.70 calendar days for local portion and 107.00 calendar days for foreign portion with which we can draw a conclusion that Payment Delay is affecting the Contractor's cash flow program and in addition to this the Employer is paying interest on late payment.

4.15.3.6 Resources (Construction Materials)

There are only two (2) nearest borrow-pits lie outside the project corridor i.e. 2km from 0+000 on the way to Gambella and 4.6km from 0+000 on the way to Sudan boarder. Majority of qualified material has been extracted from these used borrow-pits, the estimated to be re-excavated quantity is only around 60,000 m3 which is 13.5% of the total required quantities of 445,563 m3. Obviously, the remaining 86.5 % of qualified material supposed to acquire from the following 4 borrow-pits with long hauling distance; 29km from 0+000 on the way to Gambella, 36km from 0+000 on the way to Terfam, 38km form 0+000 on the way to Itang and 43km from 0+000 0n the way to Gambella. According to Consultant's and Contractor's joint investigation, about 89% filled material of the existing road are disqualified (Soaked CBR＜5%, besides, from K5+320 ~ K15+820 are swampy stretches which supposed to be all removed exclusive of the top layer of natural gravel material. This treatment increased quantity of cut to spoil, reduced quantities of cut to fill, and again largely increased the quantity of borrow material. There is lack of qualified material sources within the project alignment from 0+000 ~ 18+680; so, for long hauling distance, it needs to pass through several villages with lot of interruptions, it is difficult to ensure the traffic safety and unexpected hauling efficiency, massive and long-distance hauling will cause serious damage to the existing public road; construction period is doomed to be increased and difficult to control; the embankment works cost will be.

In relation to the subject matter, the Contractor submitted a variation proposal through a letter for the Engineer's review and approval of using Geocomposite Material (made of Geononwoven and Geomembrane) to treating the abundantly available expansive clay soil for use in the road embankment construction from Km1+360-Km34+040. The water proof membrane proposed by the Contractor is noted to be Geotextile-Geomembrane composite with the Geotextile laminated on both sides of Geomembrane for a number of purposes. The Geotextiles provide increased resistance to puncture, tear propagation and tensile strength. The Geotextiles are of the nonwoven; needle punched variety and is of relatively heavy weight. The Geomembrane type is linear low density polyethylene (LLDPE) sandwiched between Geotextiles. The composites specific name is termed as; "Thin-Film Geotextile Composites." The chronic shortage of suitable borrow embankment construction material within a reasonable reach of the project vicinity coupled with the swelling and shrinkage nature of the available material as the moisture fluctuates have been identified as a triggering factor to come up with this proposal. In this regard, the Contractor stated that the Geocomposite Material is intended to function as a sealing membrane that would enable to maintain uniform moisture condition within the road embankment so that he could use the easily available material for embankment construction i.e. the moisture within the road embankment could be kept constant by wrapping up the embankment with Geocomposite Material to controlling the seasonal moisture fluctuations which in turn enables to utilize the locally available material with swell and shrinkage potentials.

Moreover, the Contractor has also performed embankment stability analysis by employing “Rock Science Slide 2D Software” and verified the stability analysis results by using “Geo Studio V6.0 Software”. Based on the stability analysis results, the Contractor concludes that highly sensitive locally available clay soil can be used for embankment construction when treated with a sealant Geocomposite Material. The Contractor further asserts that utilizing Geocomposite treated locally available clay soil for embankment construction contributes to environmental, engineering and economic benefits. Likewise, the Engineer confirmed the absence of suitable borrow material for embankment construction within reasonable reach that satisfies both the Contract Specification and project demand. After reviewing the Contractor’s proposal, the Engineer has seconded the Contractor’s Proposal to use Geocomposite Treated Locally Available Clay Soil for Embankment Construction and assures the Employer that the Contractor’s proposal is technically acceptable. Apart from the technical feasibility of the Contractor’s proposal, the Engineer further reaffirms that it has a cost saving advantage (to be determined by the Engineer) and found it to be a win-win solution to both contracting parties (Employer and Contractor) without compromising the quality of the road. Accordingly, the Engineer has solicited the Employer’s specific approval on the Contractor’s Proposal to use Geocomposite Treated Locally Available Clay Soil for Embankment Construction.

In view of the forgoing, the Employer has approved, in principle, on the Engineer’s recommendation to the design and construction aspects of the Contractor’s proposal for section of the road from km Km1+360 - Km34+040, provided that the Engineer requests and receives in writing from the Contractor the following matters:

1. The Contractor’ s proposal for any necessary modifications to the programme according to Sub - Clause 14.1 (Programme) and to the Time for Completion;
2. The Contractor’ s proposal for evaluation of the Variation;
3. an undertaking letter to warrant the road section from km Km1+360-Km34+040 for any performance problem that might arise directly or indirectly associated with the design, material and workmanship of the embankment.

Figure 4-5: Embankment Construction using Geo-membrane in Project 2

Upgrading of the alignment of this project generally follows the existing route and considerable stretch of the road is covered with poor road bed material, thus huge quantity of quality material is needed for replacement of this weak sub grade along the route. For this purpose, a number of borrow sites have been investigated by the consultant's material team in the vicinity of the project & it has been confirmed that borrow sources for embankment construction and replacements of weak sub-grade are rare along the route. But, the contractor found one source that can meet the requirement at 22km from 0+000 on the way to South Sudan border, this borrow source has been used for the embankment construction as the only suitable borrow material source for the project. According to the approved new proposals, it is known that Geo-composite membrane will be inserted to prevent the ingression of water to the embankment and also to solve the shortage of borrow material, the Client and Consultant agreed to use the locally available material for the embankment construction.

Table 4-30: Source of Borrow Materials for embankment fill Works in Project 2

Station (Km)	Material Description	Estimated Quantity(m3)	Access	Status
22km from 0+000 on the way to South Sudan border	Laterite(suitable fill material)	~ 763,060.50	Ok	Active, in-use

Station (Km)	Material Description	Estimated Quantity(m3)	Access	Status
Km 17+100 offset 100m RHS	Black cotton clay soil	~ 155,168.28	Ok	Active, in-use
Km 17+440 offset 205m LHS	Black cotton clay soil	~ 284,904.317	Ok	Active, in-use
Km 21+520 offset 400m RHS	Black cotton clay soil	~ 250,631.25	Ok	Active, in-use
Km 26+120 offset 750m (RHS)	Black cotton clay soil	~ 198,726.00	Ok	Active, in-use
Km 29+675 offset 195m (RHS)	Black cotton clay soil	~ 103,415.74	Ok	Active, in-use
Km 19+100 offset 234m (RHS)	Black cotton clay soil	~ 165,654.17	Ok	Active, in-use

NB: Black cotton soil is used as embankment materials because of the aforementioned approved proposal of the Contractor to use Geocomposite material.

The project area completely lies in flat terrain which is mainly Lacustrine and Alluvial deposits. The rock quarry sources for the project are completely dependent on volcanic plugs of trachyte and basalt located as far as 29-46km on the way to Gambella. One quarry source at 29km was identified during the design period and sample was taken for confirmation by the supervision consultant and is found to be suitable for base course, crushed sub base, concrete aggregate, rock source for masonry works and Rock fill. As a result, land acquisition was given to the Contractor and it has been the only source of rock quarry source for the project. In addition, further testing on the less weathered part will be made, during the production time to check its suitability for concrete and asphalt aggregates.

Table 4-31: Source of Rock for Crushing, Masonry and Rock fill Works in Project 2

Station (Km)	Material Description	Estimated Quantity(m3)	Over burden Material	Access
29+200km from 0+000 on the way to Gambella, LHS offset 100m	Weathered brown Basalt.	>15,000	Brown, Silty GRAVEL and some trees	Ok

Figure 4-6: The only Rock Quarry Source at station 29+200 km from 0+000 on the way to Gambella for Project 2

4.15.3.7 Process Management

The final version of Master Work Program was submitted under the Contractor's letter dated on April 19, 2020 after reviewing, the Engineer accepted the work program and forwarded to the Employer to grasp his views, review and comment which shall be accommodated. Eventually, the Master work schedule has been approved on May 13, 2020 by the Engineer. Nevertheless, since the slippages as compared to the consented program had become significant, the Engineer instructed the Contractor to revise the Master Work Program dated on September 24, 2020. Accordingly, the Contractor has submitted the Revised Master Work Program (1st Revision) on June 15, 2021, then it have been reviewed and accepted by the Engineer on August 04, 2021. In addition to this, annual action plan have been submitted by the Contractor for each fiscal year. The project is Design Bid Build type of project there is only one change order request which is span length increment of Baro River Bridge from 200m to 260m and construction of Dyke which results a variation of ETB: 24,209,464.53. In this regard, the Engineer has submitted his Variation Order No.1 proposal to the Employer on August 28, 2020 and the revised submission of the Variation Order No.1 was submitted on October 15, 2020 and the Employer gave his Approval on March 03, 2021. The project is still ongoing and hence project closure related tasks are not undertaken. The Contractor has calibrated and submitted the calibration certificates for all Engineer's laboratory equipment & Contractor's plants from National metrology institute of Ethiopia industrial metrology directorate dated March 14, 2023.The Quality Control Manual of the project was submitted

on July 2018. To ensure and maintain the quality of the completed construction works as prescribed in the contract specification, the materials strictly subjected to quality control (process control) tests during the production/manufacturing and construction stage in addition to the regular test conducted on the completed works.

4.15.3.8 Stakeholder Management

On the third quarter of 2015 EFY delegates come from Ministry of Urban and Construction and hold discussion with Gambella Area Construction Projects Management Office, Regional Government Representatives, Ethiotelecom, EEPCo, Regional and Water Supply Authorities regarding the way forwards to solve Right of Way Obstruction timely removal. Accordingly, each of the stakeholders takes their responsibilities and tangible improvement in Right of Way obstructions timely removal is observed.

4.15.3.9 Communication

Daily activities communication is exchanged via the telegram group created jointly. The contracting parties' communication with regard to the tasks of works and service contract administrations most of the exchanged correspondences that were previously sent to the Regional Construction Projects Management Directorate have been presenting to the Gambella Area Projects Management Office pursuant to the new structure that ERA has implemented.

4.15.4 Project 3

The works Contract was signed between the Employer and the Contractor on February 20, 2020 and then the Works Commenced on July 10, 2020. On the other hand the agreements for the Consultancy Services Contract was signed between the Employer and the Employer's Representative on the May 18, 2020, and the services commenced on July 07, 2020. The Project is located in the western part of the country and lies entirely in the Gambela Regional State of the federal Democratic Republic of Ethiopia, particularly in Agniwah Zone.

4.15.4.1 Documentation

As to the other projects Review of the Document retrieval System has been undertaken and the project's filing system is organized like: Design Documents, Contract Document, Correspondences, Quality Assurance and Control Manual, Design Review Document, Environmental, Social, Health and Safety Related Documents, Monthly Reports, Minuit of Meetings, Works Programs, Payment Certificates, Bonds and Guarantee, Variation Orders, Claims and Disputes and Closeout Documents. Both hard copy and softcopy files are retrieved properly which creates an easy access of the documents despite the Resident Engineer or other key staffs are changed.

4.15.4.2 Claim and Dispute Management

The details of the time extension claim by the contractor, ER determination, Employer's decision and

response to the contractor stipulated in the table below;

Table 4-32: Extension of Time Claim for Project 3

EOT No	Contractor			Engineer Determination		Employer Approval		Info to Contractor
	Request Date	Reasons	Days	Date	Days	Date	Days granted	
1	December 13, 2022	Delays Due To Outbreak of Covid-19, Shortage of Cement, Late Removal of Row Obstructions, Late Issuance Of Payments and Security Problem	307	March 20, 2023	133	August 24, 2023	128	August 31, 2023

The Construction works of the project in caption commenced on July 10, 2020; the original completion period is 1095 Calendar Days which makes the original completion time to be July 10, 2023. In this regard, the Contractor has requested 1,295 Calendar Days of Extension of time and subsequently, the Engineer has determined 133 Calendar Days of Extension of time and the Employer approves the 128 Calendar Days of Extension of time. Accordingly, the revised completion time is November 15, 2023.

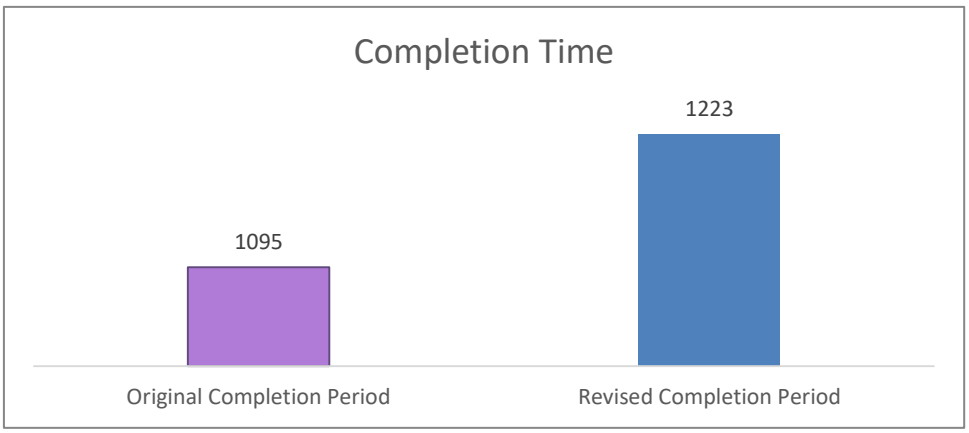


Figure 4-7: Original and Revised Contract Periods for Project 3

4.15.4.3 Resources (Equipment)

Status of major equipment mobilization to the site compared to the planned for the month of September 2023 described as follows;

Table 4-33: Equipment Mobilization for Project 3

Sr. No.	Equipment	Planned (No.)	Actual (No.)	Difference	Remark
1	Bulldozer	1	1	0	
2	Excavator	3	3	0	
3	Grader	1	2	-1	
4	Wheel Loader	3	3	0	
5	Crusher (200 ton/hr))	1	1	0	
6	Dump Truck	11	7	4	
7	Water Truck	2	1	1	1 broken down
8	Vibratory Compacting Roller	4	2	2	
9	Bitumen Distributor/Sprayer	1	1	0	
10	Double drum roller	2	2	0	
11	Pneumatic Roller	2	1	1	
12	Paver	2	1	1	1 broken down
13	Power broom /Sweep Machine	1	1	0	
14	Asphalt Plant (ACP)	1	1	0	
15	Low bed Truck	1	1	0	

As shown on the above table there is breakdown of Water Truck and Paver and backlog of equipment like Dump truck, Water truck and Pneumatic Roller.

4.15.4.4 Resources (Manpower)

The Engineer and the Contractor have mobilized the following manpower during the month of September 2023;

Table 4-34: Manpower for Project 3

Description	Employment by skill level	Grand Total (Permanent + contract)			Employment and Gender Report						Beneficiaries					
					Permanent			Contract			Age <=29 Yrs			Age > =30 Yrs		
		F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
Contractor	Skilled	0	176	**176**	0	14	**14**	0	162	**162**	0	47	**47**	0	122	**122**
	Semi-Skilled	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**
	Unskilled	15	62	**77**	0	0	**0**	15	62	**77**	5	15	**20**	10	115	**125**
	Total (A)	15	238	**253**	0	14	**14**	15	224	**239**	5	62	**67**	10	237	**247**
Consultant	Skilled	4	24	**28**	-	-	-	4	24	**28**	4	10	**14**	0	14	**28**
	Semi-Skilled	-	-	-	-	-	-	0	0	**0**	0		**0**	0	0	**0**
	Unskilled	-	-	-	-	-	-	0	0	**0**	0	0	**0**	0	0	**0**
	Total (A)	4	24	**28**	-	-	-	4	24	**28**	4	10	**14**	0	14	**28**

4.15.4.5 Resources (Financial Management)

Currency of Payment of the project is 100% in Ethiopian Birr. During September 2023 monthly report the Employer's Representative has stated that delay in certification of IPCs has effect on the project though currently it is resolved. To see the effect of delay in payment certification the last 10 Interim Payment Certificates of the project are taken by the researcher and evaluated accordingly;

Table 4-35: Time Frame of Interim Payment Certificates for Project 3

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date	Delay in Calendar Days Until September 25, 2023
		A	B	C=A+56 Calendar Days	ETB	ETB
22	Oct-22	4-Nov-22	5-Nov-22	30-Dec-22	22-Dec-23	357
23	Nov-22	5-Dec-22	6-Dec-22	30-Jan-23	10-Jan-23	0
24	Dec-22	1-Jan-23	4-Jan-23	26-Feb-23	10-Feb-23	0
25	Jan-23	1-Feb-23	3-Feb-23	29-Mar-23	03-Jul-23	96
26	Feb-23	1-Mar-23	6-Mar-23	26-Apr-23	30-Jun-23	65
27	Mar-23	1-Apr-23	5-Apr-23	27-May-23	1-Aug-23	66
28	Apr-23	1-May-23	9-May-23	26-Jun-23	1-Aug-23	36
29	May-23	01-Jun-23	10-Jun-23	27-Jul-23	8-Sep-23	43
30	Jun-23	1-Jul-23	5-Jul-23	26-Aug-23	15-Oct-23	50

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date	Delay in Calendar Days Until September 25, 2023
31	Jul-23	1-Aug-23	5-Sep-23	26-Sep-23	Not Paid	0

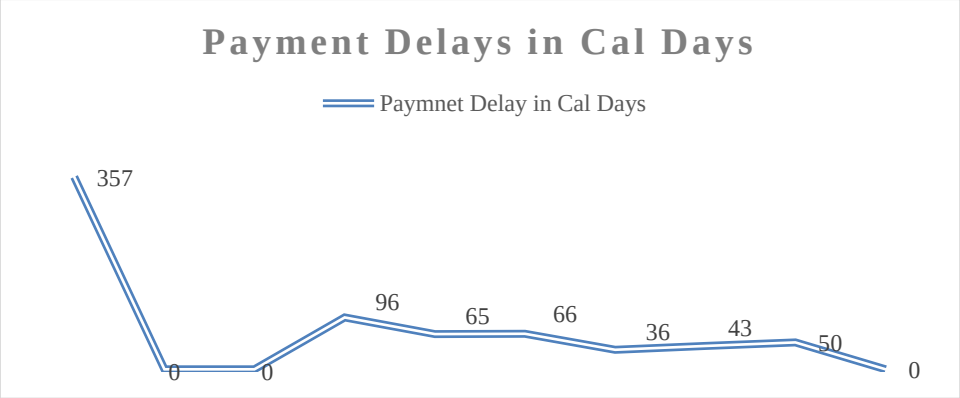


Figure 4-8: Delay of Payment Certification for Project 3

From the above table and figure the average delay of the Contractor's Interim Payment Certificates is 71.30 Calendar Days and this data can complement the above stated Engineer's statement.

4.15.4.6 Resources (Construction Materials)

Concerning Cement, Fuel, Explosive and Reinforcement Bar shortage they are a national issue and the impact of which are observed in this project as well. So far, the contractor has identified three quarries' stone sources one is 30+000 LHS offset 100m which is has been utilized for concrete aggregate, asphalt, base coarse aggregates and crushed sand. Prior to the quarry sites has been requested and possessed, rock sample had been sampled jointly and test has been conducted in Ethiopian Construction Design & Supervision Works Corporation Research, Laboratory &Training Centre and approved the same and the quarry is developed by blasting

Table 4-36: Location of Potential Material Sources for Quarries Stone for Project 3

No.	**Station**	**Estimated Quantity** (m3)	**Proposed Use**
1	30+00 LHS	150,000	Base coarse, asphalt concrete aggregate, cementconcrete aggregate and chipping aggregate etc.
2	35+750 LHS	60,000	Masonry works and Rock fill
3	56+700 LHS	200,000	Rock fill and Masonry works

Constructing of alignment of this project generally follows the existing rout from 0+000 to 30+000 and new alignment from 30+000 to 72+000 considerable stretch of the road is covered with poor material

and the road alignment is rolling thus, a huge quantity of quality material is needed for replacement of the weak sub grade and grade adjustment along the route.

Table 4-37: Location of Potential Material Sources for Fill and Capping Layer for Project 3

No.	Station	Estimated Quantity (m3)	Proposed Use
1	2+500 RHS	80,000	Embankment construction
2	5+500 LHS	60,000	Embankment construction
3	9+500 LHS	50,000	Embankment construction
4	13+300 RHS	68,000	Embankment construction
5	20+900 LHS	80,000	Embankment construction
6	25+800 LHS	450,000	Fill and Capping
8	29+800 LHS	45,000	Fill and Capping
9	33+140 LHS	80,000	Fill and Capping
10	34+800 LHS	60,000	Fill and Capping
11	42+680 RHS	100,000	Fill and Capping
12	44+500 RHS	60,000	Fill and Capping
13	50+500 LHS	70,000	Fill and Capping
14	53+600 LHS	60,000	Fill and Capping
15	42+060 RHS	80,000	Fill and Capping
16	57+500 RHS	90,000	Fill and Capping
17	44+300 RHS	80,000	Fill and Capping
18	50+000 LHS	50,000	Fill and Capping

Table 4-38: Location of Potential Material Sources for Sub base for Project 3

No.	Station	Estimated Quantity(m3)	Proposed Use
1	10+200 LHS	55,000	Sub base
2	14+200 LHS	75,000	Sub base
3	35+750 LHS	750,000	Sub base
4	2+500 RHS	30,000	Sub base
5	25+100 RHS	50,000	Sub base
6	55+800 LHS	60,000	Sub base
7	50+900 LHS	50,000	Sub base
8	68+450 RHS	25,000	Sub base

In view of the foregoing material sources in the project for Embankment, Capping, Sub base and Quarry Sites it is evident that no shortage of natural construction material sources.

4.15.4.7 Process Management

The Contractor has submitted the Draft Master Work Program on August 07, 2020. The Consultant has evaluated the submission and the comments were issued on August 20, 2020 to the Contractor. Thereby the contractor is submitted the revised master work program on December 02, 2020, the Employer's Representative reviewed & approved on March 16, 2021. The Contractor has submitted first revised master work program on 5th of August 2021 and the Employer Representative approved on 21 August

2021. The contractor has submitted second revised master work program on 15th of August 2022, the Employer's Representative reviewed & forward his consent to the second revised master work program on August 15, 2022. Further to this, annual action plan have been submitted by the Contractor for each fiscal year. The project is Design Build type of project there is no change order approved to date. The project is still ongoing and hence project closure related tasks are not undertaken. The Contractor has calibrated and submitted the calibration certificates for all Engineer's laboratory equipment & Contractor's plants from National metrology institute of Ethiopia industrial metrology directorate. The Quality Control Manual of the project was submitted on and under implementation.

4.15.4.8 Stakeholder Management

Similar to the other projects meeting was held on the third quarter of 2015 EFY with delegates that come from Ministry of Urban and Construction, Gambella Area Construction Projects Management Office, Regional Government Representatives, Ethiotelecom, EEPCo, Regional and Water Supply Authorities regarding the way forwards to solve Right of Way Obstructions timely removal. Accordingly, each of the stakeholders takes their responsibilities and tangible improvement in Right of Way obstructions timely removal is observed in this project as well. In this regard, Stakeholder management is practiced in a better way since the establishment of Gambella Area Construction Projects Management Office.

4.15.4.9 Communication

Similar to the other projects daily activities communication is exchanged via the telegram group created jointly. The contracting parties' communication with regard to the tasks of works and service contract administrations most of the exchanged correspondences that were previously sent to the Regional Construction Projects Management Directorate have been presenting to the Gambella Area Construction Projects Management Office pursuant to the new structure that ERA has implemented.

4.15.5 Project 4

The works Contract was signed between the Employer and the Contractor on May 11, 2021 and then the Works Commenced on August 06, 2021. On the other hand the agreements for the Consultancy Services Contract were signed between the Employer and the Consultant on the July 09, 2021, and the services commenced on August 06, 2021. The project road is located in Gambella People's National Regional state of Ethiopia and connects Goge and Jore Woreda of Agnuwak Zone. The Project Road starts from the Goge Woreda (Punyido town) which is located at about 883km from Addis Ababa along the Addis – Jima – Metu – Gore – Gambella – Abobo - Pinyudo. The length from Punyido to Gambella Town is 103km. The Works under this particular contract consist of construction of Asphalt Concrete road with estimated length of 36km and ends around Jore (Ongogi Town).

4.15.5.1 Documentation

Similar to the other projects Review of the Document retrieval System has been undertaken and the

project's filing system is organized like: Design Documents, Contract Document, Correspondences, Quality Assurance and Control Manual, Design Review Document, Environmental, Social, Health and Safety Related Documents, Monthly Reports, Minuit of Meetings, Works Programs, Payment Certificates, Bonds and Guarantee, Variation Orders, Claims and Disputes and Closeout Documents. Both hard copy and softcopy files are retrieved properly which creates an easy access of the documents despite Resident Engineer or other key staffs are changed.

4.15.5.2 Claim and Dispute Management

No Claim submitted by the Contractor, so far.

4.15.5.3 Resources (Equipment)

The status of equipment mobilization for the month of September 2023 is stated in the table below;

Table 4-39: Equipment Mobilization for Project 4

Sr. No.	Equipment	Planned (No.)	Actual (No.)	Difference	Remark
1	Dozer	3	1	2	3 is broken-down
2	Crusher	2	1	1	
3	Grader	3	3	0	
4	Loader	3	4	-1	
5	Excavator	5	4	1	2 are broken-down
6	Roller Tandem	5	5	0	1 is broken-down
7	Steel Asphalt Roller	-	-	-	
8	Pneumatic Roller	-	-	-	
9	Dump Truck	19	23	-4	
10	Water Truck	4	4	0	1 is broken-down
11	Low-bed Truck	1	1	0	
12	Cargo Truck	2	0	2	
13	Fuel Truck	1	1	0	
14	Mixer (350 lit)	2	0	2	
15	Mixer (750 lit)	3	2	1	
16	Plate Compactor	2	1	1	
17	Walk-behind rolled	1	1	0	
18	Concrete vibrator	4	3	1	
19	Water Pump	16	22	-6	
20	Small Vehicles (Including Engineer)	2	2	0	
21	Power generator (50-60KVA)	10	10	0	
22	Pipe Molds (Ø48)	1	1	0	
23	Mechanical tools	1	1	0	
24	Air Compressor	1	1	0	
25	Welding Machine with accessories	1	1	0	
26	Fuel Dispenser	3	3	0	
27	Fuel Tanker (50,000 Lit capacity)	16	22	-6	

As shown on the above table equipment like Dozer, Excavator, Roller and Water Truck are breakdown

and there is backlog in some equipment.

4.15.5.4 Resources (Manpower)

The Engineer and the Consultant and Contractor have mobilized the following manpower during the month of September 2023;

Table 4-40: Employments Opportunities by Consultant and Contractor for Project 4

Description	**Employment by skill**	**Total number of Employee based on Gender**			**Employment based on Gender**						**Youth and Above Gender based Beneficiaries**					
					Permanent			**Contract**			**Age ≤ 29**			**Age ≥ 30**		
		F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
Consultant	Skilled	5	2	3	5	2	3	0	0	0	4	1	1	1	1	1
	Semi-skilled	7	5	1	0	0	0	7	5	1	7	5	1	0	0	0
	Unskilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**12**	**31**	**43**	**5**	**26**	**31**	**7**	**5**	**12**	**11**	**20**	**31**	**1**	**11**	**12**
Contractor	Skilled	4	39	43	4	39	43	0	0	0	3	14	17	1	25	26
	Semi-skilled	1	28	29	1	28	29	0	0	0	1	19	20		9	9
	Unskilled	30	101	131				30	101	131	20	51	71	10	50	60
	Total	**3**	**167**	**203**	**5**	**67**	**72**	**3**	**101**	**131**	**2**	**74**	**98**	**1**	**84**	**95**

4.15.5.5 Resources (Financial Management)

Currency of Payment of the project is 100% in Ethiopian Birr. In the reporting month of September 2023 Consultant has not raised Interim Payment delay as problem in the project despite this the researcher has taken the last 10 Interim Payment Certificates of the project and evaluated accordingly;

Table 4-41: Time Frame of Interim Payment Certificates for Project 4

IPC No.	**Month**	**Contractor Request Date**	**Consultant Certification Date**	**Interest Applicable Date**	**Employer Certification Date**	**Delay in Calendar Days Until September 25, 2023**
		A	B	C=A+56 Calendar Days	ETB	ETB
08	Nov-22	3-Dec-22	7-Dec-22	28-Jan-23	3-Jan-23	0
09	Dec-	1-Jan-23	5-Jan-23	26-Feb-23	9-Feb-23	0

IPC No.	Month	Contractor Request Date	Consultant Certification Date	Interest Applicable Date	Employer Certification Date	Delay in Calendar Days Until September 25, 2023
	22					
10	Jan-23	7-Feb-23	9-Feb-23	4-Apr-23	13-May-23	39
11	Feb-23	6-Mar-23	9-Mar-23	1-May-23	13-May-23	12
12	Mar-23	5-Apr-23	6-Apr-23	31-May-23	20-Jun-23	20
13	Apr-23	8-May-23	12-May-23	3-Jul-23	21-Jul-23	18
14	May-23	6-Jun-23	9-Jun-23	1-Aug-23	31-Jul-23	0
15	Jun-23	2-Jul-23	4-Jul-23	27-Aug-23	7-Sep-23	11
16	Jul-23	4-Aug-23	17-Aug-23	29-Sep-23	6-Oct-23	7
17	Aug-23	2-Sep-23	6-Sep-23	28-Oct-23	6-Oct-23	0

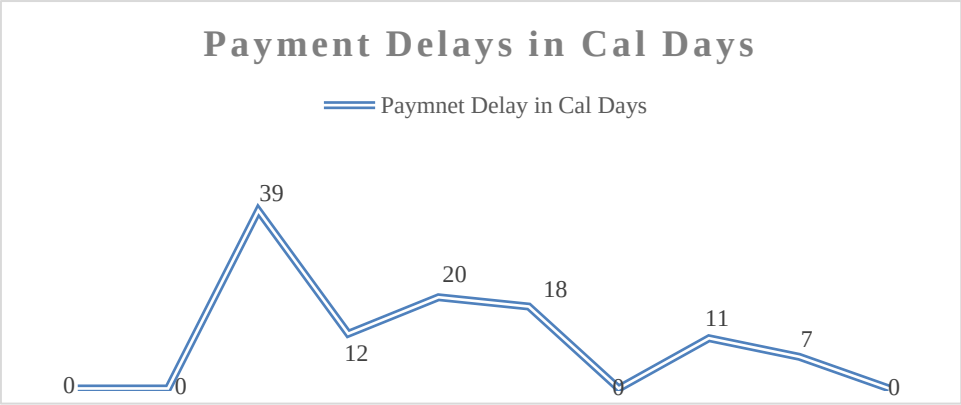


Figure 4-9: Delay of Payment Certification for Project 4

Compared to the above three projects the project in caption has minimal payment delay which is 10.70 Calendar Days.

4.15.5.6 Resources (Construction Materials)

Most of the road alignment stretch is covered by black cotton soil which is unsuitable for subgrade construction. As the project road is underlain in expansive problematic stretch, replacement material for the undercut as well as for embankment fill is highly required. Thus, under consideration of the characteristics of the project road, visual observations and borrow source investigation have been carried out. Some of the borrow sources can satisfy the specification requirement for embankment fill.

Table 4-42: Potential Sources of Embankment/Fill Material for Project 4

I. No.	Borrow Pit Location	Possession Status	Production Status	Remarks
1	0+000 RHS (offset 2.5km)	completed	Opened	
2	4+000 RHS (offset 480m)	completed	Opened	
3	7+000 RHS (offset 920m)	completed	Opened	
4	11+000 RHS (offset 1.8km)	completed	Opened	
5	16+400 RHS (offset 2.2km)	completed	Opened	
6	20+700 (offset 2.4km, RHS)	completed	Opened	
7	21+240 (offset 100, RHS)	completed	Opened	
8	24+000 RHS (offset 200m)	completed	Opened	
9	30+000 RHS	Not requested	Not opened	

The contractor has continued base course aggregate production from quarry source at Km 0+000, 16km offset (8km, offset 8km RHS along Project 3).

The Contractor identified one natural sub base source at 2.8km towards Project 4 and the source has been investigated and quality test has been conducted at central laboratory.

Table 4-43: Natural Sub-base Material Source for Project 4

I. No.	Location	Test Result	Possession Status	Production Status	Remarks
1	Km 0+000 offset 2.8km RHS along Gambella – Abobo - Pugnido road	Satisfy	completed	Opened	Retesting should be conducted for verification

In view of the foregoing natural materials sources for Embankment, Sub-base and Quarry Site we can say that material sources are optimal.

4.15.5.7 Process Management

Master work programme submitted by the Contractor and the Engineer comment the same on January 21, 2022. The Contractor submitted revised master work programme on February 21, 2022 and the Engineer comment on the same on February 28, 2022. The Contractor has also submitted action plan for this EFY; and thus, this action plan is used for progress evaluation and follow-up until a revised work

programme is submitted. The project is Design Bid Build type of project there is no change order or variation order given to the Contractor. The project is still ongoing and hence project closure related tasks are not undertaken. Construction of laboratory building has been completed. The Contractor installed the permanent laboratory equipment. The permanent laboratory continued providing services.

The Contractor has calibrated and submitted the calibration certificates for all Engineer's laboratory equipment & Contractor's plants. The Consultant is expected to submit his own Quality Assurance Manual by describing the methodology and procedures to be followed in attaining the desired quality of the service at each stage. Accordingly, the Consultant prepared and submitted Final Consultant's Quality Assurance manual.

4.15.5.8 Stakeholder Management

For this project meeting held in between Gambella Area Construction Projects Management Office, and Regional Government Representatives, Ethiotelecom, Regional and Water Supply Authorities regarding the way forwards to solve Right of Way Obstruction timely removal. Accordingly, each of the stakeholders takes their responsibilities and tangible improvement in Right of Way obstruction timely removal observed in this project as well. In this regard, Stakeholder management is practiced in better way since the establishment of Gambella Area Construction Projects Management Office.

4.15.5.9 Communication

As to the other projects daily activities communication is exchanged via the telegram group created jointly. Not only for this particular project but also for all ERA Road construction projects; Project Management Offices (PMO) established near to the projects vicinity for readily communication with the Contract Parties and other stakeholders. Based on this, Gambella Area Projects Management Office established in Gambella town since July 2022 and majority of the concerned parties' communication with Client is presenting to this office. The Language of Communication for the Contract parties is English. Monthly Progress meeting have been holding among the Contract Parties and meeting with other Stakeholders including Regional Government, Ethiopian Electric Utility, Ethiotelecom, and Water Supply Authority is holding as it deems necessary.

4.15.6 Cement and Fuel Demand and Supply in July – September 2023 of GPMO Road Projects

Table 4-44: Fuel Demand and Supply in July – September 2023 for All GPMO Road Projects

No	Project Name	Unit	First Quarter of 2016 EFY		
			Planned (A)	Actual Delivered to Site (B)	Difference (C=A-B)
1	Project 1	Liter	*750,000.00*	*80,000.00*	670,000.00
		Fuel Truck (No)	17.00	2.00	15.00
2	Project 2	Liter	540,000.00	100,000.00	440,000.00
		Fuel Truck (No)	12.00	2.00	10.00
3	Project 3	Liter	400,000.00	95,000.00	305,000.00
		Fuel Truck (No)	9.00	2.00	7.00

No	Project Name	Unit	First Quarter of 2016 EFY		
			Planned (A)	Actual Delivered to Site (B)	Difference (C=A-B)
4	Project 4	Liter	*336,000.00*	*231,812.67*	104,187.33
		Fuel Truck (No)	7.00	5.00	2.00
TOTAL		**Liter**	**2,026,000.00**	**506,812.67**	**1,519,187.33**
		Fuel Truck (No)	**45.00**	**11.00**	**34.00**
Percentage Supply (B/A)*100		**25.02**			

Table 4-45: Cement Demand and Supply in July – September 2023 for All GPMO Road Projects

No	Project Name	Ton	First Quarter of 2016 EFY		
			Planned (A)	Actual Delivered to Site (B)	Difference (C=A-B)
1	Project 1	OPC	19.2	0	19.2
		PPC	28.8	20	8.8
2	Project 2	OPC	347.26	320	27.26
		PPC			-
3	Project 3	OPC	347	80	267
		PPC	220	40	180
4	Project 4	OPC			-
		PPC	1332	80	1252
Total		**OPC**	**713.46**	**400.00**	**313.46**
		PPC	**1,580.80**	**140.00**	**1,440.80**
Percentage Supply (B/A)*100		OPC	56.06		
		PPC	8.86		

4.15.7 Risk Management for GPMO Projects

Identification of Risk categories, the risk name, description, risk owner, and the impact of the risks are executed for all Gambella Projects Management Office and presented in the table below.

Table 4-46: Qualitative Risk Identification and Management for GPMO Road Projects

No.	Risk and Opportunity Categories	Risk Name	Description	Owner	Indicators for Evaluation Criteria						
					Tips to consider for determining Likelihood	Area to consider for determining Impact					
						Progress	Time	Cost	Quality	ESOHS	Public grievance
1.	Financial	Contractor's Payment	There is a risk that [*delay in*	ERA	Budget Deficiency	X	X	X			X

No.	Risk and Opportunity Categories	Risk Name	Description	Owner	Indicators for Evaluation Criteria						
					Tips to consider for determining Likelihood	Area to consider for determining Impact					
						Progress	Time	Cost	Quality	ESOHS	Public grievance
		Delay	*Contractor's payment]* due to [*shortage of budget*] resulting in [*late payment and delay in project progress up to suspension*]		between allocated budget and Contractor's financial plan for 2016 EC comparison						
2.	Financial	Cost Increment	There is a risk that [*Cost Increment]* due to [*high market inflation*] resulting in [*shortage of cash flow and delay in progress*]	ERA & Contractor	2015 EC price increment trend and its impact on the project	X	X	X			
3.	Financial	RoW Payment Delay	There is a risk that [*delay in RoW removal]* due to [*shortage of budget*] resulting in [*delay in project progress and public grievance*]	ERA	Budget Deficiency between allocated budget and outstanding RoW payment for 2016 EC comparison	X	X				X
4.	ROW	Poor identification of utility services	There is a risk that [*late identification of utility lines]* due to [*poor investigation and consultation with concerned bodies*] resulting in [*delay in project progress and public grievance*]	ERA, Local and Regional Administrations, Utility bodies	Past RoW obstruction removal trends	X	X				X
5.	Security	Disruption of the Works	There is a risk that [*work will be disrupted]*	ERA	Disruption trend in the past years	X	X	X			

No.	Risk and Opportunity Categories	Risk Name	Description	Owner	Indicators for Evaluation Criteria						
					Tips to consider for determining Likelihood	Area to consider for determining Impact					
						Progress	Time	Cost	Quality	ESOHS	Public grievance
			due to [*security*] resulting in [*delay in project progress*]								
6.	Resource	Shortage of fuel	There is a risk that [*progress will be slowed]* due to [*allocation of insufficient fuel by petroleum and Energy Authority]* resulting in [*delay in project progress up to suspension*]	ERA	Fuel allocation trend for project by PEA	X	X	X			
7.	Resource	Shortage of Construction Cement	There is a risk that [*shortage of cement]* due to [*demand and supply imbalance and lack of business integrity]* resulting in [*delay in project progress*]	ERA & Contractor	The project Cement supply trend in the past years	X					
8.	Resource	Shortage of explosives	There is a risk that [*shortage of explosive material]* due to [*shortage of hard currency and restriction owing to security concern]* resulting in [*delay in project progress*]	Contractor	*explosive material* availability in the project	X					
9.	Resource	Shortage of Borrow and quarry areas	There is a risk that [*shortage of borrow and quarry*	Contractor	Geological formation of the area	X	X	X			

No.	Risk and Opportunity Categories	Risk Name	Description	Owner	Indicators for Evaluation Criteria						
					Tips to consider for determining Likelihood	Area to consider for determining Impact					
						Progress	Time	Cost	Quality	ESOHS	Public grievance
			material] due to [*geological formation of the area]* resulting in [*delay in project progress, increase project cost and time overrun*]								
10.	Resource	Shortage of Bitumen	There is a risk that [*shortage of bitumen]* due to [*shortage in the market, delay in foreign currency payment]* resulting in [*delay in project progress*]	Contractor and ERA	*Bitumen* availability in the project	X					
11.	Resource	Shortage of Equipment	There is a risk that [*shortage of Equipment]* due to [*shortage of Contractor's cashflow, unavailability of rental equipment]* resulting in [*delay in project progress*]	Contractor	*Equipment* availability in the project	X					
12.	Consultant's performance	Design Incompleteness	There is a risk that [*design incompleteness or error]* due to [*poor design]* resulting in [*slow progress up to suspension, late instruction*	Consultant & Employer	The quality of design and design review services rendered by Engineer	X	X	X	X		X

No.	Risk and Opportunity Categories	Risk Name	Description	Owner	Indicators for Evaluation Criteria						
					Tips to consider for determining Likelihood	Area to consider for determining Impact					
						Progress	Time	Cost	Quality	ESOHS	Public grievance
			of VO, time and cost overrun]								
13.	Stakeholder	Unexpected Work	There is a risk that [*there will be Unexpected Work]* due to [*Arise of new stakeholders and/or change of priorities by stakeholders]* resulting in [*unexpected cost implications and also will cause scope changes to the project*]	ERA	Previous experience with project stakeholders on the project	X	X	X			
14.	Health, Safety, Social and Environment	Traffic Management	There is a risk that [*traffic accident might happen and traffic jam]* due to [*detour is not sufficiently available or maintained or traffic sign appropriately provided]* resulting in [*public grievance, disruption of public traffic and noncompliance to ESOHS*]	Contractor, Consultant	Previous experience with project stakeholders on the project					X	X
15.	Health, Safety, Social and Environment	Worker and site safety	There is a risk that [*accident might happen on the workers]* due to [*poor site safety and hazard communication*	Contractor, Consultant	The project's past accident record	X				X	

No.	Risk and Opportunity Categories	Risk Name	Description	Owner	Indicators for Evaluation Criteria						
					Tips to consider for determining Likelihood	Area to consider for determining Impact					
						Progress	Time	Cost	Quality	ESOHS	Public grievance
			] resulting in [*loss of life and damage on properties and as well as delay in the progress of the project*]								
16.	Health, Safety, Social and Environment	Pollution	There is a risk that [*reinstatement problem]* due to [*the Contractor's noncompliance to the reinstatement plan]* resulting in [*loss of life and public grievance*]	Contractor, Consultant	The Contractor's pas experience with regard to reinstatement works						
17.	Contractor's Risk	Contractor's Financial capacity	There is a risk that [*the Contractor will have poor cashflow]* due to [*price inflation and or debt]* resulting in [*slow progress up to suspension/ termination]*	Contractor	The Contractor's past cashflow trend	X	X				
18.	Contractor's Risk	Contractor's Technical capacity	There is a risk that [*lack of qualified staff]* due to [*staff turnover]* resulting in [*poor planning and coordination, poor workmanship]*	Contractor	The Contractor's past cashflow trend	X		X	X		

4.15.8 Main Findings from the Case Study

- Document retrieval system in Gambella PMO projects is standardized which are organized like Design Documents, Contract Document, Correspondences, Quality Assurance and Control

Manual, Design Review Document, Environmental, Social, Health and Safety Related Documents, Monthly Reports, Minuit of Meetings, Works Programs, Payment Certificates, Bonds and Guarantee, Variation Orders, Claims and Disputes and Closeout Documents.

- Except Project 4 which has no Claims submitted so far; in other three projects Claims are mitigated properly.
- Break down Equipment needs maintenance and backlogs shall be filled.
- Manpower mobilization of the GPMO projects is fairly good though the same needs an increased number during the peak construction period.
- Foreign Payment delay is impacting the cash flow program Project 1 Project 2; which is critical especially for importation of locally unavailable construction materials like Bitumen and Explosives.
- Except Project 2 the other three Road Projects have fair amount of sources of Natural Materials for Embankment, Capping, Sub-base and Stone Quarries for various purpose.
- Project 2 has shortage of natural construction material sources and hence, future construction of Road Project in this vicinity needs proper attention with respect to source of Materials.
- In Project 2 due to shortage of suitable embankment material Geocomposite technology is implementing which is good experience for our country and in the future such technologies needs to be incorporated in the Contract Documents where there are shortages of construction Materials.
- Master Work Programme is submitted for all GPMO projects though revision of the same needed.
- All Laboratory Equipment of GPMO projects are calibrated
- Quality Control and Assurance Manual are submitted for all GPMO projects
- Better Stakeholder Management is practiced since the establishment of Gambella Area Projects Management Office
- Better Communication scheme is practiced since the establishment of Gambella Area Projects Management Office
- When we see the Fuel supply in the month of July – September 2023 it is only 25.02% i.e. from the demand of 2,026,000.00 Litters only 506,812.67 Litters Supplied.
- When we see the Cement supply in the month of July – September 2023 it is only 56.06% OPC and 8.86% PPC i.e. from the demand of 713.46 ton OPC and 1,580.80 ton PPC only 400.00 ton OPC and 140.00 ton PPC are supplied.
- As shown in Table 4-46: Qualitative Risk Identification and Management for GPMO Road Projects executed which assists the parties in the contract to identify risks and their impact then to take applicable prevention mechanisms.

CHAPTER FIVE

5 CONCLUSION, RECOMMENDATION AND FUTURE RESEARCH

The main purpose of the study was to identify the Determinant Factors for Contract Administration in Ethiopian Roads Administration Gambella Area Projects Management Office by taking into account specific objective of describing the extent and correlation of determinant factors to contract Administration in Ethiopian Roads Administration. So, based on those objectives the study presents the conclusion and recommendation as follows;

5.1 Conclusion

In view of the foregoing the research's objective to identify determinant factors for contract administration in ERA Gambella Area Projects Management Office are met and those factors are analyzed using Descriptive and Frequency analysis and Inferential Statistics. Further to this semi-structured interview and case study were also undertaken. The relationship of determinant factors with contract administration is concluded as below;

There are specific factors which are inevitable in construction industries. First of all there is documentation and the study shows documentation in ERA projects becoming essential either to retrieve the history of any intended construction projects or to monitor the progress of any projects. The response of the Resident Engineer in Project 2 implied that every file was recorded and documented which was easy for the Engineer to access the progress and files of the project. Resources are also important; in this respect, the contractors' capacity to complete the project should be assessed especially on rental based machines. Additionally, dissatisfying employee or manpower and compromising special factors like quality to compensate under estimated costs during bidding process and assessing the availability of nearby construction material is important. Regarding communication it is important to avoid special interests and set a common goal as well as clearly practicing both official (main parties in the contract should understand the details in the contract document) and unofficial communications as expressed in the master work schedule which is a bottom line for the construction. The other problem in the projects are language barriers like the Chinese contractor do not understand English and they do not fulfill the academic qualification requirements so there is a technical as well as personal communication gap. Generally, in the sites under consideration, language and technical gaps are significant.

Based on their significance and importance it is always important to engage every stakeholders. Stake holders can be the main three parties and the third parties like peoples around the project, different utility organizations and governmental officials. Third parties in the construction are inevitable stakeholders and play great role and their intervention happens in each projects. Most of the time, there intervention results unexpected cost like overrated compensation rate in the case of utilities and personal properties. Additionally, though contractually the contractor is expected to submit request for land acquisition before four months in rural area and six months in urban area; the removal of obstructions can't be completed as

planned which will affect the master work program of the contractor. This result in idle machines, delay then claim; additionally, those stake holders which are not specified in the contract are unaware of the effects of right of way and related problems what to cause on the project and they need periodic communication.

Incase disputes and other security risk issues arise during construction stage; the conditions of contracts has remedial measures for the same. In this connection, when Claims arise and if not mitigated properly; they will upgrade to disputes and subsequently, they might cause suspension and termination of projects. For a project to meet the predefined vital constraints; proper claim and dispute resolving mechanisms shall put in place among the contract parties. In addition, regarding the importance of security or safe working environment; first, for the contract administration to exist there should be safe working environment.

The correlation of the independent variables at significant level of 0.000 contract administration has positive and strong association with risk management (.616), documentation (.651), project closure (.622), claim and dispute management (.769), and project process management (.543) and weak but positive association with communication (.488), resource (.398), and stakeholder management (0.052).

Finally regression analysis on the other hand showed that documentation, project closure, claim and dispute management and project process management have significant effects on Contract Administration with significance value of 0.001, 0.000, 0.000 and 0.006 respectively and, the coefficient significance value of communication (.134), resource (.147) and stake holders (.101) are significant at above 10% significant level and that of Risk Management (0.416) at 41.60% in which the variables have a significant relation with contract administration. The Descriptive and Frequency Analysis, correlation, regression, Interview and case Study shows that the determinant factors for Contract Administration in ERA Gambella Area Construction Projects Management Office are Documentation, Resources (Financial Management, Human Resource & Machineries, and Construction Materials), Claims & Dispute Management, Risk Management, Process Management (Planning, Quality Management, Changes and Change Order Management, and Project Closure), Stakeholder Management, and Communication.

5.2 Recommendation

According to the outcome of this study, the following recommendations are offered to improve the construction contract administration performance of projects;

First, he researcher would like to recommend that the electronic document retrieval system ERA uses shall be applied for Consultants, Contractors and the newly established ERA's Projects Management Offices. Then the researcher recommends is to keep up the current communication scheme ERA uses among the parties and also device a mechanism for a better communication.

The Contractor's financial status and bankruptcy potential should be monitored regularly to avoid

project delays or at the worst stop. Here, currently though financial constraint is a national issue; the researcher would like to recommend the timely certification of payment to the Contractor. The Researcher hereby recommends that the Employer, Consultant and Contractor shall be well equipped with experienced staff. Each staff of the contract parties should have clear roles and responsibilities. This would develop accountability for each individual act and making sure the team members understand their obligations. At the project level, the contract parties should establish a structured training and development programs for the team covering the all necessary technical and contractual aspect of the project.

Regarding Equipment, the researcher recommends the establishment of strong workshop in the project vicinities and putting in place a verification mechanism for the deployment of machineries that the Contractor's agreed during the bidding stage. Concerning Construction Materials the researcher will give his detail recommendation at the end. The study recommends that recently launched ERA's various Manuals, Guidelines and Reports shall be properly implemented by the parties in the contract.

In connection with Stakeholder Management the Researcher recommends timely response to the Public Requests, Regularly Monitor the Stakeholders satisfaction level with respect to the project and Effective Communication and Coordination with the Project Stakeholders. In this connection, the recommendation for Right of Way Management will be given at the end.

Concerning planning the researcher recommends to put in place realistic and achievable Master Work Program prior to the commencement of the physical work. In addition to this, the researcher recommends for assignment of Planning Engineer throughout the projects' life which actually overlooked in most projects.

Approved change requests should be properly followed by change order or variation order in order to maintain the contractor's contractual entitlement under the contract. The researcher recommends that the Consultant should have a system in place for changes and changes control. The system should include change process, and authorities to process/approved changes.

ERA has Project Taking-over Guideline which assists for proper handing over of the completed road project and the associated documents. Here what the researcher recommends is in addition to handing over of physical work proper emphasis should be given for retrieval and transfer of all projects documents in hard and softcopies for future use as deemed necessary.

Responsibility Matrix should be established in order to assign responsibility to each identified contractual risk to its relevant party. This would maintain the risk owner aware and reliable for his/her risk. ERA has Risk Identification, Analysis and Management Mechanism Report launched on January 2019. In this regard, the researcher understands that ERA has put in place one important tool for Risk Identification, Analysis and Management; hereby, the researcher recommends for proper implementation of the same and dispatching it to the Employer's Representatives or Consultants.

Eventually, from the interview session the researcher found out that there are three vital determinant

factors for contract administration that need an explicit study as to the above other factors. Namely these are Design Related Factors, Right of Way Obstruction and Security. In this connection, researcher would like to convey his recommendation based on the inputs he has found from the interviewees. The first one is Design Related Factors; here the interviewees highlighted that most of the implementation phase encountered problems happens because of those factors that would had been considered during the design stage. Notably these are Construction Materials and Weather Condition. In this connection, the interviewees' mentions that most Contract Documents are copy paste and do not consider the actual site scenario. Hereby, the researcher recommends the Design Document shall prepare in consideration of the actual site condition for which regional/location based design manual shall be prepared. Regarding Right of Way Obstruction it shall be cleared a head of commencement of the physical construction. Finally, concerning security it is a national problem and mitigation of the same needs the Government's attention at large.

5.3 Future Research

The researcher hereby would like to recommend some future thematic areas in the subject research;

The study try to identify determinant factors for Contract Administration specifically for ERA Gambella Area Projects Management Office those factors namely are; Documentation, Resources, Claims and Dispute Management, Risk Management, Project Process Management, Stakeholders Management and Communication. In this regard, the researcher would like to recommend that each of these factors can be studied separately as a one study area. In addition to this, other fellow factors can be identified by future researches. Further to this, as the researcher identified in the interview phase the following three study areas can be a theme for future research separately or in one category;

- Design Stage Considerations
- Right of Way Obstructions
- Security

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Appendix

ADDIS ABABA UNIVERSITY

ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

Research Questionnaire

Dear respondents

This Questionnaire is part of research paper which is designed to gather data regarding on the Identification of Determinant Factors for Contract Administration in Ethiopian Roads Administration the case of Gambela region. The information obtained will be used to complete a study in partial fulfillment of the requirements for Msc. Hence, I kindly request you to full fill in this questionnaires' while assuring you that the information that you provide will be treated with confidentiality and shall only be used for the purpose of this academic research. I would also like to remind you that your fair and impartial feedback will make this study a very successful one.

Notice here that:

- ✓ Please, honest and strict for your cooperation.
- ✓ Do not write your Name.
- ✓ You are kindly request to offer the real and accurate information.
- ✓ You can also add, Amharic Language.
- ✓ Please, Use thick mark "√ " in the box, or circle the letter and write your comment on the space provided.

Thank you in advance

I. Section one: General Information of Respondent

1. Job Title_____
2. Gender

Male	Female

3. Please Specify Your Level of Education

Diploma	BSc/BA	MSc/MA	PHD	Others (Specify)

4. years of work experience in construction

<5 Years	5-10 Years	10-15 Years	>15 Years

II. Section Three: questions Determinant Factor for Contract Administration in Ethiopian Roads Administration Gambela Area Project Management Office

The following variables the most important determinant factor for Contract Administration in Road Projects administered by Ethiopian Roads Administration the then Authority. And scales from one to five were used to indicate the extent to which you believe the statement is significant in affecting the contract administration. So after selecting the extent of significances of each statements tick (✓).

1	2	3	4	5
Insignificant	Slightly Significant	Significant	Very Significant	Extremely Significant

5. Determinant Factor Related to documentation

Statements related to documentation	1	2	3	4	5
1. Establishing a Document Management System					
2. Using Information Communication Technology (ICT) in administering the contract					
3. Maintaining Updated project documentation with registers					
4. Supporting the Project Stakeholders with regular statics					

6. Determinant Factor Related to communication

Statements related to communication	1	2	3	4	5
1. Establishing a Communication Management System					
2. Regular Meeting of the Contracting Parties					
3. Effective Coordination with third parties					
4. Compliance with the language of communication as stipulated in the contract					
5. Establishment of Clients Project Management office near to the project vicinity for readily communication with the Contract parties and other stakeholders					

7. Determinant Factor Related to resources

	Statements related to resources	**1**	**2**	**3**	**4**	**5**
Human Resources	1. Assignment of technically competent, qualified and experienced Contract Administration Team					
	2. Clear Identification of individual roles and responsibilities within the Contract Administration team					
	3. Establishing training and development programs for Contract Administration Team					
Machineries	1. Mobilization of the Right Equipment's which commensurate with the actual workload					
Construction Materials	1. The readily availability of natural construction materials in the project vicinity					
	2. The readily availability of manufactured construction materials					
Financial Management	1. Establishment of a Financial Management System					
	2. Timely Certification of Payments due to the Contractor and Consultant					

8. Determinant Factor Related to claim and dispute management

Statements related to claim and dispute management	1	2	3	4	5
1. Establishment of a Claims and disputes resolution system					
2. Proper assessment of Contractor's entitlement for extension of time for completion within timelines as set out in the contract					
3. Proper assessment of Contractor's entitlement for additional payment					
4. Existence of Claims and Disputes Management Guideline and proper utilization of the same					

9. Determinant Factor Related to stakeholders

Statements related to stakeholders	1	2	3	4	5
1. Effective Communication and Coordination with the Project Stakeholders					
2. Timely Response to the Public Requests					
3. Regularly Monitor the Stakeholders satisfaction level with respect to the project					

10. Determinant Factor Related to Project Process Management

	Statements related to project process management	1	2	3	4	5
Planning	1. Establishment of an overall project management plan					
	2. Provision of Master Work Program					
	3. Conducting project kickoff meeting to discuss contract with related parties					
Quality Management	1. Timely Provision of Quality Control and Assurance Manuals					
	2. Systematic auditing of the Contractor's implementation of quality management system					
	3. Systematic auditing of the Contractor's Compliance					

	Statements related to project process management	1	2	3	4	5
	with health, safety and environmental requirements on site					
Changes and Change Order Management	1. Establishment of a change control system					
	2. Prompt assessment of the Consultant's recommendation on Contractor's proposals for changes inclusive value engineering					
	3. Proposing Financially Viable Solutions to avoid budget increase due to change requests					

11. Determinant Factor Related to Project risk Management

Statements related to project risk management	1	2	3	4	5
1. Putting in place risk identification, analysis and management mechanism					
2. Periodically assessing the contractual risks					
3. Assignment of responsibility to the relevant party for each contractual risk expressed as a responsibility matrix					
4. Monitoring the Contractor's financial status and bankruptcy potential					

12. Determinant Factor Related to Project Closure

Statements related to project closure	1	2	3	4	5
1. Establishment of a close-out system					
2. Communicating closeout activities to all stakeholders					
3. Proper verification of physical works completion					
4. Proper review of Contractor's closeout documentation					
5. Timely issuance of taking -over certificate with associated snags					
6. Proper release of the due retention monies upon releasing relevant certificates					
7. Timely approving return of deployment of the contractor's resources upon the Contractor's request					

Statements related to project closure	1	2	3	4	5
8. Periodic inspection of the works during defects notification period					
9. Proper Issuance of performance certificate when the Contractor's maintenance obligations are fulfilled in accordance with timelines as set out in the contract					
10. Documenting lessons learned and best practices					
11. Proper processing Contractor's final account in accordance with the contract provision					
12. Proper management of termination of contract process in compliance with the contract administrative procedures					

13. State the significance of Good Contract Administration on elements projects

Statements that relates each factors	1	2	3	4	5
1. Enhanced performance					
2. Onetime project closure					
3. Economical resource utilization					
4. Effective process and risk management					
5. Enhancing good relation with stakeholders					
6. Avoids claims and disputes					