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DEPARTMENT OF PROJECT MANAGEMENT

FACTORS AFFECTING SCHEDULE PERFORMANCE OF KALITY-TULUDIMTU (KT) ROAD CONSTRUCTION PROJECT.

MA THESIS RESEARCH

BY:

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ADDIS ABABA, ETHIOPIA

FACTORS AFFECTING SCHEDULE PERFORMANCE OF KALITY - TULUDIMTU (KT) ROAD CONSTRUCTION PROJECT.

A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER IN BUSINESS ADMINISTRATION: DEPARTMENT OF PROJECT MANAGMENT

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ST. MARY'S UNIVERSITY SCHOOL OF GRADUATE STUDIES
FACULTY OF BUSINESS

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DECLARATION

I, the undersigned, declare that this thesis entitled '' FACTORORS AFFECTING SCHEDULE PERFORMANCE OF KALITRY-TULUDIMTU(KT) ROAD CONSTRUCTION PROJECT'' is my original work, prepared under the guidance of Maru Eshete (PhD, associated professor). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or full to any other higher learning institution to earn any degree.

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St. Mary's University, Addis Ababa

ENDORSEMENT

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

Name of Advisor: **Maru Eshete (**PhD, Associated professor**)**

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As the result shows that there is high value which is (0.937) client related factor, (0.960) consultant related factors, (0.959) contractor related factors. this result implies that there is high agreement between the item. Because high Cronbach value indicates that response values

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ABBREVIATIONS/ACRONYM

AACRA: Addis Ababa City Road Authority

CCCC: China Communications Construction Company

ISO: International Organization for Standardization

KT: kality- tuludimtu

PMBOK: Project Management Body of Knowledge

PMI: Project Management Institute

SPSS: Statistical Package for Social Sciences

VAT: value added tax

VIF: Variance Influence Factor

ABSTRACT

In order for a road construction project to be considered successful with regards to its schedule performance, the project must be completed within the proposed time frame or even earlier. Schedule performance measures how well the project is performing in terms of meeting the pre-determined timelines and milestones that were established in the project planBased on the general research goal of identifying the reasons behind the kality-tuludimtu (KT) road construction project's delays, this study focused on five specific goals, including estimating the size of the delays and project delay using regression analysis and examining the impact of schedule performance delays on the project. 75 professionals who have worked on kality-tuludimtu (KT) road construction projects made up the study's participants, and 68 of them responded. Self-administered questionnaires were picked up and dropped as soon as respondents finished filling them out. Tables and graphics were used to present the data that had been gathered. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20 program. The results showed that client related, contractor related and material and equipment -related issues cause the majority of project delays. The regression result shows that client related factor, contractor related factor and material and equipment related factor has a positive and significant influence on the schedule performance delay whereas consultant related factor has a positive but insignificant influence on the schedule performance delay, external related factor has a negative insignificant influence on the schedule performance delay. Finally, study came to the conclusion that client-related, contractor related and material and equipment related factors have been a source of schedule performance delay, and it makes the recommendation that the client and contractor work closely together and to avoid delays brought on by a lack of materials, contractors should always keep an inventory of the number of materials on site to determine when they need to be replaced. Therefore, before using any products, contractors should make sure they are constantly present.

Key words: Causes, Delay, client, consultant, contractor, schedule, performance

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The schedule performance of road construction project relates to how well the project is performing in terms of meeting the pre-determined timelines and milestones that were established in the project plan in order for a road construction project to be consider successfully with regards to its schedule performance, it is important that the project is completed within the proposed time frame or even earlier.

Construction industry particularly, the road project is very important for the development and economic growth for developed and developing countries. It facilitates the mobility of goods and services, and business activities in the vicinity areas.

Particularly crucial to any emerging country's development and economic prosperity is the road construction sector (M. Haseeb,et.al, 2011). In developing countries like Ethiopia, the road transport sector plays a significant role in fostering economic growth by facilitating market access for agricultural products, production outputs, and everyday consumption choices. The expansion of commercial, social, and health facilities, educational opportunities, and employment opportunities all benefit greatly from improved road infrastructure. By this reason road construction is one of the most significant areas of infrastructure development in Addis Ababa. However, there are a lot of road development projects in Addis Ababa that are severely delayed. This harm includes persistent issues in the road building sector and affects the completion of projects in terms of budget, time, quality, safety, and the comfort of road users. And one of those projects is kality RR interchange Tulu Dimtu roundabout road project which is found in the southern gate of Addis Ababa.

Construction time often serves as a standard for evaluating the performance of a road project and the efficiency of its project organization. Constructing an accessible and efficient road for fulfilling the above mentioned economic and social requirements mostly struggles with accomplishment of different projects on time and with a specified cost. Time overrun is the most common phenomenon that occurs nearly in almost all the projects related to the road construction industry. It is considered to be one of the most repetitive problems that has an

adverse effect on project success in terms of the triple constraints which are time, cost, and quality. Time delay is critical in developing countries where it mostly exceeds 100 % of its estimated time while constructing a project (Muhammad A. et.al., 2017).

Schedule delay is one of the most noticed problems that sometimes causes time-cost overrun, disputes, litigation, and also leads to abandonment construction projects (Afshari, H., et al. , 2010.). Delay can be described as a situation when a project runs into overtime either beyond the contract date or beyond date that agreed by the parties. Since a project consists of more than one party, a delay that caused by a party might not always impact to another party (Arditi, D. and T. Pattanakitchamroon, 2006). Delays can be caused by several parties, owner, contractors or other parties.

Kality RR interchange -Tulu Dimtu roundabout road project with a total negotiated contract amount of ETB 2,139,074,168.07 (ETB two hundred sixty-eight thirty-nine million seventy-four thousand one hundred sixty-eight and 7/100), equivalent to USD 105,428,682.51 (USD one hundred five million four hundred twenty-eight thousand six hundred eighty-two and 5/100) excluding of 15% VAT which shall be covered by the employer in local currency. ASER is undertaking main construction activities which are prominent on building of the Kality Tulu Dimtu Round about Road Project. whereas CCCC has fully delegated its subsidiary company IFH engineering plc to carry out the construction works of the project and be responsible for the project management at site level (AACRA, 2016).

Work kicked off in 2017, with the China Communications Construction Company (CCCC) awarded the 2.5 billion Birr contract, incorporating six bridges. ASER is undertaking main construction activities which are prominent on building of the Kality Tulu Dimtu Round about Road Project. The projects cover a length of 10.87 km which will have carriage way, bicycle lane & a walk way alongside to the main road. Earth work, pavement works, construction of over bridge, installation of longitudinal drainage pipes & other similar works are the main duties of ASER. And the planned time to complete & handover projects for the main contractor will be within 720 calendar days (AACRA, 2016).

This thesis will determine the cause of road construction delay focusing on kality tuludimtu(KT) road construction project. The perceived causes of delay regarding kalitiy tuludimtu(KT) road

construction project will be assessed and identified. Recommendations based on the findings will be given to promote successful completion of the projects.

1.2 Statement of the problem

Project delays are a common occurrence caused by many unforeseeable events in a construction project. According to (Bramble, B.B., & Callahan, M.T., 1992) a "project delay" is the length of time that the entire project or a specific portion of it has been prolonged or has not been completed as a result of various unknown or uncertain circumstances.

Project delays are typical in most nations, especially in emerging nations. The severity of these delays varies greatly from project to project; some are only a few days behind schedule, while others are delayed for more than a year. It happens in practically every construction project (Wael, A., et. al, 2007). Most of the road construction projects in Ethiopia and Addis Ababa are exposed to time and cost overruns (Nega. f., 2008). One of these projects is the Kality Tulumdimtu (KT) project in Addis Ababa, which began in 2017 and was expected to be completed in three years with a capital budget of 2.2 billion birr and a length of 10.87 kilometers but evidences from the project office show that only 59 % of scheduled plane is completed in five-year time (IFH, 2023)

A delay has been one of the biggest obstacles to implementing the strategic plan, but there are many others. According to the study done on 10 finished road construction projects in Addis Ababa, all of the projects had time overruns ranging from a minimum of 25% to a maximum of 264.38% (Tadewos, S.G., & Patel, D., 2018). Given that Addis Ababa is the capital of both Ethiopia and Africa, it is essential that the city's roads be contemporary, effective, and standardized. Despite the local administration's apparent efforts, construction delays continue to be a serious issue, and there are a number of factors that can affect how quickly projects can be completed.

Numerous studies have demonstrated the detrimental effects that construction schedule overruns have on project owners, contractors, and consultants (Ghaffari, 2013;; Marzouk, M. M., & El-Rasas, T. I., 2014). One of the common issues with the execution of construction projects is believed to be construction delays (Y. Amare, et.al, 2017). And there are serious concerns about project performance because construction delays are prevalent in the construction sector (Mahlet,

2021). Additionally, every stage of a building project has construction delays, which are a typical issue in Ethiopian construction projects (Werku Koshe & K. N. Jha., 2016). but none of those have been studied in the context of the Kality- tuludimtu (KT) road construction project.

Due to this condition, a project may incur additional costs and extend its timeline if the delay is not identified and a corrective project management decision is not made in a timely manner. This results in a number of issues and leaves all parties involved in the construction process disappointed. These days; delays have become a significant barrier to the development of developing nations like Ethiopia, and their consequences may have a significant impact on the project's efficiency and effectiveness. By identifying their true causes, these delays can be minimized. Therefore, it is essential to define the actual causes of delays in order to minimize and avoid them in any construction project.

In construction projects, delay could be defined as the time overrun either beyond the contract date or beyond the date that the parties agreed upon for delivery of project outcomes (Assaf, S.A., & Al-Hejji, S., 2006). There are several main categories of delays, including compensable (client-caused) and non-excusable (contractor-caused), critical and non-critical, and concurrent and non-concurrent. Understanding the different types of delays makes it easier to identify their causes and implement mitigation measures.

Similar studies in the past have shown that finances and payments, poor project management, an increase in the cost of materials, and claims are the primary reasons of delays. However, the causes of these delay factors in the road construction industry vary from project to project, due to various environmental situations, financial capacity and the technological advancements used in the construction processes. Therefore, identifying the actual causes of delay in order to minimize and avoid the delays and their corresponding expenses is crucial since delay in government road construction projects has a significant impact on economic and social activities of the country.

The purpose of this study is to determine the causes of delays and propose their mitigation measures.

1.3 Research Questions

1. To what extent does client related causes influence the schedule performance delay for kality-tulu dimtu(KT) road construction project?
2. To what extent does consultant related causes influence the schedule performance delay for kality-tulu dimtu (KT) road construction project?
3. To what extent does contractor related causes influence the schedule performance delay for kality-tulu dimtu (KT) road construction project?
4. To what extent does material and equipment influence the schedule performance delay for kality-tulu dimtu (KT) road construction project?
5. To what extent does external related causes influence the schedule performance delay for kality-tulu dimtu (KT) road construction project?

1.4 Objective

1.4.1. General objective

To assess the factors affecting schedule performance delay of kality-tuludimtu(KT) road construction project.

1.4.2. Specific objectives

- ✓ To examine the effect of client related causes on the schedule performance delay of kality-tuludimtu (KT) road construction project.
- ✓ To examine the effect of consultant related causes on the schedule performance delay of kality-tuludimtu (KT) road construction project.
- ✓ To examine the effect of contractor related causes on the schedule performance delay of kality-tuludimtu (KT) road construction project.
- ✓ To examine the effect of material and equipment on the schedule performance delay of kality-tuludimtu (KT) road construction project.
- ✓ To examine the effect of external related causes on the schedule performance delay of kality-tuludimtu (KT) road construction project.

1.5 Significance of the study

This study will play a significant role in determining the reasons for the timetable delay in the construction of the Kality-TuluDimtu (KT) road construction project. The project will be successful, and the risks of delay, cost overrun, and quality problems are reduced with proper planning, execution, and monitoring. The completion of the project and the stakeholder relationships are hampered by an inability to manage delay causes and related elements

appropriately. By offering strategies and mitigating measures for the management of AAHDC to implement corrective measures and make informed decisions, the study's findings will further provide value, and the study will also be significant to researchers since it will add to their theoretical and practical understanding of how to do research. Additionally, it will be helpful to those researchers who need a foundation for additional research in this field.

1.6Scope of the study

This project's research only includes road construction initiatives. The study's context is the construction of the Kality- Tuludimtu (KT) road and the study focuses on examining the reasons and implications of timetable delays from several angles. The client/owner, consultant, contractors, and staff, some of the key participants in the construction of the kality- tuludimtu (KT) road, make up the group of respondents.

1.7 Limitation of the study

This study's shortcomings, like those of others, including its focus on the construction industry in general and road construction in particular, are acknowledged. The researcher considered time, as project success factors in addition to the fact that there are several other criteria.

1.8 Organization of the paper

There are five chapters in this study. The background of the study, the statement of the problem, the objectives and research questions, the aim of the investigation, the scope and limitations, and the organization of the study are all covered in the introductory section of Chapter 1. The literature review is covered in Chapter 2 and includes reviews of the body of literature that has been published on the topic. The research methodology and methods utilized for the study are discussed in Chapter 3, taking into account the necessity of getting a representative sample of the population and the accuracy of the data. It also discusses the study's subject, sample techniques, and data collection techniques used. Chapter 4 deals with the discussion and analysis of findings as well Chapter 5 presents the conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical literature

Construction projects are considered very successful if they are finished on time and within the specified budget. However, many construction projects fail as a result of the many unknowns involved, including weather, materials, equipment, money, profitability, client, contractor, and subcontractor disputes, legal requirements, economic and political concerns, functionality, and purpose. Failure types must be addressed so that subsequent construction projects do not fall into the same category of "unsuccessful construction projects" in order to prevent these failures from occurring frequently.

2.2 Project Management Knowledge Areas

2.2.1 Project Time Management

One of the crucial project management processes that is essential to a project's successful execution is time management. The estimated time objective to finish the full project is the last deliverable from the scheduling phase. The amount of time over the projected timeline is regarded as project delay time. Processes necessary to oversee the project's timely completion are included in project time management. It entails setting delivery deadlines and milestones while taking into consideration all existing constraints. Define activities, sequence activities, estimate resources, estimate durations, build schedule, and regulate schedule are some of the processes involved in project time management (PMI, 2013).

2.2.2. Project Cost Management

According to (PMI, 2013) Project cost management includes the processes required to ensure that the project is completed within the approved budget. The processes involved are planning, estimating, budgeting, and controlling costs so that the budget can be completed within the permitted budget. The Processes comprises

- Resource planning: determining what resources and quantities of them should be used

- Cost estimating: developing an estimate of the costs and resources needed to complete a project
- Cost budgeting: allocating the overall cost estimate to individual work items to establish a baseline for measuring performance
- Cost control: controlling changes to the project budget

2.2.3. Project Quality Management

According to the International Organization for Standardization (ISO), quality is the sum of an entity's attributes that affect its capacity to meet explicit or implicit needs. Joseph Juran claimed that quality has two meanings. Firstly, product characteristics that satisfy consumer wants and lead to customer happiness, and secondly, lack of flaws. Such flaws are errors that necessitate redoing things (doing something again or lead to failures after a product has been presented to a consumer). Devastating repercussions for the customer or complaints about such flaws are possible outcomes. Enhancing quality because of deficiencies typically costs less.

The Project Management Institute defines quality as “the degree to which a set of inherent characteristics fulfil requirements”. The set of inherent characteristics may be of a product, processes, or system. The criteria may be those of customers, clients or stakeholders, which are an important category for the project's progress.

The process of project quality management as mentioned in PMBOK Guide are Quality planning, Quality Assurance and Quality control. Juran trilogy describes three slightly different elements: Quality planning, Quality control and Quality improvement.

The term "quality" describes how excellent something is. Different industries have different definitions of quality, which is often stated from the viewpoint of the customer. Consider an instance when you had superior service. It might have happened in a dining establishment, service station, motel, or airport. What about that encounter stood out in your mind, in your opinion? In the car business, quality can be determined by the buyer of a vehicle and is frequently assessed based on factors including owner satisfaction, safety, dependability, and gas mileage. In the airline sector, quality is determined by factors such as personnel service, check-in simplicity, and seat comfort. According to Crosby's definition, quality is defined as conformity to specifications, with the cost of non-conformance being the failure to achieve "zero defects" in production. Six Sigma, developed by Jack Welch of General Electric, offers a different definition of quality as a product or service with 99.99% of the entire production being defect-free.

2.2.4. Project Scope Management

The discovery and documenting of customer requirements is the primary emphasis of the project scope management knowledge area. There are numerous approaches to requirements elicitation and documentation (Robert K.Wysocki., 2014). The responsibility for ensuring that our project contains all areas necessary to achieving the project's goals is known as project scope management. Planning scope management, gathering requirements, defining scope, developing work breakdown structure, validating the scope, and controlling the scope are all part of the process (PMI, 2013).

2.2.5. Project Integration Management

Project integration management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups (PMI, 2013).

2.2.6. Project Human Resource Management

Project human resource management involves organizing and managing a project team. The team is primarily made up of individuals with particular expertise and duties. From the outset of the management, the project team, also known as project members, must be interested in plans and decision-making (PMI, 2013).

All of the project team organization and management procedures fall under the category of human resource management. Human Resources administration includes the creation, growth, and administration of the project team as well as human resource planning. The project manager is in charge of forming the project team into a cohesive unit in order to finish the project. Administrative and behavioral duties are recognized as the two main categories. The project team members, their collaboration as a team, and their interactions with others outside of the project itself are all covered by the behavioral elements. These include team building, motivation, communication, and dispute resolution. Employee relations, compensation, and evaluation are among the administrative duties, in addition to government rules and evaluation.

2.2.7. Project Risk Management

Risk is an uncertainty that can adversely or positively impact project goals. The uncertainty may be about a potential event that may or may not exist, and whether it does happen, the unclear extent of the effect will disturb project priorities. Thus, the probability of occurrence characterizes a "risk". The art and science of recognizing, assessing, and reacting to risk over the life of a project and in the

best interest of achieving project goals is project risk management. As a diverse aspect of a project, successful project managers consider risk management. The four aspects of their strategy are: risk identification, risk assessment, risk mitigation and risk monitoring (PMI, 2013).

2.2.8. Project Procurement Management

According to (PMI, 2013),Procurement Management includes the processes to purchase or attain the products, services, or results needed from outside for the project team to perform the work. Planning for purchases acquisitions, contracting, requesting, seller responses, source selection, and contract administration are all part of procurement management. An effective procurement management life cycle consists of the following five phases:

- Vendor solicitation
- Vendor evaluation
- Vendor selection
- Vendor contracting
- Vendor management

2.2.9. Project Stakeholder Management

An entity that may influence, be affected by, or consider itself to be influenced by a decision, action, or outcome of a project, program, or portfolio is referred to as a stakeholder.

Based on an examination of stakeholders' demands, interests, and potential effects, stakeholder management outlines the processes, procedures, tools, and techniques to successfully involve them in project choices and execution. The steps involved are stakeholder identification, stakeholder management planning, stakeholder engagement management, and stakeholder engagement control (PMI, 2013).

2.2.10. Project Communication Management

Project communication management includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval and ultimate disposition of project information. The communication process is not always easy because there may always be barriers to communication, such as lack of clear communications channels and problems in a global team environment. Therefore, choices of sender-receiver models, media, writing style, presentation techniques and meeting management are crucial for effective communication. Managing project

management involves 5 processes. These are identifying stakeholders, planning communications, distributing information, managing stakeholder expectations and reporting performance (PMI, 2013).

2.3 Construction Project

Construction projects are those projects on which the construction of structures, roads and special-purpose services are planned. Classically, tasks are characterized by the requirement to complete a work on schedule, on budget and with acceptable consistency.

Construction projects are broadly classified based on the purpose they have. The most common types are:

Building construction projects: - Projects that are only associated with the building of private, industrial, educational, leisure, hotel, warehousing and marketing facilities.

Infrastructure projects: - Infrastructure projects include dams and canals, highways, bridges, airport terminals, hydroelectric plants, water treatment and supply lines, waste collection networks, laying of telephones and electric lines, dumps, and any building activities that develop infrastructure that would be the cornerstone of a country's economic development.

Industrial projects: - There are projects that are involved in the development of production and manufacturing facilities, such as steel mills, garment factories, oil refineries, etc.

Special purpose projects: - Projects designed for a specific purpose include satellite stations, nuclear stations, etc.

2.4 Parties in construction Project

In every sector, there are multiple players interested in achieving the desired objective or aim successfully. According to (Afshari, H., et al. , 2010.),The following are the most frequent participants in road construction projects.

Client/owner: are those who finance the project and also provide supplies and equipment, and who may eventually be the owner of the project after completion.

The client-related factors are those that relate to the type, individuality, experience, financial situation, awareness, organization, construction complexity, confidence, extent, and risk-handling of the client. Delays are brought on by the client's needs-driven actions or inactions that violate the terms of the contract. The contractor would be entitled to compensate against these losses where the project owner was at fault for the delay. Owner-related factors include things like the owner's lack of experience, financial difficulties, a slow decision-making process,

unrealistic contract requirements and deadlines, the owner's poor coordination and communication with other parties, the delay in handing over the construction site to the contractors, etc.

2. Contractors: are responsible for undertaking the actual construction of projects. Based on the form of contract, the contractor will be responsible for the planning, management, supervision, maintenance of the building site, furnishing of the supplies, machinery and manpower required for the project to be successfully completed. The contractor also appoints subcontractors with special skills and knowledge to carry out some portions of the project that the contractor is unwilling to build for different purposes.

3. Consultants: Construction consultants help clients make effective plans for their future projects to ensure that the work is completed by contractors with cost efficient manner. They provide cost forecasts, draw schedules, pick vendors, manage building contracts and address disputes between contractors and owners of projects.

Delays may also be caused by issues with the consultant, such as design flaws, late acceptance of tests and drawings, a lack of experience on the consultant's part, a shortage of site employees, bad project management, etc. (Alaghbari, W. et al., 2007) outlined a few potential causes of consultant delays, including a lack of a consultant site engineer, inadequate knowledge on the consultant's part, inexperience on the part of the consultant site staff, a delay in decision-making, a lack of documents, and a slow flow of information. In this situation, the contractor will be able to request a time extension or financial compensation, but the client will not be able to request liquidated damages because the consultant is the client's agent and under their control.

4. Designer: It is the party that transforms the owner's vision into a real-life project (blue print). It is responsible for the implementation of the project's original concept. The design incorporates all the project's architectural, structural, sanitary and electrical elements.

2.5 Definition of delay

Delay is defined in a variety of ways by different academics. A construction delay is defined as an extension of the project's completion date or the time frame agreed upon by the parties involved in its construction (Marzouk, M. M., & El-Rasas, T. I., 2014). The time spent on the completion date or time indicated in the completion and submission of the construction project

decided by both parties is also considered to be a part of the construction delay (Assaf, S.A., & Al-Hejji, S., 2006). Due to a number of problematic issues that affect the construction workflow, project delays are sometimes experienced in the road building sector (Shebob, A. et.al., 2012).

The difference between the anticipated completion date and the actual completion date can also be referred to as a "delay" (Faridi, A.S., & El-Sayegh, S., 2006; A.Chan, 2001).The period during which the entire project, or any part of it, has been prolonged or not completed due to various unforeseen circumstances, according to (B. Bramble & M. Callahan, 1987). As a result, the time overrun or extension of time past the date set by the contract parties can be used to describe the delay in a building project.

According to (Kang sik wei., 2010) a "delay" is anything that happens later than anticipated, scheduled, stipulated in a contract, or after the deadline established by the parties to deliver a project. (Fung I. W. H., 2006) also defined delay as the slowing down of work without fully halting construction, which will result in time overlapping either past the contract date or beyond the date decided by the parties to deliver the project. In the study of (Alaghbari, W. et al., 2007), delay is addressed as the most common, risky, costly, and sophisticated situation encountered in a wide range of construction projects. Due to the high value of time with both the client and the contractor, it frequently leads to disputes and legal action. According to (Bassioni, H.et.al, 2008), one of the most frequent problems that causes the project and its involved stakeholders to have a negative impact on the assembly is the construction process's delay.

According to a 2016 study by (Obodoh D.A and Chikasi Obodoh., 2016), delays are also referred to as a situation in which the contractor, the consultant, and the client together or separately contribute to the project's failure to be completed within the initial, stated, or negotiated contract length. On the other side, for the contractor, a delay means a lack of money for greater investment in supplies and resources, the hiring of people, and the wasting of time. Delays have negative effects on both the owner and the contractor of a project. Lawsuits, negotiations, cash flow issues, and an overall sense of unease will result from all of these unfavorable effects. As a result, the causes of delays for various parties vary.

2.6. Types of delay

Several studies have tried to identify the types of delay and differentiate them according to their context (Rosazuwad, 2010;; Chai, C. S., & Yusof, A. M., 2015;; Elawi, G. S. A.et,al, 2015). Based on the following studies construction delay is grouped in to three major categories.

2.6 1. Concurrent Delay

Concurrent delay is an issue that occurs in most construction industry programs. In this case, both the owner and the contractor are responsible for the delay. Simultaneous delays involving either two or three excusable delays result in extended time. When excusable delays with compensation and non-excusable delays are concurrent, an extension of time can be issued or the cost of delay can be distributed between the owner and the contractor.

If excusable and non-excusable delays occur concurrently, the contractor can assert the extension of time. If excusable with compensation and excusable without compensation delays occur concurrently, the contractor is entitled to claim extension of time but no delay damages: If two excusable with compensation delays occur concurrently, the contractor is entitled to claim extension of time and delay damages.

2.6. 2. Intrinsic and Extrinsic delays

A variety of factors impact construction projects from the planning process to the point when the project is finished. These factors can be categorized into intrinsic and extrinsic factors. Factors that contribute to construction organizations are intrinsic factors, while extrinsic factors comprise diverse aspects varying from the socio-cultural, technical, economic and political contexts in which these organizations work. Extrinsic causes of delay are difficult to monitor, whereas proactive project management may resolve the inherent causes of delay.

Extrinsic causes such as geopolitical risk, inflation and exchange rate declines have been often called global risk factors. Global risk factors range from region to region and each region is considered to have its own region-specific causes of construction project delays.

2.6. 3. Excusable and Non-Excusable delay

Excusable delay

Excusable delay is a delay that is caused due to an unforeseeable event beyond the contractor’s or the subcontractor’s control. Usually, based on common general provisions in public agency specifications, delay resulting from the following events would be considered excusable such as fires, floods, owner-directed changes, errors and omissions in the contract drawing, unusually severe

weather and etc. Excusable delays can be further classified into excusable with compensation and excusable without compensation.

Non-compensable delays: It is a delay that neither the client nor the contractor contributed to. Accidents are not investigated, and neither the owner nor the contractor are in control of the matter. Due to the fact that no one is to blame for these delays, they are frequently referred to as "acts of God." Natural disasters, unsanitary conditions, and mass wrongdoing (labor uprising, explosions, government activities that go beyond their constitutional authority, unexpectedly delayed supply deliveries, and unexpectedly delayed delivery of goods) are a few examples (Adam, A.et.al. , 2015) Because of this, the contractor receives a deadline extension and avoids paying any penalties to the owner or contractor for delay damages.

Compensable delays:

There are some delays that are brought on by unanticipated events outside the control of the contractor or subcontractor and are frequently caused by the owner or the owner's representatives. Contractors are entitled to a time extension and financial compensation if they experience this type of delay. An illustration would be the owner's architect's inability to complete sketches in the required amount of time, which contributes to the timetable extension and ultimately costs the owner money. In this scenario, the contractor would be responsible for increased indirect costs for the home office as well as the extended field office (N. Hamzaha,et.al, 2011) .

Non –excusable delay

A visible delay is the fault of the contractor or its suppliers. This frequently happens when the contractor disregards established conditions in the construction contract. Clients will assert a loss in accordance with the terms of the contract instrument. The Contractor shall pay on the basis of liquidated losses or direct damages. According to (Muhammad A. et.al., 2017),liquidated fines are calculated based on the daily average expense amount that the contractor's owner is anticipated to incur due to the delay in completing building contracts. Some of the non-excusable delays include subcontractor results that are late, supplier performance that is late, the contractor's inefficiency in managing the construction site, the contractor's poor management of the project's finances, a lack of labor, and an inability to manage the work according to the contract schedule. A project-specific labor strike brought on by the contractor's unwillingness to negotiate or unfair work practices could also cause this type of delay, in addition to common but

preventable mistakes, failure by the contractor or subcontractors to follow the owner's request, and defective workmanship.

2.7. Empirical literature

The reasons for construction project delays have been the subject of numerous researches over the years. Numerous studies improved and changed the numerous groups and causes that lead to delays into various groupings. The implementation of building projects frequently encounters issues, with delays being one of the most significant. Before it becomes a serious issue that seriously affects project schedule, cost, and quality, delay is a problem that needs to be appropriately addressed. Additionally, it will deteriorate ties between individuals involved in the project.

2.7.1 Causes of project delay

In their study on the reasons behind delays in the Indian construction sector, (Prakash Rao, B. and Joseph camron culas., 2014) noted that seven categories were involved. These include the customer, the contractor, the consultant, the material, the equipment, the labor, and the outside element. The three main factors that led to delays were inadequate coordination and communication by the owner throughout construction, late revision and approval of design papers, and delays in the work of subcontractors. The most major category of delays was shown to be contractor-related, followed by client-related and consultant-related delays.

(M. Haseeb,et.al, 2011)examined large building projects in Pakistan and found 16 significant characteristics that had a significant impact on their length after quantitatively assessing 68 reasons for delay. Finance and payments (slow and late payments by the clients), inaccurate time estimation, poor material quality (poor quality of materials used in construction projects), delay in payments to supplier and subcontractor (late payments to suppliers of materials and subcontractors working on the construction project), poor site management by the contractors, use of outdated construction techniques and methods, and natural disasters (the delays and interruptions) are some.

The frequency of occurrence, seriousness, and importance of each of the 55 reasons for delay they discovered were determined by (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016) on the investigation of causes and impacts of delays in public construction projects in Jordan. The top

22 factors among the 55 causes were listed as the client's design changes, the contractor's poor planning and management, the use of the lowest bid that resulted in poor performance, changes to the project's scope, a mistake in the design and contract documents, late payments from the client, rework caused by construction flaws, and changes to the original design. They also noted low levels of productivity, technical difficulties the contractor encountered, improper construction techniques used by the contractor, a lack of client cooperation, cash flow issues the contractor experienced, delays brought on by the work of subcontractors, denial of contractor submittals, bureaucracy and changes in government regulations, inadequately efficient drawings, a lack of consultant staff on site, and other public works (labor, material, and equipment).

72 typical reasons for delay were found by (Kamanga, M., and Steyn, W.J., 2013) in their study on the factors that contribute to delays in road construction projects in Malawi. The top ten reasons given for the delays included a lack of fuel, a lack of contractor cash flow, a lack of foreign currency for importing materials and equipment, slow client payment practices for progress payments, a lack of equipment, a delay in moving utilities, a lack of construction materials, a delay in compensating landowners, a lack of technical staff, and a delay in site mobilization. They said that South Africa, Botswana, and Swaziland were among the southern African countries where similar reasons for delays have also been noted.

Accordingly, major factors that contribute to construction project delays in the Nigerian construction sector include a lack of equipment, inaccurate time estimates, problems with interim payments, change orders, inaccurate cost estimates, inadequate modern equipment, a lack of construction materials, an inexperienced project team, improper project planning and scheduling, and financial difficulties for contractors.

(Obodoh D.A and Chikasi Obodoh., 2016)The top five factors causing delay of construction projects in Sana'a, Yemen, were mentioned as being: (1) delay in receiving progress payments by contractors; (2) financial difficulties faced by clients; (3) inadequate experience of contractors or consultants; (4) poor site management and supervision; and (5) lack of sufficient cash for project implementation.

(Aziz, R.F., and Abdel-Hakam, A.A., 2016)investigated the causes of delays in road construction projects in Egypt and identified 15 groups of delay factors, including those related to equipment,

design, contractors, materials, contracts, consultants, financing, sites, scheduling and controlling, owners, contractual relationships, labor, and project-related factors.

Contractor-related factors, consultant-related factors, owner-client-related factors, government-related factors, and externally related factors were identified as the causes in their study of the causes of delay factors in road construction projects in Sudan (K. Khair, et.al, 2016).

141 delays were found and categorized into 25 main categories in a study on the factors affecting road construction projects in Kenya. Both consultants and contractors agreed that the client's payment, the client's organization's delayed decision-making and bureaucracy, claims, insufficient planning and scheduling, and rain were the top five overall reasons for delays (Seboru, 2015) .

As a result of the failings of the contractor, consultant, and employer at the Addis Ababa City Road Authority, (Y. Amare, et.al, 2017) identified 10 causes of delay in the research they conducted during the building phase of road projects. Poor site management and contractor supervision, choosing the wrong contractors, a lack of high-tech mechanical equipment, an inaccurate initial project scope estimate, ineffective project scheduling, a lack of adequate training in construction management techniques, and poor financial control of the project are some of the issues they found in their study.

88 key delay-causing factors were identified by (Werku Koshe & K. N. Jha., 2016)in their investigation of the causes of construction delays in Ethiopian construction industries; the most frequent and important of these factors were evaluated and determined to be challenges with project financing by a contractor, an increase in the cost of materials, ineffective project planning, scheduling, or resource management, a delay in progress payments for completed works, and a lack of data.

2.7.2 Delay factor

2.7.2.1 Client Related Delay Factors

Several studies have identified client/owner related delay factors to cause schedule delays. (Kang sik wei., 2010) identified late in revising and approving design documents, change orders by owner, delay in approving shop drawing and sample materials, slowness in decision making process, poor communication and coordination, conflicts between joint-ownership of the project,

delay to furnish and deliver the site, suspension of work by owner, delay in progress payments as client related delay factors. (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016) concluded that client's changes of the design, using lowest bid that led to low performance, changes in the extent of the project, delay in progress payments by the client, lack of cooperation between client and contractor, delay of approval contractor submittals as client related delay factors construction projects in Jordan. (M. Haseeb,et.al, 2011) identified economic ability/ economically arrangement for the project, late payment of bills, lack of proper and timely decision, not definite about material, and concerns for construction time as client related problems.

2.7.2.3 Contractor Related Delay Factors

Several studies have identified contractor's related factors to cause delays in construction projects. (Kang sik wei., 2010)identified delays in sub-contractors' work, poor communication and coordination, inadequate contractor's work, ineffective planning and scheduling of project, conflicts in sub-contractors' schedule, improper construction methods implement, frequent change of sub-contractors, rework due to errors during construction, conflicts between contractor and other parties, and difficulties in financing project as the top delay causing factors. (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016) concluded that inadequate management and supervision by the contractor, inadequate planning and control by the contractor, rework due to mistakes during construction, low level productivity, technical problems faced by the contractor, incorrect construction methods followed by the contractor, cash flow problems suffered by the contractor and delay due to sub-contractor's works as contractors related delay factors in construction project in Jordan. (Assaf, S.A., & Al-Hejji, S., 2006)identified that difficulties in financing project, conflicts in sub-contractors schedule in project executions, rework due to errors, conflicts between contractor and other parties (consultant and owner), poor site management and supervision, poor communication and coordination with other parties, ineffective planning and scheduling of project, improper construction methods implemented by contractor, delays in subcontractors work, inadequate contractor's work, frequent change of sub-contractors, poor qualification of the contractor's technical staff, delay in site mobilization as the contractor's related delay factors. (M. Haseeb,et.al, 2011), asserted that the most important factor relevant to contractors are lack of acquiring new equipment, poor material used in construction, and unfair relationship of subcontractors with employees are the major factors that contribute to causes of delays.

2.7.2.3 Consultant Related Delay Factors

Several studies have identified consultant related factors that cause schedule delays. (Kang sik wei., 2010) identified delay in approving major changes, mistakes and discrepancies in design documents, unuse of advanced engineering design software, unclear and inadequate details in drawings, delays in producing design documents, insufficient data collection and survey before design, poor communication and coordination, inadequate experience of consultant as the consultant related delay factors. (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016)identified that errors in design and contract documents, changes in the original design, drawings are not efficient enough, non-availability of consultant's staff on site as the consultant related delay factors in construction sector in Jordan. (Assaf, S.A., & Al-Hejji, S., 2006)identified design errors made by designers, changes in types and specifications during construction, insufficient communication between owner and consultant during design stage as critical delay factors. (Assaf, S.A., & Al-Hejji, S., 2006)identified delay in performing inspection and testing, delay in approving major changes in the scope of work, inflexibility (rigidity) of consultant, poor communication and coordination between consultant and other parties, late review and approval of design documents, conflicts between consultant and design engineer, inadequate experience of consultant as the consultant related delay factors. (M. Haseeb,et.al, 2011), concluded that lack of completeness and timeliness of project information, missing some detail in drawing, priority on construction time, incomplete understand of client requirements, and poor design ability by the consultant was the major cause of delay.

2.8 Minimization of delay

Different studies have in the past proposed different approaches, methods and techniques in an attempt to address project delays in the road construction sector.

According to Prakash and Joseph (2014), there are 15 steps that should be taken to minimize delays in construction projects. These include frequent progress meetings, using modern technology, using proper and modern construction, placing proper emphasis on prior experience, having clear information and communication channels, completing and properly timing designs, site management and supervision, collaborative working in construction, and frequent coordination between the parties involved.

Among the above mitigation measures: site management and supervision, effective strategic planning, clear information and communication channel were considered to be the most effective methods of minimizing construction delays

(M. Haseeb,et.al, 2011)suggested the following points

- The financial issues should be avoided by the client making on time payments to the constructing parties, which is the contractor, subcontractors, suppliers and labor.
- The project's time and expense estimates should be accurate.
- The lack of content and the standard should be carefully tested so that there is less mistake and a problem.
- The subcontractors should finish their job on schedule and the suppliers should deliver the goods in a timely manner.
- The site should be well maintained and the circumstances of the site should be analyzed in depth before work commences.
- Trained labor, necessary machinery, new technologies and accident, geographic and soil conditions should be taken into account in the construction project.
- During the building process, changing orders, structural modifications, legislative and operational changes can be avoided so as not to impact the overall progress of the construction.

Methods of minimizing construction delays, according to (Obodoh D.A and Chikasi Obodoh., 2016), include: ensuring adequate and available source of finance, incorporating competent project manager, available supply of resources, frequent progress meetings with within the constructing parties, awarding bids to the right consultant and contractor, use of experienced and professional subcontractors and suppliers, competent project team, accurate initial cost estimate, competent and capable project team, and use of experienced and professional subcontractors and suppliers. The researcher also recommended

1. Improving contractors' administrative abilities through ongoing training programs for industry professionals to stay up to speed on their knowledge and become familiar with project management techniques and procedures.

2. Construction industry curriculum that emphasizes participatory growth.

3. Progress payment bottlenecks should be eliminated, and contract awards should go to seasoned consultants and contractors with a proven track record.

4. Increasing construction efficiency is crucial, along with improving human resource capabilities and expertise, and holding more frequent site meetings.

In order to be able to pay contractors on time, clients should develop their cash reporting systems, according to (Seboru, 2015). Additionally, client organizations should reduce paperwork and red tape to improve the slow decision-making process. Claims should be quickly settled in order to prevent delays. Contractors should also create conducive plans and schedules before beginning road work. To avoid delays during the rainy season, contractors should get ready to conduct operations that are not often affected by the weather.

(Y. Amare, et.al, 2017) recommended setting up a system for financial control of the project and also upgrading on the financial capacity building of the construction sector in their study of the causes of delays during the construction phase of road projects due to the failures of contractor, consultant, and employer in Addis Ababa City Road Authority.

• Establishing consolidated project information database that supports all stakeholders by giving all relevant information about the project area's status is needed and the contractor work repetition.

• Improving the efficiency of professionals and businesses by a capacity-building initiative in the construction sector, such as the ERA Master program for road industry professionals.

• It is easier to set up a framework for exchanging expertise and information between companies and companies, as well as between contractors and contractors.

• Capacity building for construction management short-term and long-term preparation and training programs shall be carried out at the job site.

According to (K. Khair, et.al, 2016)), the most effective method of minimizing delays in road building projects in Sudan is the selection of a project manager with sufficient project management skills and competence as well as the utilization of appropriate resources and procedures for project solutions.

In (Werku Koshe & K. N. Jha., 2016),proposed several measures that the client/owner, contractor, and consultant should do. The client should confirm that the sketches have been incorporated before the construction phase begins, the lowest evaluated bidder approach should be avoided, a skilled and competent supervisor or consultant should be hired with a good salary,

and the owner should also release payments based on the contract duration of the arrangement. On the other hand, the contractor should negotiate benefits to prepare the labor to provide a healthier work environment and improved efficiency, appoint the right professional to the right role, establish a culture of time order and stockpiling of daily resources, and develop the right professional. The project manager as well as top level management should apply proper project management tools and techniques, such as: proper planning, scheduling and monitoring, proper cash flow and resource scheduling together with strict monitoring and evaluation. Risk and escalation considerations should be taken into account during the calculation process, and the consultant should always plan a transparent and sufficient quantity bill and drawing with no errors. Fair time and timelines should also be established for the project, and adequate data collection, survey, and site investigation and planning should be carried out before tendering. The required payments, extra work, and variation orders should be received on time, the scope of work should be established before construction begins, and the consultant should also give the client orientation regarding the issues discovered in order to prevent altering orders.

Based on the best outcomes, (Aziz, R.F., and Abdel-Hakam, A.A., 2016) provided recommendations. In order to avoid a lack of equipment, whether for road construction or some other type of construction, he said that the owner must pay the employees on time. This will make it simple for the contractor to fund and manage the work efficiently. Furthermore, in road construction, shortages of construction materials like bitumen may result in a significant delay, especially when the shortage is caused by price changes, so it is important to choose a contractor with a good reputation and adequate work experience to prevent errors caused by these factors. Contract price changes should be taken into account.

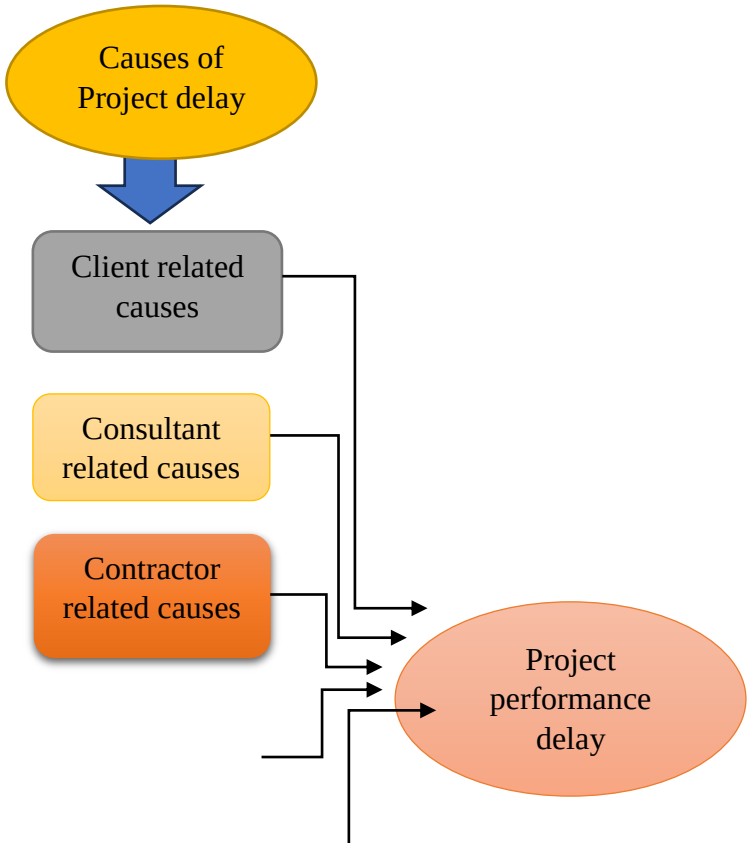
Equipment failure caused by improper maintenance, insufficient staff, or expensive equipment may force contractors to rely on a particular piece of equipment for an extended period of time. Therefore, trained employees should be assigned to deal with equipment, have routine maintenance performed, and hire contractors with the appropriate equipment. The researcher also advised the owner to choose qualified designers who are willing to alter both the beneficial and unfavorable aspects of the projects they create in order to avoid design errors. Additionally, a suitable lab should be picked because soil study is the first step in deciding how to construct roads with regard to traffic capacity, road loads, and the number of pavement layers. In addition

to this, it is advised that choosing seasoned subcontractors with solid repute and work experience is crucial.

It's helpful to agree on the design and get final approval to fulfill the demands of the owner and the work power of the contractors. Contractors may hire management experts or expand the skills of engineers responsible for site management and oversight through training programs.

2.9 Conceptual framework

This section's goal is to highlight the significance of the previous material mentioned above and summarize its main points. There have been numerous studies done on the causes of construction delays on roads. There are 36 causes found in the literature evaluation. (Aziz, R.F., and Abdel-Hakam, A.A., 2016)classify the factors that contribute to construction delays on roads into the following categories: equipment-related factors, design-related factors, contractor-related factors, material-related factors, contract-related factors, consultant-related factors, financing-related factors, site-related factors, scheduling and controlling-related factors, owner-related factors, relationship-related factors arising from contractual agreements, labor-related factors, project-related factors, external-related factors, and These groups were summarized by (K. Khair, et.al, 2016) as contractor-related, owner-related, consultant-related, government-related, and externally-related factors. Therefore, this study re-categorized these factors into 5 categories: client-related, consultant-related, contractor-related, material- and equipment-related, and external-related factors.



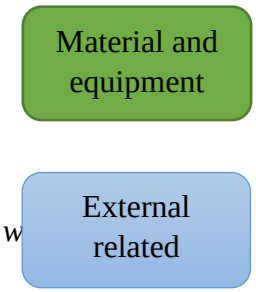


figure 2. 1: Conceptual Frame w

2.10. Research Hypothesis

In order to answer the research questions, the researcher formulates the following research hypothesis depend on the conceptual frame work of causes of project delay .

- **H_1:** client related causes for schedule performance will have positive and significant effect on the schedule performance delay.
- **H_2:** consultant related causes for schedule performance will have positive and significant effect on the schedule performance delay.
- **H_3:** contractor related causes for schedule performance will have positive and significant effect on the schedule performance delay.
- **H_4:** material and equipment for schedule performance will have positive and significant effect on the schedule performance delay.
- **H_5:** external related causes for schedule performance will have positive and significant effect on the schedule performance delay.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the methodology and procedures that were followed to determine the style and methods of collecting information and data from the study population through office and field sources. The study determines the factors that influence the duration of Kality-tuludimitu (KT) road construction projects based on the results of all the reviewed studies. This chapter discusses research design, population, sample size and sampling design, data collection methods, the validity and reliability of instruments, methods of data analysis, as well as the research ethics that have been followed in the research.

3.2 Research approach and design

The study used the mixed approach which includes both qualitative and quantitative techniques. The qualitative technique helps in-depth understanding of an individual's insight and their suggestions, but the quantitative approach assistances the reader to comprehend improved as it delivers numerical data that can be observed and associated. (Tashakkori, A., and Teddlie, C. , 2003) described a mixed-method delivers the chances to find and gain in-depth evidence and answer to the elevated issue or research question.

3.3 Research design

This study adopted explanatory research design, which is used to provide a quantitative or numerical description of the attitudes or opinions of participants in order to evaluate the perceptions of parties involved in the road construction process. A case study research approach has used to collect relevant secondary data and primary data through the review of documents. Quantitative research methods have employed to analyze the total delay-causing factors and effects of projects.

3.4 Population, Sample size and sampling procedure

3.4.1. population of the study

The focus population of this study is among the client/owner, consultants, contractors, project managers, office engineers, site engineers, and supervisors with experience in the road construction industry and currently involved in Kality-Tulumudimitu (KT) road projects.

3.4.2 Sampling technique

The study use total population of the project who engaged in the kt road construction project because of the population too small .

3.4.3 Sample size

The study participants are composed of 75 professionals who have engage in kality-*tuludimtu(KT)* road construction projects. Because of population is too small the researcher has distributed 75 questionnaires to the client, contractor and consultant to reach out the population with adequate engineering background who able to answer the research questions and those who have actively engage in the kality-*tuludimtu(KT)* road construction projects.

3.5 Data type and data sources

The research used primary and secondary data collection methods to capture the most important information about the cause of the delay on the *Kality-Tuludimtu (KT) road construction project*. The study adopted primary and secondary data collection tools that are suitable for explanatory research designs. Primary data collected from the staff of the project, and secondary data collected from different sources existing in the office documents. It includes reports, contractual agreements, published and unpublished documents related to the project, and other materials related to the cause and effects of the delay in *the Kality tuludimtu (KT) road construction project.*

3.6 Data collection method

For this research, the data collection is conducted through document review and questionnaires. Questionnaires are used to collect data from contractors, consultants, and clients. Professionals, inspectors, and questionnaires are used to assess the cause of delay in *the Kality- tuludimtu (KT) road construction project.* The questions have designed in relation to the research objectives, especially on the causes of construction delays. The questionnaire survey is designed to elicit understanding and opinions from experienced respondents about the construction work delay.

Questionnaires have used to collect data from contractors, consultants, clients, professionals, and inspectors.

hence, five points as stated in, a Likert rating scale from Never (1), rarely (2), sometimes (3), often (4) and Greatly often Rating (5) was utilized in the study as a benchmark against primary data that was gathered to support the research.

3.7 methods of data analysis

The main information obtained from the survey questionnaire is carefully coded, verified for accuracy, and encoded into SPSS version 20 spreadsheet. Regression analysis is a set of statistical techniques used for the estimation of relationships between a dependent variable and one or more independent variables. It can be used to simulate the long-term link between variables and gauge how strongly the relationships between them are related.

3.8 Model and Variable specification

The study was compelled to construct a hypothesis in order to meet its goals. However, as stated in the study's purpose, the research draws generalizations and inferences about the variables specified based on its analysis and employs statistical inference techniques. Therefore, a Pearson correlation analysis was done to see if there was any evidence of a significant association between the dependent and independent variables. Finally, using the SPSS 20 analysis tool, multiple regression was undertaken to determine the percentage of independent variables that contributed to the project's time delay. According to the study's conceptual framework, the multiple regression equation for the association between delay variables and project schedule delay reads as follows: Y = a+X1 (CR) +X2 (CTR) +X3 (CRR) +X4 (MEQ) +X5 (ER) + e Where:

Y= PD= Project schedule performance Delay.

CR =client related factor

CTR = consultant related factor

CRR = contractor related factor

MEQ = material and equipment related factor

ER = External related factor

a= the constant parameter.

X1= Coefficient of client related factor

X2= Coefficient of consultant related factor

X3= Coefficient of contractor related factor

X4= Coefficient of material and equipment related factor

X5= Coefficient of external related factor

X6= Coefficient of project implementation

e = error term. The general and specific study objectives were tested based on the previously mentioned mathematical representation, depending on the significance level of each constant parameter in the regression analysis.

3.9 Reliability test

The most often used statistical approach for assessing validity and reliability is Cronbach's alpha, which assesses the internal consistency of the items on a scale used to assess the seriousness of each item in a questionnaire. Cronbach's alpha reliability coefficient, according to (George, D., & Mallery, P. , 2003),typically ranges between 0 and 1. The closer the coefficient is to 1, the more internally consistent the items (variables) in the scale are, and the closer it is to 0, the weaker or nonexistent the consistency becomes. In other words, Cronbach alpha’s coefficient increases either as the number of items (variables) increases, or as the average inter-item correlations increase i.e., if the number of items less than 10 items the Cronbach’s alpha should be >0.5 and according to (Pallant.J., 2020),Cronbach’s alpha result more than 0.7 considered as acceptable.

table 3. 1:Reliability Statistics Test Result

Variables	Reliability Statistics	No of Items
	Cronbach's Alpha	
Client related	0.937	**8**
Consultant related	0.960	**9**
Contractor related	0.959	**8**
Material and equipment related	0.908	**5**
External related	0.907	**6**
Project schedule performance delay	0.684	**4**

Source: Survey (SPSS V.20 output 2023)

As the result shows that there is high value which is (0.937) client related factor, (0.960) consultant related factors, (0.959) contractor related factors. this result implies that there is high agreement between the item. Because high Cronbach value indicates that response values for each participant across a set of questions are consistent. Due to this condition the result shows high value and have high consistency.

3.10 Research Ethics

Throughout the research process, the researcher adheres to morally and ethically acceptable procedures. The participants' full consent was obtained before any data is gathered, and they have been made aware of the study's objectives. The organization's documents that are evaluated will stay private. The conclusions and outcomes of this study won't be applied to any other endeavor. Respondents to this study were given full rein to express their own opinions based on their personal experiences; names and other identifying details were withheld

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATIONS

4.1 Introduction

This section covers the study's findings, which were derived from data gathered using questionnaires. The responses from 75 respondents, including the project owner, project manager, site engineer, resident engineer, and supervisor, were evaluated using SPSS v20 software.

4.2 Response Rate

The respondents were given a total of 75 self-administered questionnaires, and they were closely monitored and assisted in filling them out. As a result, 68 respondents completed the surveys accurately and sent them back in an appropriate format. These responses were then analyzed. It shows that a response rate of 90.67% was achieved, which meant that the majority of the total number of respondents that were targeted took part in the survey.

table 4. 1: Responsibility of state Respondent

		Frequency	Percent
Valid	Client	6	8.8
	Contractor	40	58.8
	Consultant	22	32.4
	Total	68	100.0

Source: Survey (SPSS V.20 output 2023)

4.3 Description of respondents' characteristics

In order to explain the respondents' age, education level, type of education received, functional unit, experience in the industry, experience in the construction sector, delay time, ranking of the aforementioned delay causes, etc., the researcher uses frequency analysis.

table 4. 2: Demographic Profiles of the Respondents

		Frequency	Percent
gender of respondent	Male	43	63.2
	Female	25	36.8
	Total	68	100.0
		Frequency	Percent
Age of respondent	18-30 yrs	52	76.5
	31-40 yrs	14	20.6
	41-50 yrs	2	2.9
	Total	68	100.0
		Frequency	Percent
Responsibility of respondent	Client	6	8.8
	Contractor	40	58.8
	Consultant	22	32.4
	Total	68	100.0
		Frequency	Percent
respondent designation	project manager	3	4.4
	site engineer	29	42.6
	Supervisor	16	23.5
	Other	20	29.4
	Total	68	100.0
		Frequency	Percent
level of education	Diploma	8	11.8
	1st degree	54	79.4
	2nd degree	6	8.8
	Total	68	100.0
		Frequency	Percent
working experience	1-5 yrs	55	80.9
	6-10 yrs	10	14.7
	>15 yrs	3	4.4
	Total	68	100.0

Source: Survey (SPSS V.20 output 2023)

The table shows demographical characteristics of projects, as indicated 54(79.4%) of respondents are first degree holders 8 (11.8%) of respondents hold their diploma and the rest 6 (8.8%) of respondents are holders of second degree.

Regarding the current position of respondents, 29(42.6%) of respondents are site managers who frequently interact with project work and day today activity. 20(24.2%) of respondents are other, which is foreman and office engineer who control the activity and give payment for the employee 16(23.5%) of respondents are supervisors.

The above table shows that, among 68 sampled respondents, 76.5% of the total respondents were of age below 30 and above 18 years or there were young adults, 20.6 % of them were of age 31 to 40 years or middle-aged adults, and only 2.9 % of the respondents were between 41 and 50 years old.

4.4 Ranking of the Delay Factors

table 4. 3: Ranking of delay factors

Delay factor	Mean	Rank
client related	3.4632	1
consultant related	3.3480	4
contractor related	3.3070	5
material and equipment related	3.4294	3
external related	3.4583	2

Source: Survey (SPSS V.20 output 2023)

According to the mean value, the above table shows the various rankings of the delay factor. According to the ranking, the level of significant influencing elements from high to low is those that are client (3.4632), external (3.4583), material and equipment (3.4294), consultant (3.3480), and contractor (3.3070)-related respectively.

4.5 Level of Project Delays Causes

This response analysis presents respondents' opinion regarding their level of agreement on six dimensions with various questions about cause's project time delays. The results were interpreted based on the following measurement scale intervals or range; 4.51-5.00 very excellent, 3.51-4.50 very good, 2.51-3.50 good or average or moderate, 1.51-2.50 fair and 1.00-1.50 poor (Aster, 2018).

table 4. 4: the client related factors (N=68)

Client related factors	Never		Rarely		Sometimes		Often		Greatly often		Mean
	N	%	N	%	N	%	N	%	N	%	
Slow and late payments by the clients	2	2.9	8	11.8	12	17.6	29	342.6	17	25	3.75
Change orders (changes about design or working Process	4	5.9	14	20.6	26	38.2	13	19.1	11	16.2	3.19
Delay in paying compensation to land owners	7	10.3	10	14.7	8	11.8	22	32.4	21	30.9	3.59
Lack of sufficient cash for project implementation	13	19.1	2	2.9	10	14.7	20	29.4	23	33.8	3.56
Bureaucracy in client organization	6	8.8	8	11.8	17	25.0	25	36.8	12	17.6	3.43
Type of project bidding and award (lowest bidder)	9	13.2	12	17.6	10	14.7	20	29.4	17	25.0	3.35
Delay in site mobilization	8	11.8	10	14.7	8	11.8	28	41.2	14	20.6	4.44
Slow decision making	11	16.2	6	8.8	5	7.4	37	54.4	9	13.2	4.40
Grand mean											3.4632

Source: Survey (SPSS V.20 output 2023)

In analyzing causes of project schedule performance delay, respondents' perceived project schedule performance delay causes are client related factors. The mean score 3.4632 was rated as good or moderate. It implies that it needs cautions in client related factors schedule as issues such as Slow and late payments by the clients, Change orders (changes about design or working Process, paying compensation to land owners, sufficient cash for project implementation, Bureaucracy in client organization, Type of project bidding and award (lowest bidder), site mobilization, decision making shall also be taken into account.

table 4. 5: the consultant related factors (N=68)

Consultant related	Never		Rarely		Sometimes		Often		Greatly often		Mean
	N	%	N	%	N	%	N	%	N	%	
Late in revising and approving design documents	6	8.8	7	10.3	18	26.5	14	35.3	13	19.1	3.46
Inaccurate cost estimation	3	4.4	13	19.1	10	14,7	26	38.2	16	23.5	3.57

Design and contract document error	6	8.8	12	17.6	18	26.5	15	22.1	17	25.0	3.37
No approval of contractor submittals	5	7.4	21	30.9	16	23.5	16	23.5	10	14.7	3.07
non-availability of consultant's staff on site	19	27.9	1	1.5	9	13.2	19	27.9	20	29.4	3.29
Improper project planning and scheduling	9	13.2	8	11.8	15	22.1	24	35.3	12	17.6	3,32
Inaccurate initial project scope estimate	10	14.7	10	14.7	7	10.3	24	35.3	17	25.0	3.41
Insufficient data collection and survey before design	8	11.8	12	17.6	6	8.8	28	41.2	14	20.6	3.41
Inadequate experience of consultants	15	22.1	6	8.8	5	7.4	33	48.5	9	13.2	3.22
										Grand mean	3.3480

Source: Survey (SPSS V.20 output 2023)

In analyzing causes of project schedule performance delay, respondents' perceived project schedule performance delay causes are consultant related factors. The mean score 3.3480 was rated as good or moderate. It implies that it needs cautions in consultant related factors schedule as issues such as experience of consultants, data collection and survey before design, initial project scope estimate, Improper project planning and scheduling, availability of consultant's staff on site**,** approval of contractor submittals. Design and contract document, cost estimation, revising and approving design documents shall also be taken into account.

table 4. 6: the contractor related factors (N=68)

Contractor related	**Never**		**Rarely**		**Sometimes**		**Often**		**Greatly often**		**Mean**
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Delays in sub-contractor's work	2	2.9	9	13.2	18	26.5	24	35.3	15	22.1	3.60
Utilization of old techniques and methods for construction Process	13	19.1	8	11.8	11	16.2	22	32.4	14	20.6	3.24
Inadequate management and supervision by the contractor	12	17.6	9	13.2	9	13.2	23	33.8	15	22.1	3.29
Rework due to faults during	10	14.7	2	2.9	20	29.4	18	26.5	18	26.5	3,47

construction											
Incorrect construction methods followed by the contractor	10	14.7	16	23.5	19	27.9	13	19.1	10	14.7	2.96
Lack of adequate training on construction management techniques for Contractor's staffs	11	16.2	6	8.8	12	17.6	21	30.9	18	26.5	3.43
Ineffective resource management	9	13.2	12	17.6	12	17.6	24	35.3	11	16.2	3.24
Inadequate experience of contractor	13	19.1	10	14.7	10	14.7	18	26.5	17	25.0	3.24
										Grand mean	3.3070

Source: Survey (SPSS V.20 output 2023)

The finding shows that contractor related factor is one of the causes of project schedule performance delay in the kt road construction project as shown by the largest mean of 3.60. The grand mean 3.307 was rated as good; it implies there is a moderate cause that creates delay in project activities. Research outcomes of the study in the above table show that all the mean values were greater than 3.24 and less than 3.783; this is an indication that the respondents agreed with the delay in the schedule performance of kt road construction project.

table 4. 7: the material and equipment related factors (N=68)

Material and equipment related factors	**Never**		**Rarely**		**Sometimes**		**Often**		**Greatly often**		**mean**
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Quality of material	8	11.8	15	22.1	20	29.4	14	20.6	11	16.2	3.07
Shortage of construction materials	6	8.8	11	16.2	7	10.3	25	36.8	19	27.9	3.59
Lack of high-technology mechanical equipment	9	13.2	2	2.9	21	30.9	24	35.3	12	17.6	3.41
Escalation of the materials price	7	10.3	11	16.2	7	10.3	22	32.4	21	30.9	3.57
Insufficient equipment	9	13.2	7	10.3	6	8.8	33	48.5	13	19.1	3.50
										Grand mean	3.4294

Source: Survey (SPSS V.20 output 2023)

The finding shows that material and equipment related factor related factor is one of the causes of project schedule performance delay in the kt road construction project as shown by the largest mean of 3.50. The grand mean 3.4294 was rated as good; it implies there is a moderate cause that creates delay in project activities. Research outcomes of the study in the above table show that all the mean values were greater than 3.07 and less than 3.783; this is an indication that the respondents agreed with the delay in the schedule performance of kt road construction project.

table 4. 8: external related factors (N=68)

External related factors	**Never**		**Rarely**		**Sometimes**		**Often**		**Greatly often**		**Mean**
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Unforeseen site conditions	5	7.4	14	20.6	23	33.8	14	20.8	12	17.6	3.21
Natural disasters	6	8.8	12	17.6	9	13.2	23	33.8	18	26.5	3.51
Bureaucracy and changes of government regulations	16	23.5	2	2.9	15	22.1	23	33.8	12	17.6	3.19
Effect of local community	8	11.8	8	11.8	10	14.7	21	30.9	21	30.9	3.57
Shortage of foreign currency for importation of materials	4	5.9	9	13.2	5	7.4	36	52.9	14	20.6	3.69
Delay in relocating utilities	4	5.9	13	19.1	4	5.9	34	50.0	13	19.1	3.57
										Grand mean	3.4583

Source: Survey (SPSS V.20 output 2023)

The finding shows that external related factor is one of the causes of project schedule performance delay in the kt road construction project as shown by the largest mean of 3.69. The grand mean 3.4583 was rated as good; it implies there is a moderate cause that creates delay in project activities. Research outcomes of the study in the above table show that all the mean values were greater than 3.19 and less than 3.783; this is an indication that the respondents agreed with the delay in the schedule performance of kt road construction project.

table 4. 9: The project delay (N=68)

Project delay	**Never**		**Rarely**		**Sometimes**		**Often**		**Greatly often**		**Mean**
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	

The project is highly delay as compared to the project schedule time	12	17.6	4	5.9	8	11.8	24	35.3	20	29.4	3.53
The project is highly delayed as compared to the total task that conducted in the project	2	2.9	4	5.9	18	26.5	31	45.6	13	19.1	3.72
The project is highly delayed as compared to other contemporary projects	3	4.4	6	8.8	13	19.1	28	41.2	18	26.5	3.76
The delayed project will expect to accomplished in the rescheduled time	2	2.9	3	4.4	1	2.9	39	57.4	22	32.4	4.12
										Grand mean	3.783

Source: Survey (SPSS V.20 output 2023)

Survey outcomes in the above table show that all the mean values were greater than 3.50 and less than 4.12; this is an indication that the respondents agreed with the various statements on attitude towards project schedule performance delay. The grand mean score 3.783 was rated as very good; it implies there is high project schedule performance delay.

4.6 Inferential Statistics

4.6.1 Correlation Analysis

The study makes use of scale-typed questionnaires that are sent to pertinent respondents and questionnaire replies that are encoded in the SPSS 20 version. The goal of the study is to assess the degree to which the dependent variable, project delay, and the independent variables, client-related, consultant-related, contractor-related, material and equipment-related, and external-related, are related to one another.

Simple correlation analysis, in contrast to multiple regression analysis, makes an effort to characterize the direction of relationship between two variables. As a result, there is a positive association between all of the independent factors and project delay, according to the correlation matrix analysis.

The dependent and independent variables in this study were analyzed using a straightforward bi-variate association analysis. According to (Aster, 2018), the relationship between two variables will be rated as having a relationship between 0.01 and 0.09 negligible association, 0.10 and 0.29 low association, 0.30 and 0.49 moderate association, 0.50 and 0.69 substantial association, and 0.70 and above very strong association in this study. To determine the strength of the correlation between the variables, a Pearson's Product Moment Correlation was performed. The table below presents the results.

table 4. 10: result of correlation Pearson correlation

Correlations

		client related factors	consultant related factors	contractor related factors	material and equipment related factors	external related factors	project delay
client related factors	Pearson Correlation	1	.941**	.907**	.921**	.979**	.823**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	68	68	68	68	68	68
consultant related factors	Pearson Correlation	.941**	1	.957**	.903**	.921**	.800**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	68	68	68	68	68	68
contractor related factors	Pearson Correlation	.907**	.957**	1	.935**	.878**	.780**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	68	68	68	68	68	68
material and equipment related factors	Pearson Correlation	.921**	.903**	.935**	1	.921**	.696**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	68	68	68	68	68	68
external related factors	Pearson Correlation	.979**	.921**	.878**	.921**	1	.787**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	68	68	68	68	68	68
project delay	Pearson Correlation	.823**	.800**	.780**	.696**	.787**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	68	68	68	68	68	68

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

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

Source: Survey (SPSS V.20 output 2023)

4.6.1.1 Multicollinearity Test

When two or more predictor variables are associated, problems may occur. The VIF measures how much the variance has been inflated in order to identify multicollinearity. According to (Frost, 2017), a VIF greater than 10 is regarded to imply hazardous multi collinearity.

table 4. 11: Summary of Collinearity Statistics

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	client related	.030	3.103
	consultant related	.044	2.592
	contractor related	.041	4.203
	material and equipment related	.067	4.891
	external related	.031	2.002

Source: Survey (SPSS V.20 output 2023)

According to (Stephanie, 2018), who stated that a VIF larger than 10 is a cause for concern, the Variance inflation factor (VIF) was evaluated in all of the analyses and is not a cause for concern.

4.6.1.2 Normality Test

Because Kurtosis and Skewness are between -2 and +2, this study's descriptive statistic of Kurtosis and Skewness statics computation shows that the distribution is normal and that the data had a reasonable variance for use in further analysis. Inferred from the results of the histogram test for normality, the study discovered that both tests' significance levels were less than 0.05, which results in the rejection of the null hypothesis that the data for all variables were not normally distributed.

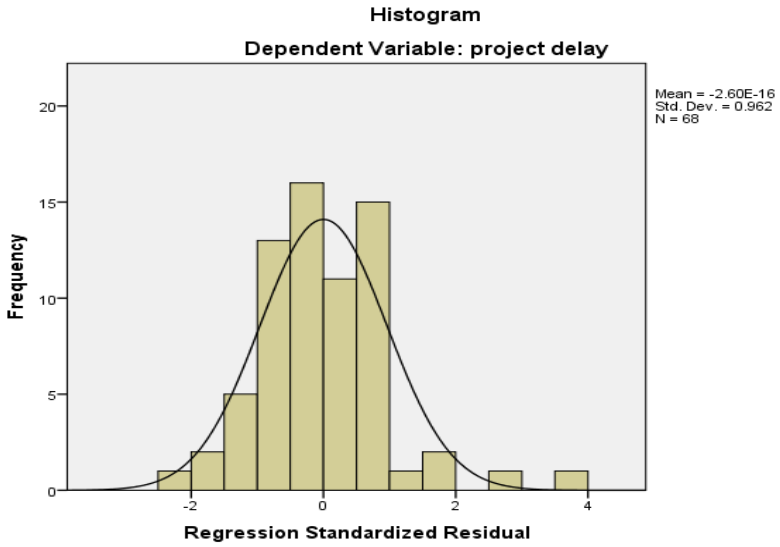


figure 4. 1: Histogram

Source: Survey (SPSS V.20 output 2023)

4.6.1.3 Test for Autocorrelation

Autocorrelation is a term used to describe a lack of independence when the observations follow a natural order in time or space. The covariance between the error terms across time (or cross-sectional, for that sort of data) is assumed to be zero for the multiple linear regression disturbance terms. In this investigation, the well-known Durbin-Watson Test was used to determine whether autocorrelation existed. The independence requirement is satisfied for this study because the Durbin-Watson statistic of 2.379 with the given range of 1.5 to 2.5 indicates that the residuals are uncorrelated (Frost, 2017).

table 4. 12: Result of Durbin-Watson (N=68)

Model	Durbin-Watson
1	2.379

Source: Survey (SPSS V.20 output 2023)

4.6.2 Regression Analysis, interpretation and generalization of findings

Regression analysis carried out to determine the degree of independence between the independent and dependent variables. Regression modeling is therefore used to investigate the impact of a few delay-related elements, including those that are client-, consultant-, contractor-, material-, equipment-, and externally-related. Therefore, when independent variables in a

regression model are correlated, the multi collinearity test is used. Because independent variables should be independent, this association is problematic. When fitting the model and interpreting the findings, it can be problematic if there is a high enough degree of correlation between the variables.

table 4. 13: Regression Test Results Model Summary (N=68)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.871a	.758	.738	.40555

a. Predictors: (Constant), external related, contractor related, material and equipment related, consultant related, client related

b. Dependent Variable: project delay

Source: Survey (SPSS V.20 output 2023)

The multiple regression test result is shown in the above table, and its measurement is done by extrapolating the value of R2 to explain the amount of the independent variable's effect on the dependent variable. The linear regression of five independent factors and the dependent variable is shown below. As seen in the above table, the dependent variable was explained by the five independent variables in a total bundle that explained 75.8% of them (R2 =0.758). This shows that whereas 24.2% of the project delay is controlled by other unexplained factors in this study, 75.8% of the project delay is dependent on the mentioned independent variables.

table 4. 14: Regression Test Results ANOVA (N=68)

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	31.916	5	6.383	38.810	.000[b]
	Residual	10.197	62	.164		
	Total	42.113	67			

a. Dependent Variable: project delay

b. Predictors: (Constant), external related factors, contractor related factors, material and equipment related factors, consultant related factors, client related factors

Source: Survey (SPSS V.20 output 2023)

The combination of determinant factors has a positive effect on project delay, which is statistically significant, as shown by the second table's result F= 38.810. Thus, the null hypothesis is rejected by this investigation. To ascertain whether any of the predictor variables are connected to the explanatory variable in the model equation, the F-test is performed. The validity of the model equation is demonstrated by the fact that at least one independent variable is linearly related to the dependent variable, as shown by the F significant value of less than 0.05 in Table 4.14 above.

table 4. 15: Test of Significance - Regression Test Results Coefficients (N=68)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.808	.174		10.373	.000
	client related	.709	.269	.949	2.640	.010
	consultant related	.227	.205	.328	1.105	.273

contractor related	.639	.207	.949	3.088	.003
material and equipment related	.713	.175	.983	4.078	.000
external related	.177	.269	.232	.657	.514

Source: Survey (SPSS V.20 output 2023)

We receive two partial statistics—unstandardized slopes—from the regression equation. OLS unstandardized coefficients can be understood as a coefficient-sized rise (drop) in Y is related with a one-unit increase in X. The results of an analysis on variables that have been standardized so that their variance is 1 are known as standardized coefficients. As a result, they can be compared to one another because they are expressed in "standard deviation" terms or units. Unstandardized coefficients, however, actually state the change in Y for every change in X of one unit. Additionally, he said that the model summary table shows how closely the independent and dependent variables are related.

4.6.2.1Linearity Test

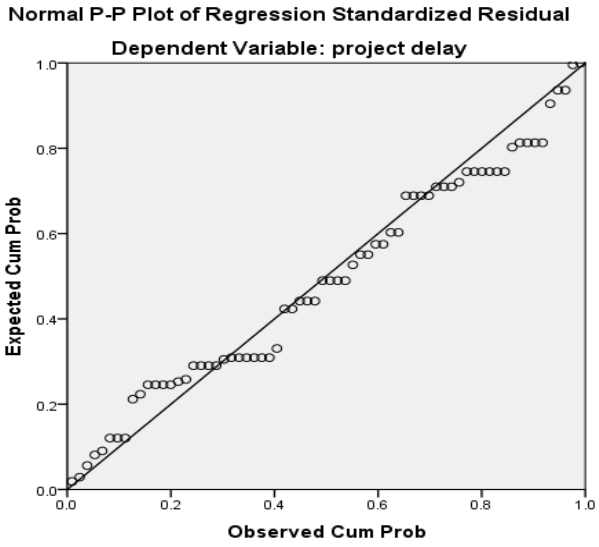


figure 4. 2: Normal P-P Plot

Source: Survey (SPSS V.20 output 2023)

A straight-line function of the independent variables, X', yields the mean value of the response variable (Y). A deviation from this presumption can suggest that the connection between the answer and the explanatory variables is not linear. As a result, the linear regression model might

not be appropriate or suitable for the data at hand. The graph below demonstrates that the regression can proceed as a result.

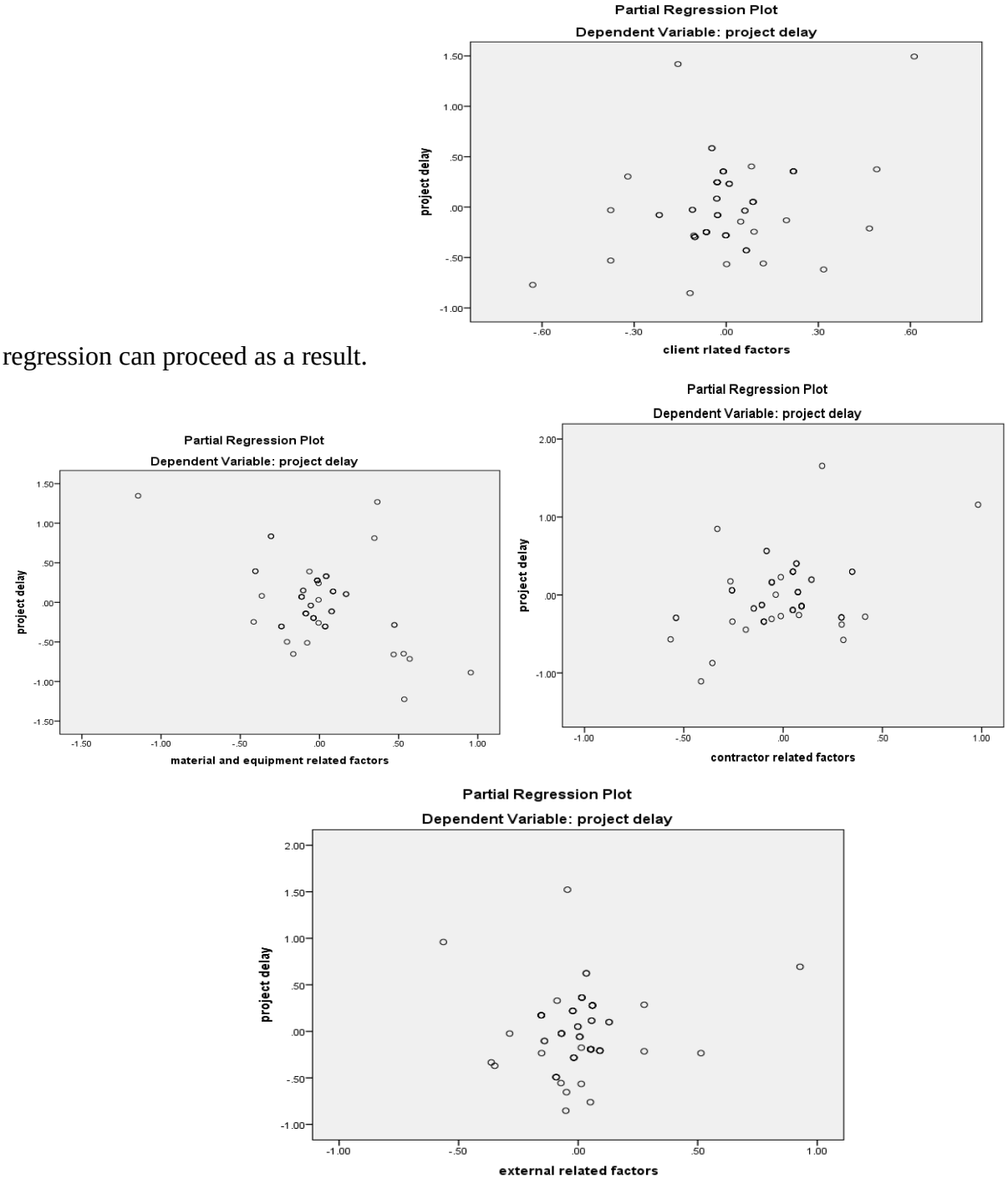


figure 4. 3: Scatter Plots

Source: Survey (SPSS V.20 output 2023)

If the homoscedasticity assumption is true, the residuals will appear to be randomly dispersed all over the place around the horizontal line around ri=0. The homoscedasticity assumption appears to have been met, as seen in the test result of a residual plot depicted in the above image, which shows a relatively equal grouping of residuals along the horizontal line in a rectangular shape. It refers to the homogeneity of variances, meaning that the variance is the same across all treatment groups. The same residual plots of the standardized residuals and predicted values shown in the assumption of linearity can be used to visually examine the homoscedasticity assumption. If the homoscedasticity assumption is true, the residuals will appear to be randomly dispersed all over the place around the horizontal line around ri=0. The hypothesis of homoscedasticity seemed to have been met as the test result of a residual plot showed a relatively equal grouping of residuals along the horizontal line in a rectangular shape.

4.6.2.2 Error Term

The initial presumption necessary is that the average value of the errors is zero, as stated by the error term test (E (Ut) = 0). The average value of the error term in this study is therefore anticipated to be zero because the constant term (i.e.) was included in the regression equation.

4.6.2.3 Model Specification

The multiple linear regression model of the study is based on the theoretical regression model as indicated follows

$Y=a+\beta 1x1+\beta 2x2+\beta 3x3+\beta 4x4+\beta 5x5+e$

$Y=1.808+ 0.709x1+0.227\ x2+0.639\ x3+0.713x4+0.177\ x5 + e$

Y is the project delay, and a is the y intercept. e stands for the error term, while X1 to X5 are the project delay causes. Although the mathematical interpretation is the average value of Y when the stated independent variables are set to zero, a, the intercept term, gives the mean or average effect on Y of all the variables omitted from the formula. The numbers 1 to 5 denote the coefficient of each independent variable, which calculates the change in the mean value of Y for every unit change in each independent variable. The highest beta values showed that the external related and client related were the key factors contributing to project.

4.7 hypothesis testing

The goal of this study was to identify the reasons behind the construction project's delays on the kality-tuludimtu(kt)road and make suggestions for mitigating measures to address the issue. As a result, the following discussion of the study's findings is based on the hypothesis and issues mentioned in Chapter one.

H_1: client related causes for schedule performance will have positive and significant effect on the schedule performance delay.

The results of multiple regression are shown in table 4.15 and show that the state of the client -related component has a positive and significance impact on project delay (B=0.709, t = 2.640, and p< 0.05). The pre-established hypothesis was therefore supposed to be accepted because the significance threshold of 0.01 is less than 0.05. This is consistent with the findings of (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016), who found that client-related delay factors in construction projects in Jordan included client changes to the design, using the lowest bid that resulted in low performance, changes to the scope of the project, delays in client progress payments, a lack of client and contractor cooperation, and delays in the approval of contractor submittals. (M. Haseeb,et.al, 2011) also found that client-related delay factors included economic ability/economic feasibility.

H_2: consultant related causes for schedule performance will have positive and significant effect on the schedule performance delay.

The results of multiple regression are shown in table 4.15 and show that the state of the consultant -related component has a positive but insignificance impact on project delay (B=-0.227, t = -1.105, and p> 0.05). The pre-established hypothesis was therefore supposed to be disproved because the significance threshold of 0.273 is more than 0.05. This result is in contrast to their findings of (Assaf, S.A., & Al-Hejji, S., 2006) found that major delay factors included design flaws caused by designers, changes in types and specifications during construction, and inadequate communication between owner and consultant throughout the design stage. And according to research by (M. Haseeb,et.al, 2011), inadequate and tardy project information, missing details in drawings, prioritizing construction time, a lack of understanding of customer requirements, and the consultant's poor design skills were the main causes of delays. this shows that consultant related factors have an impact on the project schedule performance delay but not significantly.

H_3: contractor related causes for schedule performance will have positive and significant effect on the schedule performance delay.

The results of multiple regression are shown in table 4.15 and show that the state of the contractor-related component has a positive and significance impact on project delay (B=0.639, t = 3.088, and p< 0.05). The pre-established hypothesis was therefore supposed to be accepted because the significance threshold of 0.03is less than 0.05 and This finding is consistent with (Kang sik wei., 2010) conclusion, which identified delays in subcontractors' work, poor communication and coordination, inadequate contractor work, ineffective project planning and scheduling, conflicts in subcontractors' schedules, improper construction methods implemented, frequent changes in subcontractors, rework due to errors during construction, conflicts between contractor and other parties, and challenges with project financing as the main causes of project delays. In addition to the as a result of (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016), which came to the conclusion that, inadequate management and supervision by the contractor, inadequate planning and control by the contractor, rework due to mistakes made during construction, low level productivity, technical problems experienced by the contractor, incorrect construction methods used by the contractor, cash flow issues experienced by the contractor, and delay due to sub-contractor's works as contractors related delay factors in Jordan.

H_4: material and equipment for schedule performance will have positive and significant effect on the schedule performance delay.

The state of the material and equipment related component has a positive and significance on project delay, as evidenced by the results of multiple regression displayed in table 4.15 (B=0.713, t = 4.078, and p< 0.05). Thus, it was intended that the pre-established hypothesis be accepted because the significance level of 0.00 is lower than 0.05. This outcome is consistent with the findings of (Y. Amare, et.al, 2017) and (Werku Koshe & K. N. Jha., 2016) which investigated the high significance of a lack of high-tech mechanical equipment and a rise in material costs, respectively, for project delay. This means that because of there is no full access advanced equipment, high material cost inflation, unstable market condition, low material quality the road construction project is not performed in the established time.

H_5: external related causes for schedule performance will have positive and significant effect on the schedule performance delay.

According to the results of multiple regression shown in table 4.15 (B=0.177, t = 0.657 and p> 0.05), the state of the external environment has a positive and insignificant impact on project

delay. Consequently, the pre-established hypothesis was intended to be rejected. The study's conclusions are in contrast to those of prior research by (K. Khair, et.al, 2016), which found that the causes of delays in road development projects in Sudan were determined to be externally related variables.

table 4. 16: summary of regression findings

Hypothesis	Sig.	Outcome	Decision
H_1: client related causes for schedule performance will have positive and significant effect on the schedule performance delay.	0.01	Positive	Significant
H_2: consultant related causes for schedule performance will have positive and significant effect on the schedule performance delay.	0.273	Positive	Insignificant
H_3: contractor related causes for schedule performance will have positive and significant effect on the schedule performance delay.	0.03	Positive	Significant
H_4: material and equipment for schedule performance will have positive and significant effect on the schedule performance delay	0.00	Positive	Significant
H_5: external related causes for schedule performance will have positive and significant effect on the schedule performance delay.	0.514	Positive	Insignificant

CHAPTER FIVE

SUMMARY AND DISCUSION OF FINDING, CONCULUSION AND RECOMMENDATION

This chapter main deals with the summary and discussion of major findings of the study and respective conclusions drawn from the analysis made, additionally, based on these findings the study will make possible recommendations.

5.1 Summary and discussion of major findings

A reliability test on a subset of the questionnaire's items was undertaken to ensure that the study project's objectives would be met, and as shown in table 3.1, the questionnaire's acceptable and dependable reliability score was 0.986.

In accordance with table 4.2s demographic information, 29 respondents (or 42.6%) are site managers, 20 respondents (or 24.2%) are other and the remaining 16(23.5%) of respondents are supervisors. Looking at the respondents' educational backgrounds, indicated 54(79.4%) of respondents are first degree holders 8 (11.8%) of respondents hold their diploma and the rest 6 (8.8%) of respondents are holders of second degree shows demographical characteristics of projects, as.

Additionally, correlation analysis made and table 4.10 depicts that some independent variables i.e., client related factors, contractor related factor and material and equipment related factor are positively and significantly correlated with dependent variable i.e. (project delay) at 1% level of significance. The highest correlation is attached to client related factors.

In order to test the hypothesis, multiple regression analysis was done. The findings are shown in table number 4.15 and the tested model yields an adjusted R2 of 0.758 at the $p<0.05$ significant level. The result shows that the five independent variables listed under this study are responsible for 75.8% of the delay. Other factors could be to blame for the remaining 24.2% of the variance

in project schedule delay. Consequently, three of the pre-established five hypotheses are accepted by using the data in table number 4.15.

As a result, elements relating to the client, contractor and material and equipment related factors were discovered to have a dominant impact on the project's performance delay. The study's other component, while helpful, did not significantly contribute to the project's delay.

The results of multiple regression are shown in table 4.15 and show that the state of the client -related component has a positive and significance impact on project delay (B=0.709, t = 2.640, and p< 0.05). The pre-established hypothesis was therefore supposed to be accepted because the significance threshold of 0.01 is less than 0.05. This is consistent with the findings of (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016), who found that client-related delay factors in construction projects in Jordan included client changes to the design, using the lowest bid that resulted in low performance, changes to the scope of the project, delays in client progress payments, a lack of client and contractor cooperation, and delays in the approval of contractor submittals. (M. Haseeb,et.al, 2011) also found that client-related delay factors included economic ability/economic feasibility.

The results of multiple regression are shown in table 4.15 and show that the state of the consultant -related component has a positive and insignificance impact on project delay (B=-0.227, t = -1.105, and p> 0.05). The pre-established hypothesis was therefore supposed to be disproved because the significance threshold of 0.273 is more than 0.05. This result is in contrast to their findings of (Assaf, S.A., & Al-Hejji, S., 2006) found that major delay factors included design flaws caused by designers, changes in types and specifications during construction, and inadequate communication between owner and consultant throughout the design stage. And according to research by (M. Haseeb,et.al, 2011), inadequate and tardy project information, missing details in drawings, prioritizing construction time, a lack of understanding of customer requirements, and the consultant's poor design skills were the main causes of delays.

The results of multiple regression are shown in table 4.15 and show that the state of the contractor-related component has a positive and significance impact on project delay (B=0.639, t = 3.088, and p< 0.05). The pre-established hypothesis was therefore supposed to be accepted because the significance threshold of 0.03is less than 0.05 and This finding is consistent with (Kang sik wei., 2010) conclusion, which identified delays in subcontractors' work, poor

communication and coordination, inadequate contractor work, ineffective project planning and scheduling, conflicts in subcontractors' schedules, improper construction methods implemented, frequent changes in subcontractors, rework due to errors during construction, conflicts between contractor and other parties, and challenges with project financing as the main causes of project delays. In addition to the as a result of (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr., 2016), which came to the conclusion that, inadequate management and supervision by the contractor, inadequate planning and control by the contractor, rework due to mistakes made during construction, low level productivity, technical problems experienced by the contractor, incorrect construction methods used by the contractor, cash flow issues experienced by the contractor, and delay due to sub-contractor's works as contractors related delay factors in Jordan.

The state of the material and equipment related component has a positive and insignificance on project delay, as evidenced by the results of multiple regression displayed in table 4.15 (B=0.713, t = 4.078, and p< 0.05). Thus, it was intended that the pre-established hypothesis be accepted because the significance level of 0.00 is lower than 0.05. This outcome is consistent with the findings of (Y. Amare, et.al, 2017) and (Werku Koshe & K. N. Jha., 2016) which investigated the high significance of a lack of high-tech mechanical equipment and a rise in material costs, respectively, for project delay.

According to the results of multiple regression shown in table 4.15(B=0.177, t = 0.657 and p> 0.05), the state of the external environment has a positive and insignificant impact on project delay. Consequently, the pre-established hypothesis was intended to be rejected. The study's conclusions are in contrast to those of prior research by (K. Khair, et.al, 2016), which found that the causes of delays in road development projects in Sudan were determined to be externally related variables.

5.2 Conclusion

The study's conclusion was reached through a comparison of project-specific goals with actual outcomes. Therefore, the study's overall goal was successfully attained, and the timetable performance of the KT road building project was influenced by a number of different elements. Thus, the study comes to the conclusion that client, contractor and material and equipment related factors have a considerable favorable impact on schedule performance delay, which is in line with the findings of (K. Khair, et.al, 2016), who come to the conclusion that the factors that

caused delays in road construction projects in Sudan included those related to the contractor, the owner/client, the government, and externally related factors. A lack of fuel, a lack of contractor cash flow, a lack of foreign currency for importing materials and equipment, slow client payment practices for progress payments, a lack of equipment, a lack of construction materials, a delay in compensating landowners, a lack of technical staff, and other factors are also identified as contributing to project delays (Kamanga, M., and Steyn, W.J., 2013).

The study comes to the conclusion that project delay is positively but negligibly impacted by consultant-related factors. This result is in contrast to their findings of (Assaf, S.A., & Al-Hejji, S., 2006)found that significant delay factors included design flaws brought on by designers, changes in types and specifications during construction, and insufficient communication between owner and consultant throughout the design stage. And according to research by (M. Haseeb,et.al, 2011) , the primary reasons for delays included incomplete and delayed project information, missing features in drawings, prioritizing construction time, a failure to comprehend client requirements, and the consultant's subpar design abilities.

The study's findings, which are in contrast to those of result claimed by (K. Khair, et.al, 2016), which found that the causes of delays in road development projects in Sudan were determined to be externally related variables. But the result show that factors related to external related factors have a positive impact on project schedule performance delay of the kality tuludimitu (KT) road construction project but are not statistically significant. because p=0.514 indicates that the significance threshold is bigger than 0.05.

5.3 Recommendation

In view of the previous result, the researcher suggests the senior management of the kality tuludimtu (KT) road building project consider the following corrective actions into account.

- ✓ The client must prepare the work site, provide a suitable design, prepare for adequate planning, and assign an appropriate budget that is in line with the construction contract's timetable.
- ✓ Paying contractors their progress payments late will make it harder for them to fund the project. Client and contractor should collaborate closely so that the bank or other financial institution releases the funds on time.
- ✓ Contractors should have enough money based on the cash flow to start the project in order to run the project smoothly. Contractors should also able to manage its financial by utilizing progress payments

- ✓ Contractors should always take inventory of the quantity of materials on site so as to know when it is due for replacement to avoid delay caused by shortage of materials. Therefore, contractors should ensure that materials are always on site before its use.

5.5 Areas for Further Research

The researcher believed that this study should be extended so as to cover all mega projects in Ethiopia as the researcher believes that the current study was carried out at kality -tuludimtu(kt) road construction projects and the focus was only directed to delays but ignored cost escalation that happen by schedule delay and quality of the project.

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DEPARTMENT OF PROJECT MANAGEMENT

Research Questionnaire on Perceived causes of delay on kality- tuludimtu (kt) road construction project

Dear Respondent

My name is Sisay Gebretsadik. I am currently doing my MA in project management at St. Mary`s University School of graduate studies. I am conducting research about perceived causes of delay on kality- tuludimtu (kt) road construction project. The focus of the study is kality-tuludimtu (kt) road construction project office. I believe that your experience and knowledge related to road construction projects will help me acquire valuable information on the cause of kality- tuludimtu (kt) road construction project delay. I kindly invite you to help me in completing the attached questionnaire as honestly as possible. I guarantee that your identity will be kept confidential and the information will only be used for academic purposes. Your kind assistance in this aspect is highly appreciated. Thank you for sharing your precious time.

Note: Writing your name is not necessary.

Yours sincerely

Sisay Gebretsadik

Graduate Student, Project Management

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Email: sisaygk14@gmail.com

Advisor: Maru Eshete(PhD, associated professor)

SECTION A : General Information

Please thick on the answer which describes you

1. Gender

Male ☐ Female ☐

2. Age

18-30 yrs ☐ 41-50 yrs ☐

31-40 yrs ☐ 51-60 yrs ☐

Over 60 yrs ☐

3.Responsibility of state Respondent

Client ☐ Contractor ☐ Consultant ☐

4.Respondent Designation in the company

Owner ☐ Project Manager ☐ Site Engineer ☐

Resident Engineer ☐ Supervisor ☐ Other, specify _____

5. Level of Education

Diploma ☐ 2nd Degree ☐

1st Degree ☐ PHD ☐

6. Relevant working Experience (years)

1-5 Years ☐ 11-15 years ☐

6-10 years ☐ Greater than 15 years ☐

SECTION B: Causes of Delays

Please rank the delay causing factors below based on frequency of occurrence in road construction projects.

Category	Never	Rarely	Sometimes	Often	Greatly often
Rating	1	2	3	4	5

Please indicate on boxes using the following criteria

Causes of Delay		**Frequency**				
		1	2	3	4	5
1. Client Related	1. Slow and late payments by the clients					
	2.Change orders (changes about design or working process					
	3.Delay in paying compensation to land owners					
	4. Lack of sufficient cash for project implementation					
	5.Bureaucracy in client organization					
	6. Type of project bidding and award (lowest bidder)					
	7. Delay in site mobilization					
	8. Slow decision making					
2. Consultant Related	1.Late in revising and approving design documents					
	2. Inaccurate cost estimation					
	3.Design and contract document error					
	4. No approval of contractor submittals					
	5.non-availability of consultant's staff on site					
	6. Improper project planning and scheduling					
	7. Inaccurate initial project scope estimate					
	8. Insufficient data collection and survey before design.					

	9. Inadequate experience of consultants					
3.Contractor Related	1. Delays in sub-contractor's work					
	2. Utilization of old techniques and methods for construction					
	3.Inadequate management and supervision by the contractor					
	4. Rework due to faults during construction					
	5.Incorrect construction methods followed by the contractor					
	6. Lack of adequate training on construction management techniques for Contractor's staffs					
	7.Ineffective resource management					
	8. Inadequate experience of contractor					
4. Material and Equipment Related	1. Quality of material					
	2. Shortage of construction materials					
	3. Lack of high-technology mechanical equipment					
	4. Escalation of the materials price					
	5. Insufficient equipment					
5.External Related	1. Unforeseen site conditions					
	2. Natural disasters					
	3. Bureaucracy and changes of government regulations					
	4. Effect of local community					
	5.Shortage of foreign currency for importation of materials					

	6. Delay in relocating utilities					

SECTION C: Questions related to project delay

Please state your level of opinion for the delay time of the project by using the following rating scales: Please tick and fill in the blanks if you select others. Each scale represents the following rating:

Category	Never	Rarely	Sometimes	Often	Greatly often
Rating	1	2	3	4	5

No	Items	Never	Rarely	Sometimes	Often	Greatly often
1	The project is highly delay as compared to the project schedule time					
2	The project is highly delayed as compared to the total task that conducted in the project					
3	The project is highly delayed as compared to other contemporary projects					
4	The delayed project will expect to accomplished in the rescheduled time					

If you have any comments or suggestion regarding the causes of delay on kality-tuludimtu (kt) road construction project or its importance, please specify here