ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

PERCEIVED CAUSES OF PROJECT IMPLEMENTATION DELAY ON THE CASE OF KALITY WASTE WATER LINE AND TREATMENT PLANT REHABILITATION PROJECT

BY

BERHANU SHEWAGO

ID.No. SGS/0629/2007A

June/2017

ADDIS ABABA, ETHIOPIA

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A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ST. MARY'S UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE MASTER OF BUSINESS ADMINISTRATION (MBA) IN PROJECT MANAGEMENT

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APPROVED By BOARD OF EXAMINERS

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DECLARATIONS

I, the undersigned, declared that this thesis is my original work, prepared under the guidance of Teklegiorgis Assefa (Asst. Prof). All sources of materials used for the thesis has been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

BERHANU SHEWAGO **Signature**

St. Mary's University, Addis Ababa **June, 2017**

ENDORCEMENT

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

_____	_____
Teklegiorgis Assefa (Asst. Prof)	**Signature**
St. Mary's University, Addis Ababa	**June, 2017**

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Abbreviations/Acronyms

AAWSA	:	Addis Ababa Water and Sewerage Authority
LC	:	Letter of Credit
MoWUD	:	Ministry of Works and Urban Development
PMBOK	:	Project Management Body Of Knowledge

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ABSTRACT

On-time completion and compliance with assigned project time of every project are the most important factors in the success of project plans. Project delays have been critical problems of many projects around the world in general and in Ethiopia in particular. Taking this into consideration, time overruns is one of the major problems in the construction projects. The main objectives of this research are to assess the dominant causes of project delays and, identifying possible and practical measures that can minimize project delays in Kality waste water line and treatment plant rehabilitation project. These objectives are achieved through the implementation of the research methodologies that are mainly literature review and questionnaire survey conducted to identify and evaluate the significant factors contributing to time overruns within the projects of interest. A review of literature have categorized the factors that cause delays in the four categories, those are due to; contractor's responsibility, Client's responsibility, Consultant's responsibility and external factors. The total of 52 questionnaires were distributed and 46 questionnaires were collected from all parties; managers, team leaders, experts and others. From the data analysis and findings of the research; the top main significant causes of project delays are, waiting time for approval of design, Poor engineering estimate and frequent rework. The top ranked impacts of project delays identified by this research are Loss of end users benefit that will be obtained if it has been completed on time, Project time extension, Contribution to the development of the city would be affected has been ranked in the first, second and third position as impacts of project delays. Finally, the study recommended the ongoing project, Kality waste water line and treatment plant rehabilitation project to have committed leadership and management, timely decision process, advanced contract and project management, systematic control mechanism and effective and efficient strategic planning and management.

***Keywords**: Time overrun, resolution, Time management, Construction Industry, Cause, Effect, Mode, Median, Addis Ababa Water & Sewerage Authority*

CHAPTER ONE
INTRODUCTION

1. Background of the Study

A project according to PMBOK, Project Management Body of Knowledge, (PMI 2013) is a temporary endeavor undertaken to achieve a particular aim. By definition, a project is temporary in nature; that means that it has a specific start and finish date. A project consists of a well-defined collection of small jobs (tasks) and ordinarily culminates in the creation of an end product or products (deliverables). There will be a preferred sequence of execution for the project's tasks (the schedule). Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements, Project Management Body of Knowledge (William 2000).

It has often been said that project management really consists of two major phases doing the right project and doing the project right. Ensuring that your project is based upon a true need and that it has justified from a business standpoint are two important aspects of doing the right project. Project planning, on the other hand, is all about doing the project right. Project planning gets more attention than any other aspect of project management—and justifiably so. It’s hard to imagine how a project could be successful without some planning (Gary Heerkens, 2002).

The successful execution of construction projects and keeping them within estimated time and prescribed schedules depend on a methodology that requires sound engineering judgment. To the dislike of owners, contractors and consultants, however, many projects experience extensive delays and thereby exceed initial time estimates.

Therefore, improving construction efficiency by means of cost-effectiveness and timeliness would certainly contribute to cost savings for the country as a whole. Efforts directed to time effectiveness were associated with managing time, one of the main objectives and policies of any public or private sectors dealing with the execution of projects have to upgrade projects performance, through reduction of costs, completion of projects within their assigned budget and time constraints, and improve quality.

It is hard to imagine how a project could be successful without some planning. Project plans are considered consisting of three fundamental "dimensions"

- **Cost:** how much money that will be spent and how it's budgeted over time
- **Time:** how long it will take to execute work—individually and as a total project
- **Scope:** what is to be done

Project success will have defined as meeting goals and objectives as prescribed in the project plan. A successful project means that the project has accomplished its technical performance, maintained its schedule, and remained within budgetary costs. Project management tools and techniques play an important role in the effective management of a project.

Time management is one of the tools and techniques in project management. Therefore, a good project management lies in the management of tools and techniques used to manage the project.

Project management involves managing the resources—workers, machines, money, materials and methods used. Some projects are effectively and efficiently managed while others are mismanaged, incurring much delay and cost overruns.

Assessing construction projects' time management is critical in today's market-driven economy. Delay to projects is one of the foremost concerns of the construction industry in the Ethiopia. The delays to the projects are affecting the economies throughout the country.

Delay to projects mean the slowdown of development in all other related fields. The main aim and objective of this research is to evaluate the various types of delays and the reasons for those delays that are currently affecting this specific Kality Waste water line and treatment plant rehabilitation project. Kality waste water line and treatment plant rehabilitation project is one of the projects owned by Addis Ababa Water & Sewerage Authority. The project is located in Addis Ababa, Akaki Kality Sub-City Kality area.

Therefore, the purpose of this study is to investigate the causes of project delays and to alleviate and assess the impact of time management on Kality waste water line and treatment plant expansion and rehabilitation project. The proposed new sewer line will accommodate new settlement areas and reduce the high hydraulic load of the existing system significantly. The project designed to upgrade the capacity of the existing sewer line and treatment plant of Addis Ababa city to benefit the industries and government organizations. It has expected that the project will enhance the environmental quality of the Akaki river communities who are residing within the Kaliti wastewater catchment area as well as different industries and government organizations.

Thus, the study on time management of this specific project aims to understand effects of delays in order to answer the following basic questions: What is project delay and what is time overrun in the project? What are the impacts of delay in the project? What are the delay causes in the project?

Therefore, the study has assessed the perceived causes of project implementation delay in Kaliti Waste Water Treatment Plant Rehabilitation Project.

1.2 Statement of the Problems

Cost, time, and quality are used to measure the project performance and success. Generally, the success of a project would be defined by accomplishing it within specified cost, time and quality. Project time will define as duration of the project on the date stated in the contract, or interim completion dates required for phases of the work (Clough, 2000).

It will also define as the duration that has needed to complete the work starting from site handover until finished. “Duration” the time, usually in days, taken to complete the entire project, from starting the first task to finishing the last one (Sunny and Kim Baker, 2003). Estimating the duration of tasks is the most important. This is like trying to predict the future. It has concluded that project time is the duration or time schedule that needed to complete all the project work.

According to Faridi et al. (2006), delays have an adverse impact on project success in terms of time, cost, quality and safety. For the purpose of this research, project delay defined as the time difference between the actual completion time and the estimated completion time, agreed by and between the client and the contractor during signing of the contract. Completion of a project considered as the most important factors of successful projects, which help to decrease problems for all parties and give new chances to construct other related projects. The accomplishment of the projects reveals that the execution of most of the Governments projects resulted in cost and time overruns have determined that the projects is not completed on time, within budget, and desired quality.

Many studies have been conduct in different countries to identify the factors affecting delay in construction projects. Mahamid (2011), indicated that the most severe factors affecting time delay in construction projects in the West Bank in Palestine from the owner perspective

are poor communication between construction parties, poor resource management and delay in commencement, insufficient inspectors, and rework. Odeh and Battaineh (2002), found that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision-making, improper planning, and subcontractors are among the top ten most important factors of construction delay in Jordan.

The population of Addis Ababa city is growing rapidly and provision of water supply and other associated socioeconomic development is increasing from time to time that in turn increases wastewater generation from domestic and other facilities. Sewerage system and a wastewater treatment plant currently serving some parts of Kaliti catchment specifically Bole, Ledeta, and Old Airport, Central part of the City, Mekanisa and Kera areas.

The existing sewerage service system does not satisfy the demand. A lot has to be done to meet the wastewater management system of the city. The undergoing project expected to play important role towards reducing the grave wastewater management problem in the city of Addis Ababa. The Kaliti wastewater line and treatment plant expansion and rehabilitation project, which was implemented to solve the existing wastewater management problem of mainly the southern and southwestern part of the city. The project has three trunk lines i.e. eastern, western and southern that joins the existing wastewater treatment plant at Akaki - Kaliti sub-city. Much of the proposed trunk lines follow the existing functioning sewer lines, which is in a bad shape.

The existing system is working with very high hydraulic load because of some technical problems. Some of the pipes are broken and wastewater is being released in to open grounds and nearby streams.

Project implementation delay also considered a problem, which hinders project's progress, since it decreases the contractor profit leading to huge losses leaving the client as well as the end users in a big trouble. Based on the above indicated problem area this study tried to address the following research questions.

1.3 Research Questions

The researcher formulates the following research questions.

1. What are the types of project delay problems in Kality Waste Water Line and Treatment Plant Rehabilitation Project?
2. What are the impacts of delay and methods to minimize delay in Kality Waste Water Line and Treatment Plant Rehabilitation Project?
3. What are the causes of delay in the project?

1.4 Objectives of the Study

1.4.1 The General Objective

The General objective of this study will assess project implementation delay in Addis Ababa and Kality Waste Water Treatment Plant Projects.

1.4.2 Specific Objectives

The following specific objectives addressed in the study:

1. To discuss the kinds of project delay problems in Kality Waste Water line and Treatment plant Rehabilitation project.

2. To discuss the impacts of delay and methods to minimize delay in Akaki Waste Water line and Treatment plant Rehabilitation project.
3. To identify the causes of delay in the project?

1.5 Significance of the Study

This research based on identifying the cause and effects of Project implementation delay to the public, the Government as well as to stakeholders. This study will help to identify the various problems and their possible alternative solutions. The study might be a contribution to smoothen the time management problem in Kality Waste Water Treatment plant rehabilitation project. The findings and recommendations of this study will be helpful for Government, donors and policy makers. The study will add knowledge to the existing practices and it will serve as a reference for those who will conduct further study.

1.6 Definition of Terms

PMBOK: - Stands for **Project Management Body of Knowledge** and it is the entire collection of processes, best practices, terminologies, and guidelines that are accept as standards within the project management industry.

Deliverable: - is a term used in **project** management to describe a tangible or intangible product or service produced as a result of the **project** that is intended to be delivered to a customer (either internal or external). ... A **project deliverable** may contain a number of documents and physical things.

1.7 Scope and Delimitations of the Study

The study will cover the practice of project implementation delay in Akaki Waste Water Treatment Rehabilitation Project in Addis Ababa, Akaki Kality sub-city, Kaliti area. Therefore, it does not include other projects in the Addis Ababa Water & Sewerage Authority. There are different projects currently underway by Addis Ababa Water & Sewerage Authority Project Office. However, due to time and financial constraints this research is delimited only to assess the project implementation delay on Kality waste water line and treatment plant rehabilitation project. This research would have been required casual research design but used Descriptive research method; this also one of the limitation of the study.

1.8 Organization of the Study

The study organized in to five chapters with the scope of study, so as mentioned above and systematically to deal the fact in the most comprehensive manner chapter one incorporated background of the study, statement of the problems, basic research questions, objective, significance and scope of the study.

The second chapter concern with the review of different researches and related literature dealing with the assessment of Project Time Management. Third chapter present methodologies used in conducting the study and description of the study area, research design, data sources, sample size and sampling procedures, data collection instruments, data collection procedures and methods of data analysis.

Chapter Four include the results and discussion of the study and the data collected will analyze using the data analyses tools. Finally Chapter five contains; conclusion, the possible recommendations made based on the findings and directions for future research.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter identifies previous literature on the subject of project time management and provides a brief discussion of past findings. The definitions, causes, effects and resolutions of project implementation delay in projects as found in the previous studies has provided and discussed.

2.2 Overview of the construction industry

The construction industry is truly the engine of national economy through which the total of physical development achieved and has a great influence on the economy of all countries. The construction industry is a vital element of the economy and has a significant effect on the efficiency and productivity of other sectors.

According to World Bank, 2007, the share of construction industry in developing countries is approximately between 6-9% of the GDP. In Ethiopia, its percentage of GDP (2011) amounts to be 3%, obviously lower than the sub Saharan average of 6% (MoWUD 2006). It is not possible having extensive investment in manufacturing, agriculture or in service sectors without construction of infrastructures facilities. One of the main objective and policies of any Government, public or private sectors dealing with the execution of projects is to enhance project performance through minimization of project completion time to attain a situation where to get a project success with in assigned budget, time and quality.

The ability to complete projects on time and within budget continues to be a serious problem worldwide (Ahmed et al 2002). According to Azhar and Farouqui (2008), observation that the trend of cost overruns is common worldwide.

There is a developing discussion in the construction industry on how to minimize or eliminate delays and cost overruns among professionals, owners of the projects, end users and policy makers.

The Construction Industry continues to grow in size, so do completion on time problems, time overrun and cost overrun. This is because it is common for projects not completed on time and within the initial project budget. There is quite the number of examples at the national and international level; that projects faces delay. For instance, most of the construction projects in Ethiopia have had problems with project delay and cost overruns and this has caused a lot of concern (Becker and Behailu, 2006). Because of constructions; that are not completed on time, less and less work is performed despite the increase construction budgets.

The loss of control on time leads to failure of projects and the shortage of control caused as the result of lack of knowledge and awareness. Completing projects (Small or Large size) within time is an indicator of an efficient construction industry, Chan and Kumaraswamy (1997). They emphasized also that timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery. Failure to achieve targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects. Normally, when the projects are delayed, they are either extended or accelerated and therefore, incur additional costs.

According to Chan and Kumaraswamy (1995), the ability to estimate the completion time is normally dependent on the individual intuition, skill and experience of the planning engineer. According to Chan and Kumaraswamy (1997), The most important cause of delay in Hong

Kong construction industry are poor supervision and management, Unpredictable site conditions, slow decisions, variation by client, and variation of work. According to Mansfield (2002), the most important causes of delay in Nigerian construction industry has finance and payments, poor handling of contract, shortages of materials and equipment, inaccurate estimations and fluctuations of prices.

According to Odeyinka HA Yusif A (1997), the main client related causes of delay in Nigerian construction projects are variation orders, slow decisions, and problems in cash flow. The main contractor related causes of delay in Nigerian construction projects are difficulties in finances, poor site inspection, and shortage of labor, problems in planning and scheduling, and problems in material management & also the main external causes of delay in Nigerian construction projects are natural disasters, weather conditions, conflicts, and labor disputes and strikes.

According to Assaf Sa, Alkhalil M & Al-Hazmi M. (1995), main causes of delay according to clients are slow progress of contractors, labor shortage and poor skills, and errors in design. The main causes of delay according to contractors are design modifications and changes, payments by clients, and approval of payments. The main causes of delay according to consultants and engineers are slow decisions of client, subcontractor issues, and cash flow during construction and payments by clients, and approval and preparation of design and drawings.

It is common to see construction projects failing to accomplish within the specified project period. Hardly few projects are complete on time and within budget. Completing the project or reaching to the end of any project is not a kind of success for the project owner. For the client or owner of the project, success of the project depends on many factors; the most important factors are finishing the project within the budgeted cost and reaching to the closing date of project without project time delay with a good quality of work and creating no health and safety problems, Abd. Majid & McCaffer (1998).

Ismael (1996) reported time overrun is endemic to construction projects in Ethiopia. He discussed the magnitude of delays in percentage and he had examined 13 projects in Ethiopia and obtained the delays encountered in most of the projects range between 100% and 460% of the original contract time. Project delay is the major cause of claims of time extension and associated cost overrun. According to Ibrahim, H.1, Baki, A.2, Atan, I.2 (2012) the failure in estimating reasonable construction duration will jeopardize the successful completion of the projects.

There are needs to establish a tool to estimate construction time performance. According to Tebeje (2016), timely and with budget completion of a construction project frequently seen as a major criterion of project success by clients, contractors, consultants and related stakeholders. Schedule delay could define as a discrepancy where actual completion of the project exceeds the planed period according to the contract (Chabota *et al.,* 2008).

An examination of the records of more than four thousand construction projects by Moris et. al. (1998), showed that projects were rarely finished on time or within the allocated budget. Other researchers Arditi et. al. (1985) have also observed that time and cost overruns are common in the construction industry worldwide.

Al- Khalil and Al- Ghafly (1999), have all show that time overrun occur on the majority of civil engineering contracts and that is a most common problem. Mezher & Tawil (1998), however noted that time overrun in Lebanon construction industry are costing the country a lot of money and that there is a need to find more effective methods to overcome the problem. Mc Manus et al. (1996), who evaluated delay causes in architectural construction projects, concluded that many delays manifest during all project phase and primarily occur during the construction phase; However delays that start in the design phase include inadequate schedule by architects, inability of owners to review design in a timely manner, late incorporation of

emerging technologies in to a design and ineffective coordination and/or conclusion of project user groups.

According to a 2008 Gartner report, 15% of all projects failed because of high cost variance, while 18% were unsuccessful because they were substantially late (Mieritz, & Fizggerald, 2008).

2.3 Definitions of Project, Project Management, Project Time Management, Project Scheduling and Time overrun (Delay)

2.3.1 Project

Different institutions and authors provide different definitions for the concept *project.* According to the project management institute (PMI 2001) a project is "a temporary endeavor undertaken to create a unique product, service, or a result. On the other hand, UNIDO (1986) defined "a project as a proposal for investment to create, expand and/or develop certain facilities in order to increase the production of goods and/ or services in a community during a certain period of time". A project is a group of linked activities leading to the delivery of a product or service, clearly identified and usually in a context of limited time and resources. It is expected to produce future benefits of a specific kind. In general, development economists refer to projects as "the cutting edge of development".

2.3.2 Project Management

The PMBOK(1996) definition of project management is "Application of knowledge, skills, tools and techniques to project activities to achieve project requirements. Project management

is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and evaluation, and closing process groups."

Project management is both a science and an art. It is perceived as a science because it has supported by charts, graphs, mathematical calculations, and other technical tools. Producing these charts requires the hard skills to manage a project. But project management is also driven by political, interpersonal, and organizational factors—thus the "art" of project management. Communication, negotiation, and conflict resolution are only a few of the soft skills used in the art of project management.

2.3.3 Project Time Management

The project which was delivered on time within the cost agreed and completed with acceptable quality are the benchmarking for projects to be categorized as successful (Naoum, 1994; Wright, 1997; William, 2003; Hasil et al. , 2008)

- PMBOK's (1996) defines project time management as the effective and efficient use of time to facilitate the execution of project, which starts from planning, scheduling and controlling the project to achieve the time objectives.
- Degoff and Friedman (1999), defines project time management as the development of a project time schedule to manage that schedule, and to ensure the project completes within the approved time schedule.
- According to (PMI, 2013), "Project time management is the processes required to manage timely completion of the project". Indeed, time management is a process that records and controls time spent to finish each activity (PMI, 2013).

- Project time management is the act or process of planning and exercising conscious control over the amount of time spent on specific activities, especially to increase effectiveness, efficiency or productivity (Buck, Lee et al. 2000).

- Project time management in projects involves processes required to accomplish timely completion of projects (PMI 2004).

2.3.4 Project Scheduling

- According to pinto (2007), project scheduling represents the conversion of project goals into an achievable methodology for their completion. He further elaborates , It creates a timetable and reveals the network logic that relates project activities to each other in a coherent fashion. Project Scheduling is also a vital element of project planning and subsequent monitoring and control.

- Project scheduling determines when every single activity should be performed in order to finish the project on time project scheduling and also distinguishes planning and scheduling as, planning is about deciding what activities to do while scheduling is all about deciding when they should be done (Rolstadaas 2008).

2.3.5 Time Overrun (Delay)

One of the most important problems in the construction industry is project delay. Time overrun occur in every construction project and the magnitude of these delays varies considerably from project to project. So it is essential to define the actual causes of time overrun in order to minimize and avoid delays in any construction project. Construction works that are not completed on time are referred to as projects that have undergone project

delay. Project delay is defined as the extension of time beyond planned completion dates traceable the contractors (Naveenkumar and Prabhu, 2016). Further they defined project delay as the difference between the actual completion time and the estimated completion time. It was measured in number of days. Project delay occur when projects is not completed within the time the project plan specifies.

- According to Assaf and Al-Hejji (2006), construction time overrun has defined as the time overrun either beyond completion date specified in a contract, or beyond the date that parties agrees upon for delivery of a project.

- Construction project time overrun can be defined as an extension of time beyond the contractual time agreed during the tender, Al- Gahtani and Mohan (2007).

- Choudhry (2004) and Chan (2001), defined time overrun as the difference between the actual completion time and the estimated completion time. It measured in number of days.

- Time overrun is defined as the extension of time beyond planned completion dates traceable to the contractors (Kaming et al 1997).

- Elinwa and Joshua (2001), defined it as the time lapse between the agreed estimation or completion date and the actual date of completion.

- According to Kaming et. al. (1997) and Trigunarsyah (2004), time overrun is the extension of time beyond planned completion dates usually traceable to contractors.

- Dolage and Rathnamali (1992), defined time overrun as the non-completion of the project within the original or stipulated or agreed contract period.

- Bramble and Callahan (1987), describe time overrun as the time during which some part of construction project is completed beyond the project completion date or not performed as planned due to an unanticipated circumstance.

- Lo, Fung & Tung (2006) and Assaf & Al-Hejji (2006), mentioned that time overrun is either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project.

2.4 Causes of Time overrun

Causes of time overrun are factors that lead to construction projects not being finished according to the planned scheduled time at the inception of projects. Several studies have addressed many different factors that cause overruns in different types of construction projects. Generally; construction delay is considered to be one of the most recurring problems in the construction industry and it has an adverse effect on project success in terms of time, cost, quality, and safety (Sweis G.J., 2013). The causes and effects of delay factors in construction industry vary from country to country due to environmental, topographical and technological constraints.

Projects success defined as meeting goals and objectives as prescribed in the project plan. A successful project means that the project has accomplished its technical performance, maintained its schedule, and remained within budgetary costs (Frimpong et al 2003).

In the construction industry, the aim of project control is to ensure the projects to finish on time, within budget and achieving other project objectives. It is a complex task undertaken by project managers in practice, which involves constantly measuring progress, evaluating plans and taking corrective actions when required (Kerzner (2003).

The first step to minimize delays is to identify causes that may lead to delay (Pourrostam and Ismail, 2011, Yang et al., 2013). Over the last 40 years, a significant attention is given to identify possible causes of construction delays (Yang et al.; 2013). To identify delay causes, some authors (e.g. Gonzalez et al.; Faridi and El-Sayegh. Doloi et al.; Chan and Kumarasawamy, Assaf and Al-Hejji, Kazaz et al. Sambasivan and Soon) have used quantitative methods like survey and questionnaires. While some others like Asnaashari et al. (2009) has used qualitative methods like interview to identify causes.

During the last few decades, numerous control methods, such as Gant Bar Chart, Program Evaluation and Review Techniques (PERT) and Critical Path Method (CPM), were developed Nicholas (2001) and Lester (2000). Insurance provides financial protection against a loss arising out of happening of an uncertain event. The project time, in particular the critical path method (CPM) schedule has become the most significant tool available for project stakeholders to understand the status of a project whether a project it on, ahead, or behind the agreed upon completion date.

Variety of software packages have become available to support the application of these project control methods; for example Microsoft project, Primavera and etc. Despite the wide use of these methods and software packages in practice, many construction projects still suffer time overrun. In recent years, there have been numerous studies on the identification of influencing factors of project time overrun worldwide.

Mansfield et. al. (1994) carried out a questionnaire survey amongst 50 contractor, consultant and client organization in Nigeria and found out that the most important variables causing construction delays are poor contract management, financing and payment of completed works, changes in site conditions, shortage of materials, imported materials and plant items, design changes, sub contractor and nominated suppliers.

Kumaraswamy and Chan (1998) conducted a more extensive study in Hong Kong using 400 questionnaires after which follow up interviews were held. The study revealed the top causes of construction delays from the constructors' point of view are delays in design information, long waiting time for approval of drawings, poor site management and supervision, mistakes and discrepancies in design documents, etc.

Kaming et. al. (1997) identified factors influencing construction time overrun on high rise building projects in Indonesia through a questionnaire survey administered on 31 project managers. Design changes; poor labor productivity, inadequate planning, material shortages, inaccuracy of material estimate, skilled labor shortage and etc. were identified for time overrun.

Al-Momani (2000) examined 130 public projects in Jordan and concluded that the main causes of delays include changes initiated by designers, client requirements, weather, site conditions, late deliveries, economic conditions and etc. Yogeswaran et. al. (1998), scrutinize 67 civil engineering projects in Hong Kong and suggested that at least 15-20% time overrun was due to inclement weather.

Table 2.1 - Significant factors causing time overrun identified in past research studies

Researcher	Title	Significant factors
Jayawardene and Panditha (2003)	Understanding and mitigating the factors affecting construction delay	Rainy weather, changes by owner and consultant Manpower shortage, Manpower labor skill, Contractor's cash position, Changes in Foundation conditions encountered in the field, Changes in water table condition, Material shortage, equipment shortage, Obtaining permit from relevant authorities.

Pathiranage & Halwatura (2010)	Factors Influencing the Duration of Road Construction Projects in Sri Lanka	Financial problems of the owner as well as the contractor, Poor site management by the contractor, Poor weather condition, Contract modification, Incomplete document/ slowness in making decision, Shortage of site labor and material, Lack of sub contractor's skill/ poor skills, Construction mistakes and defective works, Poor site condition
Jeykanthan & Jayawardena (2012)	Mitigating delays in donor funded projects inSri Lanka	Inadequate feasibility studies, Errors and omissions in detail designs, Improperly harmonized procurement documents, Shortcomings in contract document, Stakeholder identification and management issues, Variation and scope changes, Land acquisition and resettlement, Extreme weather, Shortage of bitumen
Mansified et al. (1994)	Causes of delay and cost overruns in Nigerian construction projects	Financing of and payment for completed project, Poor contract management, Shortages of material, Price fluctuations, Inaccurate estimates
Assaf and Al-Hejji (2006)	Causes of delays in large construction Projects	Change orders by owners during construction, Delay in progress payment by owner, Ineffective planning and scheduling of projects by contractor, Poor site management and supervision by contractor, Shortage of labor, Difficulties in financing project by contractor
Sambasivan and Wen Soon (2006)	Causes and effect of delays in Malaysian construction industry	Contractors improper planning, Contractors improper site management, In adequate contractors experience, Inadequate client's finance and payments for completed work, Problems with sub contractors, Shortage of material, Labor supply, Equipment availability and failure, Lack of

		communication between parties, Mistake during construction stage
Sweis *et al.* (2007)	Delay in Construction Projects: in the case of Jordan.	Financial difficulties faced the contractors, Too many change orders by the owner, Poor planning and scheduling of the project by the contractors, Shortage of man power (skilled, Semi skilled, unskilled)
El-Razek *et al.* (2008)	Causes of Delay in Building Construction Projects in Egypt	Financing projects by contractors during construction, Delay in contractors payment by owner, Design changes by owners during construction, Partial payments during construction, Non utilization of professionals during construction and construction management

From Table 2.1 **Source, Journal of the Institute of ENGINEERS Volume 44, No 03, pp (9-18), 2013**, it inferred that the significant factors causing time overrun are somewhat common across different countries and industry sectors.

2.5 Responsible parties for causes of Time Overruns

As the construction industry continues to grow in size and complexity, there exists planning and budgeting problems. As many researchers' findings showed that it is common for projects not to be completed on a given time and within the prescribed budget. This mostly happed due to the presence of various interest groups on the project activities. These interest groups include project owners or clients, contractors, consultants, financers, suppliers, end users, government and the like. Internal causes of delay include the causes arising from three parties involved in the project. These parties are the owner(clients), contractors and consultants. Other delays, which do not arise from these three parties, are based on external causes. Theses external causes are material suppliers, government, financers and weather condition. Many

researchers have categorized the reasons for project delays are internal and external factors caused by different stakeholders.

Studying the significant factors that cause delay of construction projects in Malaysia, Salim & Ernawati (2007: PP199- 200), used four categories for analysis, namely contractor, consultant, owner and external. As far as causes related to contractor actions are concerned, financial problems, shortage of materials and poor site management has ranked among the top three. Owner causes included delayed payments, slow decision-making and contract scope changes.
The top three consultant causes were poor supervision, slowness to give instructions and lack of experience. Finally, external causes of delay included shortage of materials, poor site conditions and lack of equipment and tools in the market.
Similarly, Sambasivan & Soon (2007), divided their findings into client, contractor and consultant categories, with all three categories listing poor site management, inadequate contractor experience and poor subcontractors are among the top causes for time delays on construction projects.

Ogunlana et al (1996), investigated 12 high-rise buildings and differentiated their findings into client, consultant, contractor related and external causes for time delays. The weighted findings among these three categories indicated that material shortages, overstretching of technical personnel and design changes were the most important causes for project delays.

Ahmed et. al. (2003) and Theodore (2009) identified the following factors causing delays in construction projects. One of the most important problems that may arise in construction project is delays and the magnitude of these delays varies considerably from project to project. According to delay categories that were contractor related, client related, consultant related, labor related and external related.

They have categorized the factors that cause delays in the four categories, those are due to:-

Contractors Responsibility

The factors that are that are related to contractor's responsibility are:

- ✓ Poor qualification of the technical staffs.
- ✓ Shortage of materials on site.
- ✓ Poor workmanship and defective work.
- ✓ Poor skills and experience of labor.
- ✓ Low productivity of labor.
- ✓ Financial problems.
- ✓ Coordination and communication problems with others.
- ✓ Conflicts in sub-contractors schedule in execution of project.
- ✓ Poor site management.
- ✓ Delays in site mobilization.

Consultant's Responsibility

The factors that are related to consultants' responsibility are:

- ✓ Absence of site staff
- ✓ Lack/ inadequate/ of experience
- ✓ Delay in approving major changes in the scope of work
- ✓ Mistakes and discrepancies in design document

Owner's Responsibility

The factors that are related to owner's responsibility are:

- ✓ Delay to furnish and deliver the site.
- ✓ Lack of working knowledge.
- ✓ Change orders during construction (replacement and addition of new work to the Project and change in specifications).
- ✓ Financial problems (delayed payments, financial difficulties and economic problems).
- ✓ Slowness in decision making process.

- ✓ Poor communication and coordination.

External Factors

The factors that are related to external factors are:

- ✓ Delay in obtaining permits from municipality.
- ✓ Lack of labor, materials, equipment and tools in the market.
- ✓ Weather conditions.
- ✓ Poor site conditions (location, ground and etc.)
- ✓ Poor economic conditions (currency, inflation rate, LC and etc.)
- ✓ Changes in laws and regulations.
- ✓ High transportation cost.
- ✓ Delay in providing services from utilities (such as water, electricity and etc.)

2.6 Impact of Project Implementation Delay

A construction project is commonly acknowledged as successful when the aim of the project is achieved in terms of predetermined objectives that are mainly completed the project on time, within budget and specified quality in accordance with the specifications and to the stakeholders satisfactions. One of the most important problems that may arise in the construction project is delays and the magnitude of these delays varies considerably from project to project. Because of time delay, the owner and/or the user loses both tangible and intangible benefits during extended time.

Delays can lead to many negative effects such as cost overrun, disputes, arbitration, and litigation and total abandonment (Pourrostam and Ismail, 2011, Sambasivan and Soon, 2007). Delay cause loss of motivation, procrastinate, and more delay (Halvorson, 2013). In addition, delays in projects result in troubles for both owner and contractors. The main troubles for the

project owner include losing the benefits of first to market or late operation of the project, increase in expenses conflict with the contractor which may lead to claim by the contractor and end up as court case (Abbasnejad and Izadi Moud, 2013).

Time overrun in construction projects prevent the planned increase in property and service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth, Arditi, et.al.(1985). Aibinu and Jagboro (2002), studied the effects of construction delays on project delivery in Nigerian construction industry.

All in all based on the literature, six major effects of delay in construction projects:

- Time overrun.
- Cost overrun.
- Dispute.
- Arbitration.
- Total Abandonment.
- Litigation.

Time overrun which subsequently lead to additional time extension, as the duration of a project is extended; the price of materials will rise which subsequently lead to additional costs, not only to the project owner or to the client but also to the contractor and to the consultant, which participate on that project until completion. The contractor will incur also an additional cost due to idle manpower and equipment. The two major delay effects are time extension and liquidated damages. The contractor will claim for time extension or for additional cost or for both, and the owner will ask liquidated damage for late completion of the project.

The two major delay effects are time extension and liquidated damages. The contractor claim for time extension or for additional cost or for both, and the client or the owner will ask liquidated damage for late completion of the project. The time extension is usually made to save the contractor from liquidated damages for late completion.

The consequence of delay in construction projects is time overrun and the major impacts that have come out from the time overrun are; it significantly affects the economic development of a country and affects the end user's benefit that obtained, if the project not completed on time.

Delay in delivering projects on schedule has becomes serious and expensive problems for parties involved in the projects. Late completion of projects can deny employers the benefits or profits potentially accrued through use of the project. Delays may also expose them to serious financial economic risks such as high interest rates and loss of market opportunities. On the contractor's side, delays in completion entails additional cost accrued from extended insurances, extended use of site office overheads, labor and equipment, standby costs and other intangible cost such as opportunity cost (Diekmann and Nelson, 1985; Semple et al. ,1994; Kumarasawamy and Chan, 1998).

2.7 Applications of Project Time Management

Project time management includes the processes required to ensure timely completion of the project (R.Duncan 1990).

Degoff and Friedman (1999), defines project time management as the development of a project time schedule to manage that schedule, and to ensure the project completes within the approved time schedule.

PMBOK’s (1996) defines project time management as the effective and efficient use of time to facilitate the execution of project, which starts from planning, scheduling and controlling the project to achieve the time objectives.

Therefore, schedule is important to manage time, which involves defining project activities, sequencing the activities, developing the schedule, executing the schedule and controlling the plans during project execution.

Overviews of the major processes in project time management are as follows:

- ✓ **Activity definition:** identifying the specific activities that must be performed to Produce the various project deliverables.
- ✓ **Activity sequencing:** identifying and documenting interactivity dependencies.
- ✓ **Activity duration estimating:** estimating the number of work periods which will be needed to complete, individual activities.
- ✓ **Schedule development:** analyzing activity sequences, activity durations and Resources requirements to create the project schedule.
- ✓ **Schedule control:** controlling changes to the project schedule.

Each of these processes occurs at least once in every project and in one or more project phases.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Research Design and Methodology

The purpose of the study was to establish the factors causing project delays and to evaluate the impacts these factors have on project implementation. Review of literature was carried out to establish those factors influencing delays of construction projects in Akaki waste water line and treatment plant rehabilitation project.

This chapter discusses methods adopted in carrying out the main principles of research methodology for this study. It includes research design, data sources, and methods of data collection, sample size and sampling methods, data analysis methods, and ethical considerations.

3.2. Research Methodology

As Dawson (2003) definition, the research methodology is the philosophy or general principle, which guides the research. Furthermore, qualitative and quantitative research methodologies defined as follows by Dawson. Qualitative research explores attitudes, behavior and experiences through such methods as interviews or focus groups. As it is attitudes, behavior and experiences, which are important, fewer people take part in the research, but the contact with these people tends to last a lot longer.

Quantitative research generates statistics through the use of large – scale survey research, using methods such as questionnaires or structured interviews. Even though each methodology represents a different approach to evaluation, in this thesis, a mixed approach is used which incorporates both quantitative and qualitative research methodologies to achieve the desired objectives of the study. According to Creswell (2009) definition "Mixed methods research is an approach to inquiry that combines or associates both qualitative and quantitative forms." Therefore, in this study a quantitative approach was used to understand the perception of clients, contractors and consultants and qualitative approach was used to gain insights and to understand the attitudes of individuals or groups towards factors influencing project delaya at Kality waste water line and treatment plant rehabilitation project.

3.3 Research Design

Bogdan and Biklen (1998) define research design as the overall plan for collecting and analyzing data including measures to enhance both internal and external validity. The research design is therefore constitute the blue print for the collection, measurement and analysis of data.

This study use descriptive research design with which determining the Mode and Median with which an event occurs or relationship between variables has been determined. It was employed both qualitative and quantitative research approach.

3.4 Population and Sample Size

Sampling design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt to select units for the sample. In

order to evaluate and assess the impact of project implementation delay of the project under study, a wide range of project stakeholders involved could be targeted.

Participants were select randomly from Akaki Waste Water line and treatment plant rehabilitation project, which is going to be studied under this research. It also indicates the number of units to be included in the sample also known as Sample size. The first step in developing any sampling design to clearly defined the aggregate of sampling units, namely the population.

3.5 Data Sources

In order to achieve the objective of the study, the researcher has designed to use two appropriate data sources. These are the primary and secondary sources.

3.5.1 Primary sources:

This study based itself much on the primary sources of data by means of qualitative and quantitative methods of data collection by employing different tools such as questionnaires as well as direct personal interviews with people who are directly involved in the project under study.

The questions will be structured in Likert scale format. In this technique, the degree of agreement or disagreement is given a numerical value ranging from zero to four. Thus, a total numerical value can be calculated from all responses.

3.5.2 Secondary sources:

Different project documents and literatures consulted to complement the primary data. This may include documents and manuals used for the implementation of the project under study, contract documents, contract agreements, Addis Ababa Water and Sewerage Authority archive sources , previous researches on time management, books, journals, and the internet sources were uded.

3.6 Method of Data Collection

The primary data, which is the main source of information for the study, collected from samples drawn from; targeted Project managers, Team Leaders, Experts, and Others using questionnaire and interview method. Questionnaires of both open ended and close-ended type were used.

3.7 Sampling Method

The goal of the sampling method used to obtain a sample that is a representative of the population. That is, apart from random error, the information derived from the sample expected to be the same and will have a complete census the population going to be carried out.

As it's mentioned above, to obtain the required information relevant for the study, simple random sampling techniques have been used taking the different levels of project workers such as; Project managers, Team Leaders, Experts, and Others in the project under study. These

techniques were preferred because it is used to assist in minimizing bias when dealing with the population.

3.8 Sample Size Determination

Since practically it would be difficult to consider all target populations as a sample for this study, the researcher finds it necessary to determine the appropriate and representative sample size using scientific techniques. The targeted population, which directly related to the subject under study, is 45 employees. However, 15 end users from the client side had been included for the study. Thus, the total population has found to be 60 that all directly influenced the project.

Furthermore; the researcher had been used the following sample size determination formula to decide the sample size of the population. The formula developed by Yamane (1973), the reason to choose this formula was its simplicity and the population under study was finite. According to Yamane for any sample given the estimated population proportion of 0.05 and 95% confidence level, the sample size is given by:-

$n=N/ (1+N (e)^2)$

Where

n= the sample size

N= the total population size, and

e=is the level of the precision or sampling error= (.05)

Therefore, $n=60/ (1+60 (.05)^2)$ = Sample Size

=52

3.9 Data Analysis

Bogdan and Biklen (1998) indicate that data analysis is a mechanism for reducing and organizing the bulk data to produce findings. These findings ultimately aid researchers in the interpretation of their work.

The primary data collected from survey used classified, categorized and organized for analysis. SPSS used to analyze the data collected. Standard deviation used in analyzing the data quantitatively. The data presented using descriptive statistic. On the other hand, data gathered through key informant interviews used analyzed qualitatively to strengthen the study. Hence, both quantitative and qualitative methods of data analysis would employed.

3.10 Ethical Considerations

All the participants in the study have the right to know:-

- ✓ **W**hat the study fully involves.
- ✓ What will be the implication of the study?
- ✓ The research purpose and of their role.
- ✓ All procedures used to protect their secrecy.
- ✓ The information they have given is confidential.
- ✓ The data they have provided for study is also confidential.
- ✓ Participants should be told, what benefits they will receive if they participate in the study.

CHAPTER FOUR
RESEARCH RESULTS & DISCUSSION

4.1 Introduction

Chapter four presents the way the questionnaires are distributed, responses are retrieved and subsequent analysis of the data collected through the questionnaire survey from professionals working for clients, consultants and contractors who are directly involved in the Kality waste water line and treatment plant rehabilitation project.

This chapter also examines and analyses the data gathered from the questionnaire administered and personal interviews conducted at Kality waste water line and treatment plant and rehabilitation project. The procedure used in analyzing the results has aimed at establishing the perceived causes of project implementation delay of the project under study with various factors responsible for project delay and time overrun.

The principal purpose of the survey is to rank the already identified variables of construction projects delay and time overruns and then to find out the critical factors that are required to be given due attention in order to substantially minimize project delay problems in Kality waste water line and treatment plant rehabilitation project.

4.2 Background Characteristics of Respondents

This part mainly designed to provide general information about the respondents in terms of gender, relevant work experience, job status and educational qualification. The 52 questionnaire sets aimed distributed to individuals; i.e., 25 professionals working for the client, 10 for consultants and 17 for contractors.

The general response rate for respondents is 88.5 % and the total number of respondents for all three categories was 46 out of 52 respondents. According to Moser and Kalton (1993), in order for data to be acceptable for analysis, the response rate should be as much as possible above 40% and if the response rate is lower than 30%, the data fails to be representative and the result of the analysis are of little value for further interpretation. In this study, the questionnaires numbers collected are within the acceptable rate and therefore I can precede the analysis.

Table 4.1 Summary of respondents' gender from the questionnaire survey

Gender	Occurrence	Rate of occurrence (%)
Male	**38**	**82.6**
Female	**8**	**17.4**
Total	**46**	**100**

Source: Own Survey, 2017

Table 4.1 shows the response regarding Gender with respect to rate of occurrence. 82.6% (38) were Male and 17.4% (8) were Female.

Table 4.2 Summary of questionnaire responses from the questionnaire survey

Job's Status	Distributed in number	Returned in number	Rate of return (%)
Manager	**6**	**6**	**100**
Team Leader	**13**	**11**	**84.6**
Expert	**19**	**17**	**89.5**
Others	**14**	**12**	**85.7**
Total	**52**	**46**	**88.5**

Source: Own Survey, 2017

Table 4.2 shows the general response rate for respondents is 88.5 % and the total number of respondents for all four categories was 46 out of 52 respondents. The response rate of managers is 100% (6 out of 6 respondents), team leader's 84.6% (11out of 13) respondents, for experts it was also 89.5 % (17 out of 19) and for Others 85.7% (12 out of 14) respondents.

Table 4.3 Summary of respondents' job status from the questionnaire Survey

Job's Status	Occurrence	Rate of occurrence (%)
Managers	**6**	**13.0**
Team Leaders	**11**	**23.9**
Experts	**17**	**37.0**
Others	**12**	**26.1**
Total	**46**	**100**

Source: Own Survey, 2017

Table 4.3 shows that 13.0 % (6) of respondents were managers, 23.9 % (11) were team leaders and 37.0 % (17) were experts and 26.1% (12) were others.

Table 4.4 Summary of respondents' work experience from the questionnaire survey

Experience (Years)	Occurrence	Rate of occurrence (%)
Up to 5	**15**	**32.6**
5-10	**9**	**19.6**
10-15	**12**	**26.1**
Above 15	**10**	**21.7**
Total	**46**	**100**

Source: Own Survey, 2017

Table 4.4 shows that 32.6 % (15) of the respondents have experience up to 5 years, 19.6% (9) of the respondents experience is between 5 to 10 years, 26.1 % (12) of respondents have experience from 10 to 15 years and 21.7 % (10) are with service year of above 15 years.

Table 4.5 Summary of respondents' educational qualification from the questionnaire survey

Experience (Years)	Occurrence	Rate of occurrence (%)
Diploma	**-**	**-**
First Degree	**36**	**78.3**
Second Degree	**10**	**21.7**
PHD	**-**	**-**
Total	**46**	**100**

Source: Own Survey, 2017

Table 4.5 shows that 0.0 % (0) of the respondents have diploma, 78.3 % (36) of the respondents' qualification is 1st degree and 21.7 % (10) of respondents have educational background of 2nd degree.

4.3 Data Analysis Techniques

The results of the data from the questionnaire are analyzed and interpreted in order to find answers to the research problems.

The purpose of this data analysis was to determine the main causes, impacts and mitigation factors on project delay. Two types of data were collected, secondary data from various related literature review and primary data using a survey conducted with project parties in Akaki waste water line and treatment plant rehabilitation project; as well as interview

discussions with the project managers of the owner, consultant and contractors. Hand-to-hand delivery of the questionnaires has been used preferred to improve the response rate and to encourage respondents. Phone calls frequently made to remind respondents to complete the questionnaire.

A total of 52 questionnaires were distributed to owner, contractors and consultant involved in the project under study. Out of 55 distributed questionnaires 88% (46) completed set were received back.

The numbers are summarized and interpreted by a statistics tool, SPSS , to find The frequency, Mode and Median.. The statistics provide a means through which numerical data made more meaningful.

The questionnaire gave each respondent an opportunity to identify the factor that was likely to causes project delay by giving the response: “Extremely significant”, “Very significant”, “Moderately significant”, “Slightly significant” and “Not significant”; effects of project delay variables on the project under study; and their impacts on the end users of the project under study. For each variable of project delay, the percentages of respondents’ response were ranked for analysis purpose. On the basis of the ranking of the variables by the various groups, it was possible to identify the most important factors that influenced project delay in Akaki waste water line and treatment plant rehabilitation plant. The presentation of the results are described by means tables.

An analysis of summarized research results is done in order to make a meaningful conclusions and recommendations. Tables and descriptive explanations have been employed to illustrate data gathered from the field to make the research findings more significant.

4.4 Results of study

The study mainly focused on project implementation delay on a particular project of Kality waste water line and Treatment plant rehabilitation project. The first measure question of the statement of the problem of this study was what are the kinds of the project delay problems in the project under study? The research question has got answer during this study that the delay problems have been identifiied on the basis of client,contractor, consultant and external factors.

4.5 Causes and responsible parties for the project delay

Causes of project delays are the third major question of the statement of the problem, i.e. "What are the causes of delay in the project?" In order to get answer in detail from the respondents this question has been further subdivided into two questions.

The first question indicates identification of different types of causes and the question indicates identification of significance rate of different types of causes and the second question understands of the significance rate of causes related to responsible parties.

4.5.1 Causes of project delay

The causes of project delay that are included in this study literature review are considered entirely with the questionnaire. When the Frequency, Mode and Median results calculated for each project delay causes are found out as indicated in the table. Accordingly, Table 4.6 below indicates the Mode, Median and rank of the top 10 causes of project delays in Kality waste water line and treatment plant rehabilitation project.

Table 4.6 Mode, Median and ranks for causes of project delay from the questionnaire.

I. No	Causes	Mode/Median	Rank
1	Waiting time for approval of design	**4/3**	**1**
2	Poor engineering estimate	**4/2**	**2**
3	Frequent rework	**4/2**	**2**
4	Contractual claims such as time extension	**3/2.5**	**4**
5	Failure to update schedules on time	**3/2**	**5**
6	Excessive change orders	**3/2**	**5**
7	Unexpected sub soil conditions	**3/2**	**5**
8	Poor workmanship and defective work	**3/2**	**5**
9	Setting unrealistic time schedule	**2/3**	**9**
10	Poor contract management	**2/3**	**9**

Source: Own Survey, 2017

Table 4.6 shows the data analysis findings of the top ten project delay causes; Waiting time for approval of design, Poor engineering estimate, Frequent rework ... etc

4.5.2 Responsible parties for project delay

In this part of study due attention has been given for discussion and results of the questionnaire that responsible parties for the causes of project delay. These factors include Contractors' responsibility, Consultants' responsibility, Client's responsibilities and external factors. Having calculated the Mode and Median of each causes of project delay from the questionnaire responses, the result is as indicated in the table below.

As shown in the Table 4.7, indicated the Mode, Median and ranks of the major or top causes of project delay for each responsible party according to this study analysis.

Table 4.7 Mode, Median and ranks for causes of project delay responsible parties from the questionnaire

I. No	Causes	Mode/Median	Rank
A	**CONTRACTOR**		
1	Lack of on time decisions	**3/2.5**	**1**
2	Rework due to defective work	**3/2.5**	**1**
3	Failure to update schedule on time	**3/2**	**3**
4	Poor pre planning process	**3/2**	**3**
5	Poor qualification of the technical staff	**3/2**	**3**
B	**CONSULTANTS**		
I. No	**Causes**	**Mode/Median**	**Rank**
1	Poor site supervision	**4/3**	**1**
2	Poor contract management	**4/2.5**	**2**
3	Incomplete design	**4/2**	**3**

4	Changes in design	**3/3**	**4**
5	Lack of on time decision	**3/2.5**	**5**
C	**CLIENTS**		
I. No	**Causes**	**Mode/Median**	**Rank**
1	Poor site supervision	**4/3**	**1**
2	Technical incompetence and poor organization structure	**4/3**	**1**
3	Poor contract management	**4/2.5**	**3**
4	Incomplete design	**4/2**	**4**
5	Inappropriate choice of site	**4/2**	**4**
D	**EXTERNAL**		
I. No	**Causes**	**Mode/Median**	**Rank**
1	Unexpected problem	**4/3**	**1**
2	Follow up of project progress	**4/2.5**	**2**
3	Lack of labor, materials, equipment and tools in the market.	**4/2**	**3**
4	Force Majeure	**3/3**	**4**
5	Bad weather	**3/3**	**4**

Source: Own Survey, 2017

Table 4.7 shows the data analysis findings of the top three project delays responsible parties:

A) CONTRACTOR: - Top Three responsible factors are; Lack of on time decisions, Rework due to defective work and Failure to update schedule on time respectively.

B) CONSULTANTS: - Top Three responsible factors are**; Poor site supervision, poor contract management and Incomplete design respectively.**

C) CLIENTS: - Top Three responsible factors are**; Poor site super vision, Technical incompetence and poor organization structure and poor contract management respectively.**

D) EXTERNAL: - Top Three responsible factors are**; Unexpected problem, Follow up of project progress and Lack of labor, materials, equipment and tools in the market respectively.**

4.6 Impacts of Project Delay

The main objectives of this study is to answer the problem statements and one of the major research question was "What are the impacts of delay in Kality waste water line and treatment plant rehabilitation project?" Since the objective of the study is to evaluate the existing problems associated project implementation delay under study; and hence this part consists of discussion and results of impacts of time.

Having calculated the Mode and Median of each impact, it's found out as indicated in the table shown below. Accordingly, Table 4.8 indicates the Mode, Median and ranks of the major or top impacts of project delay in Kality waste water line and treatment plant rehabilitation project.

Table 4.8 Mode, Median and ranks for Impact of project delay from the questionnaire

I. No	IMPACTS	Mode/Median	Rank
1	Loss of end users benefit that will be obtained if it has been completed on time	**4/3**	**1**
2	Project time extension	**4/2.5**	**2**
3	Contribution to the development of the city would be affected	**4/2**	**3**
4	Affects the relationship among stakeholders	**4/2**	**3**
5	The contribution of the construction industry to the national economy will be less	**3/3**	**5**
6	Supplementary agreement	**3/2**	**6**
7	High cost of consultancy fee and supervision work	**3/2**	**6**
8	Liquidated damage	**3/2**	**6**
9	Customers/End users dissatisfaction	**3/2**	**6**

Source: Own Survey, 2017

Table 4.8 shows the data analysis findings of the top ten Impacts of project delay; Loss of end users benefit that will be obtained if it has been completed on time, Project time extension, Contribution to the development of the city would be affected ... etc

4.7 Resolutions of project delay

Since the main reason of this research is to minimize time project delay in the project under study and hence this part consists of discussion and results of resolution of project delays based on the questionnaire survey.

After calculation the Mode and Median of each resolution methods, the result found out as indicated in the table. Accordingly, Table 4.9 below shows that the Mode, Median and ranks of the major or top resolution methods of project delay in Kality waste water line and treatment plant rehabilitation project.

Table 4.9 Mode, Median and ranks for Resolution of time overruns from the questionnaire

I. No	RESOLUTIONS	Mode/Median	Rank
1	Avoid poor quality and rework	**4/3**	**1**
2	Timely decision on design change	**4/3**	**1**
3	Use of experience of subcontractors and suppliers	**4/3**	**1**
4	Risk management during project execution	**4/2.5**	**4**
5	Systematic control mechanism	**4/2.5**	**4**
6	Measure performance against other projects	**4/2**	**6**
7	Conduct site meeting more frequently	**4/2**	**6**
8	Dissatisfaction of project financiers	**3/3**	**8**
9	Focus on quality, cost time and deliverable	**3/2.5**	**9**
10	Improving contract award procedures	**3/2**	**10**

Source: Own Survey, 2017

Table 4.9 shows the data analysis findings of the top ten resolution method to minimize project delay; Avoid poor quality and rework, Timely decision on design change, Use of experience of subcontractors and suppliers ... etc

The second underling research question: how delays and time overrun would substantially minimize in Kality waste water line and treatment plant rehabilitation project. The critical factors have already identified through analysis, and it is deemed that mitigating these factors would substantially minimize the problems of project delay in Kalaity waste water line and treatment plant rehabilitation project. According to the resolution (Mitigation) Mode and Median of the analysis, the following top five scores have been identified as a factors to minimize project delay: Avoid poor quality and rework , Timely decision on design change, Use of experience of subcontractors and suppliers, Risk management during project execution and Systematic control mechanism.

There are at least five mitigation factors that have major influences to minimize project delay in Kality waste water line and treatment plant rehabilitation project as per this study finding.

The results of the research reveal that ensuring to avoid poor quality and rework, Timely decision on design change from consultant side, Use of experience of subcontractors and suppliers, Implementing appropriate risk management technique during project execution and establishing a systematic project control mechanism are found to be the major factors to minimize project delay in the project under study. These methods emphasize that successful project can be implemented with ease, that is, financing, resources, effort and leadership should be available at all times throughout the project's life to ensure that construction projects run smoothly within the project time table.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

There are many causes of project delay in construction projects and several studies have pointed out various factors based on the underlying conditions that their specific study is concerned with. Therefore, this research attempts to investigate the problems particularly for Kality waste water line and treatment plant rehabilitation project.

The research undertaken by reviewing literature, which used to identify the possible variables causing project delay in construction projects as a whole. Then the variables has examined in line with the Kality waste water line and treatment plant rehabilitation project. Thirty-seven variables for project delay have identified.

This research conducted to study “Perceived causes of project implementation delay on Kality waste Water line and Treatment Plant rehabilitation Project ". The data analysis used to conduct and the Perceived cause of project implementation delays has found accordingly.

5.1 Conclusions

The first major question of the statement problem was to identify causes of project delay in Kality waste Water line and Treatment Plant rehabilitation Project.

Data analysis and result indicated that **:-**

- Waiting time for approval of design, Poor engineering estimate and Frequent rework have been ranked in the first, second and third position as the causes of time overruns.

- Lack of on time decisions, Rework due to defective work and Failure to update schedule on time has been ranked in the first, second and third position as contractors responsibility.

- Poor site supervision, poor contract management and incomplete design are consultants' responsibility.

- Poor site super vision, Technical incompetence and poor organization structure and poor contract management are clients' responsibility.

- Unexpected problem, Follow up of project progress and Lack of labor, materials, equipment and tools in the market are external causes of time overruns.

One of the specific objectives of this study was to identify the impacts of project delay in Kality waste Water line and Treatment Plant rehabilitation Project. There are many impacts of project delay to stakeholders in the construction industry. But, during analysis of this study results indicated that Loss of end users benefit that will be obtained if it has been completed on time, Project time extension, Contribution to the development of the city would be affected has been ranked in the first, second and third position as impacts of project delays.

The other major question of the problem statement was to forward the resolution methods to minimize time overruns in Kality waste water line and treatment plant rehabilitation project. Therefore; during analysis of this research results indicated Avoid poor quality and rework, Timely decision on design change, Use of experience of subcontractors and suppliers has been ranked in the first, second and third position as resolution methods of time overruns.

5.2 Recommendations

Based on this study, some recommendations given as follows:

All stakeholders (clients, contractors and consultants) should work together to achieve successful projects within the stipulated time and budget, and exceed the anticipated quality standard.

- Kality waste water line and rehabilitation project is recommended and guided to avoid poor quality and rework, to make timely decision on design change and to use of experience of subcontractors and suppliers.

- Kality waste water line and rehabilitation project is recommended and guided to use planning and scheduling**,** which are continuing processes during construction and match with the resources and time to develop the work and to avoid project delay.

- Kality waste water line and treatment plant rehabilitation project has to be aware about best construction materials procurement methods, recommended to purchase the construction materials at the beginning of work and material time schedule.

- Kality waste water line and treatment plant rehabilitation project must have committed leadership and management, timely decision process, advanced contract and project

management, systematic control mechanism and effective and efficient strategic planning and management.

In order to improve contractor's managerial skills there is need for continuous work-training programs for personnel in the construction industry to update their knowledge and be familiar with project management techniques and processes. Have effective and efficient material procurement systems should be established within projects. Material procurement process should be executed properly by improving procurement processes in order to avoid supply delays.

5.3 Directions for Future Research

This study investigated causes, impacts and resolutions of time overruns of Kality waste water lines and treatment plant project. From the study it is clear that there is much scope for future research in the other project management body of knowledge areas.

Based on the limitation of not being able to study other project management body of knowledge areas, future research should engage on other areas of knowledge such as; project cost management, project quality management, project risk management and project procurement management.

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APPENDIX

APPENDICES

A) QUESTIONNAIRE

Questionnaire for data collection

Dear respondents,

I am studying Master's degree program of Business Administration MBA, specialization in Project Management; that is conducted by St. Mary's University (SMU).The main purpose of this questionnaire survey is to collect information on "***Assessment of the Impact of Time Management on Effectiveness of Kality waste Water Treatment plant rehabilitation project" (*** *at Addis Ababa Water and Sewerage Authority, Kality rehabilitation project). The project respondents will be asked to answer the questions in the questionnaire based on yourpersonal knowlede and experience regarding the research title in* Kality waste water line and treatment plant expansion and rehabilitation projects.

The questionnaires has been prepared to consist four sections accordingly. The first section (Section A) consists of questions that aimed at collecting General information (Profile and experience in construction industry) of the respondents.

The second section (Section B) is aimed at finding out the causes of time overruns of responsible parties. The third section (Section C) is focused on impacts or effects of time overruns. The fourth section (Section D) is aimed to collect information on the resolution methods of time overruns.

Hence, I request you kindly to fill up this questionnaire which will have significance help in my study. I assure you that, this study is entirely intended for academic purposes and confidentiality of your response is guaranteed.

Would you please take a look at the required information, give appropriate time, try to answer correctly and accurately to get the required project information.

Hope the required information will be provided by the respondents as timely as possible; since timely reply is very crucial for this study analysis.

Finally, thank you very much for your brand cooperation, kindly and timely respond to provide the required information.

QUESTIONS

SECTION - A (General Information)

Q.1 Name of Respondent (Optional) ----------

Q.2 Gender

☐ Male ☐ Female

Q.3 Job Status

☐ Manager ☐ Team Leader ☐ Expert Others, -------

Q.4 Relevant work experience (Years)

☐ Up to 5 years ☐ 5 - 10 years ☐ 10 - 15 years ☐ Above 15 years

Q.5 Educational qualification

☐ Diploma ☐ Post Degree ☐ Degree PHD ☐

The following are the significance rate of each factor and you can indicate the factors by ticking the appropriate box as per your observation. There is a remark provision in the last column and you can add your remarks if any.

E.S. = **E**xtremely **S**ignificant **(4)**

V.S. = **V**ery **S**ignificant **(3)**

M.S. = **M**oderately **S**ignificant **(2)**

S.S. = **S**lightly **S**ignificant **(1)**

N.S. = **N**ot **S**ignificant **(0)**

SECTION - B

Q.6 **Causes of TIME OVERRUNS of *Kality Waste Water Line and Treatment Plant rehabilitation project.***

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Poor contract management						
Changes in site conditions						
Skilled labor shortages						
Failure to update schedules on time						
Client initiated variations						
Unexpected problems						
Changes in design						
Delayed approval of payment by consultant						
Long waiting time for approval of design and material sample						
Setting unrealistic time schedule						
Causes	**N.S**	**S.S**	**M.S**	**V.S**	**E.S**	**Remarks**
Additional work						
The degree of project complexity						

Unexpected sub soil conditions						
Poor in Engineering estimate preparation						
Poor site management and supervision						
Mistakes and inconsistency in design document during tender						
Bad weather condition						
Delays in site mobilization						
Force majeure						
Inappropriate sub-contractor						
Wrong choice of site						
Lack of timely decisions						
Shortening of contract period						
Poor workmanship and defective work						
Excessive change orders						
Frequent rework						
Poor schedule management						

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Changes in material specification						
The nature of inter personal relations in the project						
Frequent breakdown of construction machineries and equipments						
Contractual claims, such as time extension						
Delay in providing services from Utilities (Water, Electric power ..etc)						
Delay in obtaining permits from municipality						

Responsible Parries for causes of time overruns

A) Contractor

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Poor contract management						
Finance & payment arrangements						
Poor qualification of the technical staffs						

Ineffective resource mobilization						
Skilled labor shortage						
Poor site management and supervision						
Inaccuracy of material estimates						
Failure to update the schedule on time						
Setting unreachable time schedule						
Inappropriate sub-contractors						
Poor skills, experience and labor productivity						

A) Contractor (cont'd)

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Poor workmanship and defective works						
Lack of on time decisions						
Poor pre planning process						
Poor project management						
High transportation cost						
Technical incompetency and poor organizational structure						
Poor schedule management						
The nature of interpersonal relations in the project						
Contractual claims						
Rework due to defective work						
Less emphasis to planning						
Poor skills, experience and labor productivity						

Responsible Parties for causes of time overruns

B) Consultant

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Changes in design						
Delayed approval of payments						
Failure to approve updated schedules on time						
Poor site supervision						
Lack of on time decision						
Deficiencies in engineering estimate preparation						
Poor contract management						
Excessive change order						
Incomplete designs						
Resolving issues between the contractor's and the client's on time						
Mistakes and discrepancies in design documents						
Long waiting time for approval of drawings and materials samples						
The nature of interpersonal relations, communication and coordination in the project						

B) Consultant (Con'd)

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Contractual claim's such as, time extension						
Inappropriate choice of site						
Lack of technical experience						
Lack of on time decision						
Poor contract management						
Incomplete design during tender						
Absence of staff in site						
Technical incompetence and poor organization structure						
Poor and timely communication to the client and contractor						

C) Client

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Poor contract management						
Changes in site locations						
Shortening of contract periods						
Additional works						
Initiations of variations						
Timely decisions making process						
Delayed release of payments						
Lack or poor communication and coordination with contractors						
Follow up of project progress						
Assignment of qualified counterpart staffs						

D) External

Causes	N.S	S.S	M.S	V.S	E.S	Remarks
Unexpected problem						
Bad weather						
Increase in workmen's wage						
Unexpected sub soil nature						
Delay in obtaining permits from municipality						
Force majeure						
Changes in laws, regulations and taxes						
Lack of labor, materials, equipment and tools in the market.						
Delay in providing services from utilities (such as water, electricity etc...)						
Inadequacy of foreign collaboration agreements.						
Lack of fund and donation						

SECTION - C

Q.7 IMPACTS of TIME OVERRUNS of *Kality Waste Water Treatment Plant rehabilitation project.*

IMPACTS	N.S	S.S	M.S	V.S	E.S	Remarks
Dissatisfaction of project owners and end users						
Poor quality of the out put						
Making doubtful the end users in other projects too						
The client developed loss of confidence						
Affecting the growth of construction industries						
High cost of consultancy fee and supervision work						
Supplementary agreement						
Discourage investment in other projects						
Incurred additional project cost						
Budget short fall of the client						
Negative attitude towards the construction industry by the government and the society						
The contribution of the construction						

industry to the national economy will be less						
Customers/End users dissatisfaction						
Contribution to the development of the city would be affected						
Affects the relationship among stakeholders						
Loss of end users benefit that will be obtained if it has been completed on time						
Liquidated damage						
Project time extension						
Dispute						
Arbitration						
Litigation						
Dissatisfaction of project financiers						

SECTION - D

Q.8 RESOLUTION METHODS of TIME OVERRUNS of *Kality Waste Water Line and Treatment Plant rehabilitation project.*

RESOLUTIONS	N.S	S.S	M.S	V.S	E.S	Remarks
Provide training to unskilled workers periodically						
Increase timely supply of materials						
Focus on client's requirements						
Continuously update the work schedule						
Conducted site meetings more frequently						
Systematic control mechanism						
Improving contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of sub-contractors.						
The use of up to date technology						
Realistic time estimation						
Efficient management						

Resolution con'd

RESOLUTIONS	N.S	S.S	M.S	V.S	E.S	Remarks
Timely changing or cancellation of purchase orders						
Timely decision on design change						
Timely decision on variation order						
Quick response from client side						
Proper project planning and scheduling						
Assign Competent personnel						
Protection of uncompleted work						
Safety precaution to the project						
Appropriate scope definition						
Use of experience of subcontractors and suppliers						
Measure performance against other projects						
Focus on quality, cost, time and deliverable						
Timely progress control, schedule control, cost control, resource control						

by comparing with the completion date						
Avoid poor quality and rework						
Adopt project management tools						
Risk management during the project execution						
Increase the expertise and skill of human resource						
Committed leadership and management						
Increase the construction productivity						