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MASTER OF PROJECT MANAGEMENT

THE MAJOR CAUSES AND EFFECTS OF PROJECT DELAY IN ADDIS ABABA: THE CASE OF LEGEDADI DEEP WEELS WATER SUPPLY CONSTRUCTION PROJECT (PHASE- II)

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Causes and Effects of time delay The Case of Legedadi Deep Well Water Supply Project

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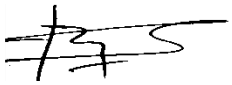
Mekonnen Mengistie (PhD)		**September 2023**
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DECLARATION

I declare that the research thesis entitled: ‘’ Causes and Effects of delay: The case of Legedadi Deep Well Water Supply Project’’ has been carried out by me and the research thesis is original and it has not been submitted for the award of degree or diploma at any university or institutions.

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ENDORSEMENT

This thesis has been submitted to Addis Collage University, School of Graduate Studies for examination with my approval as a university advisor.

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List of Abbreviations (Acronym)

AAWSA	Addis Ababa water and sewerage authority
LDWWSP	Legedadi deep wells water supply project
MDE	Mississippi Department of Educations
NPC	Network and Parallel Computing
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PPM	Poor planning Management
PRM	Procurement process Management
PTM	Project time Management
SHM	Stakeholder Management
SPSS	Statistical package for social science
TD	Time delay

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ABSTRACT

A project management is the applications of knowledge, skills, tools and techniques for project activities in order to chives the specific goals and objectives by using specific success criteria's these all must be managed to deliver the on time and on budget results. Construction projects are very rarely finished on schedule or according to an agreement in developing countries. There is an increase in the number of construction projects experiencing extensive delays leading to exceeding the initial time and cost budget. The main objective of this study to determine causes and effects of time delay on AAWSA in the case of legedadi deep wells water supply project (phase-II) As per the original signed contract agreement, the project is supposed to be completed in 22 months with the total allocated budget of ETB 1.69 Billion while due to time overrun the project have been completed in 26 months and consumed at the end of the project ETB 1.72 Billion which is higher by ETB 0.03 Billion or 1.78% than the contract amount which creates challenges to allocate additional budget on the client side, inefficient service delivery and this creates public grievance due to low performance on the project owner. The research design of the study descriptive and explanatory analysis and adopts quantitative and qualitative methods with the help of primary and secondary data. Therefore respondent distribution was undertaken through census techniques; Primary data was collected using self-administered questionnaires on 54 respondents from the project owner, consultant, and contractor. Secondary data was collected through reviewing of project documents. Such as; BOQ, Contract agreement and design documents etc. the existing causes of time delay project, the main factors to determine delay of the projects are Mean, standard deviation and other analysis tests or tools with SPSS applications are used. 92.8% of the variance is coming for in time delay of water supply project (dependent variables) and the causes of delay (independent variables). The findings reveal that stakeholder managements are well practiced and managed in the project. But On the procurement process management and poor planning are managed poorly practiced. The study suggested every projects properly planning, monitoring and evaluation system, starting from study stage up to commissioning date.

Key Words: Causes, Effects and time Delays and water supply Project.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Construction delays can be defined as the late completion of work compared to the planned schedule or contract schedule. The delays can be minimized only when their causes are identified. As we know the city of Addis Ababa is one of the cities in a rapid development country in all aspects in Africa. Due to this, Construction of new Water supply Projects are widely seen particularly in Addis Ababa Water and Sewerage Authority (AAWSA), the number of water supply construction projects is increasing from time to time because of the population growth of the city is high and different huge investments including Housing projects are undergoing(MDE 2016).

Existing water supply scarcity becomes increasing from time to time and the need of developing new additional potable water sources becomes among prioritized tasks of the city administration of Addis Ababa and central government. Among these different new water supply projects have been made and one of the project constructed in this program has been LDWWSP, "Legedadi Deep Wells Water Supply Construction Project (Phase II)" with Estimated Budget of ETB 1,699,421,224.00 (birr One Billion Six Hundred Ninety Nine Million Four Hundred Twenty One Thousand Two Hundred Twenty Four Only) including VAT (Megabit 30, 2011 E.C AAWSA Project Office).

Water Supply & Sanitations are the public utilities that have been worst hit. These faucitis are necessary commodities in house hold and municipal activities. Though continuity of water supply and sanitation is taken for granted in most developed counties, it is a severe problem in many developing countries, even some time water is only provided for a few days a week on a shift bases.

Taking into account of the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS, 2014) led by WHO on behalf of UN-Water, drew a data from 94 countries and 23 external support agencies in the years 1990 and 2012. In this data it was stated that, 2.3 billion people around the world gained access to an improved drinking-water source but, the number of children who died from diarrheal diseases in this same period is strongly associated with poor water, sanitation and hygiene which fell approximately 1.5 million (GLAAS,2014 and WHO).

Moreover, as stated in the researches of (Watkins, 2006 and World Bank ,2003), Unimproved drinking water and sanitation are the world's second biggest killer of children which is approximately 10,000 people die every day from water- and sanitation related diseases, and thousands more suffer from a range of debilitating illnesses.

From the report of Rift Valley water supply and sanitation project report, water supply coverage in Kenya has been estimated at 70% for 7.5 million urban residents and 48% for 23.7 million rural residents. Sanitation coverage is lower, with only 65% of urban and 40% of rural populations having access to sanitation services. This has resulted in the contamination of water supplies and a high incidence of water related diseases like typhoid and cholera, which affects mostly the children and the poor. More than half of the population below age 15 and close to 50% of the population live below the poverty line (African Development Bank, 2004). With respect to Ethiopia, as reported in a research report of Seifu, Amy, and Manayahshal (2012) the access to safe drinking water supplies and sanitation services in Ethiopia are among the lowest in Sub-Saharan Africa. Safe potable water access for the urban areas was 68 per cent, while the access to potable water in rural Ethiopia is about 55 % (within 1.5 km) in the year 2010. Water and sanitation-related diarrheal disease is among the top three causes of all deaths in Ethiopia (Manayahshal, 2012) and (African Development Bank, 2004).

The case of Addis Ababa water and sewerage authority construction area of Legedadi Deep Well Water Supply project (LDWWSP) is one of the water supply projects implemented to alleviate the prevailing unsatisfactory water supply situation at the capital city, which is an important service for one of the most water deficit areas in Yeka sub cities like Kotebe, Ankorcha Yeka Abado. Source of water, 16 deep wells are located in Legedadi well field with a maximum discharge or production of 86,000m3/day. The main distribution line passes from Ayat Square through Legetafo, Yeka Abado and Ankorcha and it distribute clean water to North -Eastern part of Addis Ababa, particularly to Yeka and Gulele sub-city residents. This thesis were examines causes and Impacts of delay in an integrated manner and determines how critical delay causes are most influential in project performance. This were provide owners, consultants and construction organizations involved in construction projects with the foundation on which such strategies on how to avoid delays can be developed in the future (MDE 2016).

The project at the beginning has been designed to produce estimated capacity of 86,000 m^3/d, which has a total capacity of satisfying a daily demand of 860,000 inhabitants at a daily consumption rate of 100 l/c/head and the surplus water after supplying to the residents was planned to distribute to existing system to alleviate water shortage of nearby areas and reinforce the central part of the city. While designing the water supply system, the necessary complete data of all sixteen wells drilling results was obtained, discharge of 16 wells and some other design imputes were assumed.

As per the original plan or signed contract agreement; Study, design and construction of the project is supposed to be completed in 22 months with the allocated budget while due to time overrun the project have been completed in 26 months (two years and two months) which causes inefficient service delivery on the project owner, Addis Ababa Water and Sewerage Authority.

This thesis was examining causes and impacts of delay in an integrated manner and determines how critical delay causes are most influential in project performance. This will provide owners, consultants and construction organizations involved in construction projects with the foundation on which such strategies on how to avoid delays can be developed in the future.

The main factors of delay are the most frequent challenges confronting the industry of construction and global phenomenon. Having had all these reasons of project delay, this study is intended to identify the Legedadi deep well water supply project delay causes with its effect.

1.2. Statements of the Problem

Construction projects are very rarely finished on schedule experts in recruitment of highly skilled professionals according to survey on large scale projects by Mississippi Department of Educations (MDE) 2017. According to Assaf and Al-Hejji, (2006) only 30% construction projects were completed within the scheduled completion date globally. According to Reports of the many donor organizations also indicated that the project management practice of the Addis Ababa Water and Sewerage Authority Project Office has not been without problems. Some of the whys and wherefores were largely due to the delay in project preparation, and limitations in technical, financial, contract management capacity, and right of way issues in certain projects (World Bank, 2017).

Water supply projects are entrapped by various types of causes, some are- inadequate or inefficient equipment, tools and plants , unreliable sources of materials on the local market,

inadequate manpower, (e.g., in terms of numbers, poor training, lack of training, etc.), delayed payment to contractors, subcontractors and/or suppliers , rework required due to poor work or the wrong materials used by contractors , change of work scope and/or changes in material specifications, poor communication among stakeholders (e.g., slow responses to site queries, late receipt of drawings, etc.), disputes among the parties involved in the project (clients, contractors, consultants) , high inflation, insurance and interest rates , contractor's work load, bureaucracy, site accidents etc. Delay is a significant issue in a constructions industry of the world for the past decades. Delays in a Study of construction projects is counted as a common problem worldwide and became a cause for delay projects completion with huge cost overrun (requiring higher budget than estimated), extended completion time, inferior quality deliverables, contract termination and stakeholders dissatisfaction.

In recent time it was an accepted phenomenon to have delays in construction projects completion time After conducted this specific research, enable the stakeholders to aware additional causative factors that led to cost escalation besides city administration and stakeholders revealed, and also concurrently shows the impact and the overall effects of time overrun in their water supply programs execution. In spit to this the study also intended to contribute knowledge in the area of Addis Ababa water and sanitation authority construction industry in the case of legedadi deep well water supply project.

The best practices in projects fields are not documented because there aren't many empirical studies on whether project management in Ethiopia is successful or unsuccessful. Legedai phase -II water construction project birth in the case of increasing population growth in Addis Ababa city administration has been struggling to meet the demand of the population in terms of potable water for the community by implementing various water construction projects for the last fifteen years. Completion of construction projects on Specified time or time agreed by the parties indicates their efficiency. The delays in construction projects happen because of various factors or causes. These causes lead to the delay in construction completion, and this delay ultimately leads to negative effects on the water supply project. Most researches are done in related to this title but there objectives were not similar with this study. For the cline Some researches wish are done before this study are listed as follow: - Bekele (2017), Lijalem Mulu (2019), Alemayehu Takele (2020) and Yenehareg Bekele (2021) indicated the existence of time delay in AAWSA’s

Water supply and sanitation and other projects, all of the above mentioned scholars define the cause of delay and the main specific objectives are almost about stakeholders (Clint, consultant and contractors).

This study wants to minimize and fill the gap of documentations for empirical study delay of a project. in Addis Ababa water and sanitation authority the case of legedadi deep well water supply project delay is a significant issues especially extend the construction time of the project is a loss of revenue and productivity, dependency on existing facilities and creates public grievance, higher costs, longer work duration, increased labor cost, higher material and equipment costs etc. This has a major impact in the economy as it causes a significant amount of cost overrun and resource wastage.

According to Survey on mega projects by Network and Parallel Computing (NPC) 2016 projects have difficulties problem in implementation and success, development actions particular face in different set of issues, . In Ethiopia Particularly, in the capital city Addis Ababa, there are a number of construction projects that have been suspended behind their scheduled period one of them legedadi water supply project and for such kind of project. The Addis Ababa Water and Sewerage Authority (AAWSA) mobilize significant portion of the annual budget and identifying the problem of the planning and procurement process will help the authority to save significant portion of annual budget and helps to serve the public in efficient and effective manner.

Therefore, the conceptual and omitted of variables gap to investigating the current poor planning, procurement process and stakeholder activities can avail conclusion and recommendations for future proper usage of resource for achievement of the authority goal. Generally this study wants to fill a gap of omission of variable and conceptual gap in the case of delay at Legedadi Deep Wells Water Supply Project (Phase II).

1.3. Research Questions

1. To what extent the projects are delayed by the causes of poor planning and procurement process the case of legedadi deep well water supply project?
2. What are the effects of time delay project related to poor planning and procurement process for the case of legedadi deep well water supply project?

3. What are the main responsible parties (stockholders) for delay of legedadi deep well water supply project?

1.4. Research Objective

1.4.1. General objective:- to determine the major causes and effects of delays in the case Legedadi Deep Wells Water Supply Construction Project (Phase II) on the successful completion of the project.

1.4.2. Specific Objectives

- To determine the main causes of delay related to poor planning and procurement process for legedadi deep well water supply project.
- To identify the effects of time delay related to poor planning and procurement process the case of legedadi deep well water supply project.
- To determine the main responsible parties (stockholders) for the cause of delay in legedadi deep well water supply project.

1.5. Scope of the Study

The main purpose of this study is to determine the factors of delay construction of Legedadi Deep Wells Water Supply Project in Addis Ababa (Phase II) which constructed to supply potable water to resident expansion areas located in North East of the city. There are a number of components which influence the extend adversely that causes a delay in arrange to pay additional costs and additional time in expansion to the contract understanding in this think about the centering portion is the major determinant variables of timed delay completion projects such as the existing hones of extend management information zones, current execution (time measurements) within the information zones and Impacts of Extend information management regions on project execution (time). In arrange to meet the goals of consider there are distinctive information collection strategies in this case survey, perception and secondary data are utilized to realize the destinations of ponder.

The study area is conducted at only the case of Addis Ababa water and sanitation Authority (AAWSA) in project office (PO). Due to different reasons a researcher would select this project for study. Geographical areas of the study is the largest ground water project ever undertaken by the AAWSA and is located in different parts of Oromia special zone bureka wereda, The project mainly consists; the design of well field collector pipes from deep wells that are under drilling works around LegeTafo, Legedadi and Sendafa areas. The conceptual scope of the research:-

water supply construction project to carry out of the conceptual review on time delay .when time delay arise due to different causes by poor planning, procurement process and stakeholders these arisen overruns need time management requirement such as preventive and solution.

1.6. Significance of the Study

This study highlights the determinant factors of delay on water supply and sewerage construction projects in the case legedadi deep well water supply project. It will also help to narrow down the knowledge gap with respect to schedule delay or success related to water supply projects. The researcher has also hoped that the findings of this study will be used by various researchers, government organs, project managers, clients, Site Engineers, consultants, contractors and scholars of project management and academic institutions.

Moreover, the result were make the concerned parties be aware of the serious effect that their failure to complete their projects on time and properly have an impact on the socio-economic development of the City as well as in the country in general. The study could be used by the Addis Ababa Water Supply and Sewerage Authority in addressing some of the determinant factors related to project management. Additionally, the study will again, let the AAWSA project office realize the need to equip its project team, train and motivate them properly for the efficient working mindset. The study further tries to build effective and efficient process of the water supply project by analyzing the current progression in relation with the practical and scientific approach. As well, Addis Ababa Water and Sewerage authority could use findings and recommendations of the study as a feedback to improve time delay on water supply project. Finally, the study could be used as an instigator for researchers to conduct further study in this area. The study could be used by the Addis Ababa Water Supply and Sewerage Authority in addressing some of the determinant factors related to time delay project practices.

1.7. Limitations of the Study

The main constraint of this research is that the research was conducted on the water supply and Sewerage projects of Addis Ababa City only and it doesn't cover other construction project sectors so that the findings may not indicate the general situation of other regional towns of Ethiopia. Further, few staff members were not willing to fill out the questionnaires, time and resource constraints, the unavailability of adequate current literature on this research topic at a national level were also some of the limitations of the study.

1.8. Operational Definitions of Terms

- Project: A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources (PMI, 2013); It is a temporary endeavor undertaken to create a unique product, service, or result (Kerzner (1998).
- Project management: PM is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements (PMI, 2013).
- Schedule overruns (delay): Schedule overruns refer to situations where the actual project duration exceeds the originally planned and agreed completion period (Kaming et al (1997), Choudhry (2004) and Chan (2001), Mohamad, M.R.B. (2010))
- Project Management Body of Knowledge (PMBOK): PMBOK is a guide that the PMI introduced as a global standard for project managers to conduct good management practices while managing individual projects (PMI, 2013).
- Project management office (PMO): Project Management Office (PMO) is the office responsible for providing support for enhancing timely completion of the projects within the allocated budget (Kaleshovska, 2014).

1.9. Organizations of the study

This study is organized in five chapters. Chapter one provide a background of the study, statement of the problem, research objectives, and research questions, significance of the study, scope and limitations of the study that the study looks forward to answer, purpose of the study. Chapter two is about the literature reviews of different scholars that were written similar titles in different time and this chapter has theoretical literature reviews, empirical literature reviews and conceptual frameworks. Chapter three is about methodology data approaches and design, sources of data, data collection method, sampling of collected data, target populations, data analyzing methods. Chapter four data presentation, analyzes and interpretations of the collected data in this chapter the collected data were changed in to practicable meeting its objectives of the study and in this chapter the study were give a meaningful. Chapter five is about conclusions and recommendations in this chapter checking whether the objectives meet its target or not and from the output we will conclude something that is true.

CHAPTER TWO: LITRATURE REVIEW

2.1 Theoretical literature review

This chapter discus the theoretical, empirical and conceptual framework of causes and effects of delay construction projects in Addis Ababa water and sanitation authority in the case of legedadi deep well water supply project phase II. This review discusses the literatures related to cause & effect of delays in construction projects and the way to avoid or minimize the effect of the event.

A project is a temporary endeavor that practiced by a group of peoples to create a unique product and services within an established budget, time and specific quality to create identifiable, accountable and deliverable activities (PMBOKR Guide Fourth Editions). Project is ubiquitous that means it is found every part of the world and done by everyone. Each organization has driving tools that is called a project because a project has a power to facilitate a change in the organizations (AMA Hand Book Third Editions). Project risk is an uncertain event or condition that, if it occurs, has a positive or negative affect on one or more project objectives such as scope, time, cost, quality, and stakeholder management's. For all project uncertainty is an inherent part of a project and by this thing it makes all projects similar (Miller and Lessard, 2001). Uncertainty is lack of predictability and results in either positive or negative products (Stein, 1981).

2.1.1 Theory on delay of the Construction Projects

2.1.1.1 Theory of Constraints in Project Management

According to Lamb, Robert, Boyden (2002) at first extend administration is challenged in accomplishing of targets and objectives of a chance in this circumstances the normal compels of a chances are scope, time, cost, quality and stakeholder managements of a given extend. The other challenge of development is to optimize the designation and integration of inputs essential to meet pre-defined goals Goldratt (1984). In his speculation of objectives states that any sensible system is compelled in accomplishing more of its objective by dreadfully little number of impediments, which there's persistently at scarcest one impediment. Theory of Confinements is based on the present that the rate of objective achievement is restricted by at scarcest one compelling handle. Limitations can be inner or outside to the framework.

2.1.1.2 Stakeholder theory

This research is based on stakeholder theory (Freeman (1984), resource dependency theory institutional theory (Mintzberg et al. 1998; Mintzberg and Lampel 1999). Freeman (1984,) defines a stakeholder as: An individual who can influence or be influenced by the achievement of an organization's objectives." A year later, in 1985, Cleland published another definition of stakeholder, which also existed. One of the important definitions used in various scientific literature, especially in the project area Management literature (Littau et al., 2010,). Cleland defines a stakeholder as an individual or an organization that "has a legitimate interest in the outcome of the project" (Clean, 1985 Quoted in Littau et al 2010,). Since then there has been a lot of literature on this subject Stakeholder definition; however, the definition was not applied consistently (Andriof & Wattock 2002). Furthermore, several authors (Achterkamp & Vos, 2008; Davis, 2013,) researched about the uses of the stakeholder notion in project management literature and discovered that effective stakeholder management has been recognized as one of the key delay factors of the projects.

The stakeholder can be divided into two according to Calvert (1995) and Bonke (2002):

- Internal Stakeholders to the organization, who are the team members of the project or those who provide for the financing of it.
- External Stakeholders like the people affected by the project in some significant way.

2.1.1.3 Types of time delay

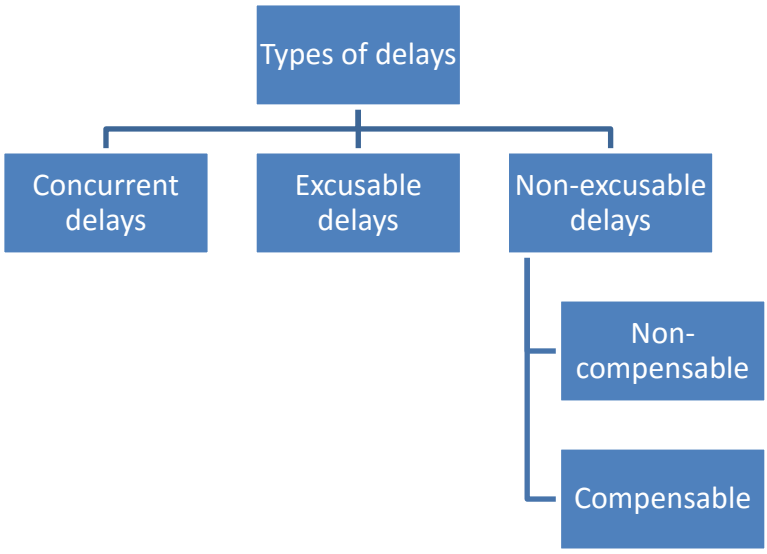


Figure2.1.Types of time delays project

As shown on Figure 1, there are three types of delays Non-Excusable delays, Excusable delays and Concurrent delays (Saleh Al HadiTumi, 2009).

A non-excusable delay is delay caused by the contractor or its suppliers, through no fault by the owner. The contractor is generally not entitled to relief and must either make up the lost time through acceleration or compensate the owner. Therefore, non-excusable delays usually result in no additional money and no additional time being granted to the contractor.

Excusable delays are divided into two: compensable and non-compensable delays. Compensable delays are caused by the owner or the owner's agents. While non-compensable delays are caused by third parties. These delays are commonly called “acts of God” because they are not the responsibility or fault of any particular party. (Wa’elAlaghbari, (2007) and Saleh Al HadiTumi, (2009)

The Third type of delay factor is called Concurrent delay. A more complicated and this type are very typical in construction project. This situation happened when more one factor delays the project at the same time or in overlapping periods of moment.

2.1.2 The major causes for delays in a project

2.1.2.1 Poor planning related to delay factor

Project is characterized as succession of tasks and activities that have certain targets with specific standards, recognized beginning and complete dates, budgetary constraints, requires nonhuman and human assets and include different functions (Kerzner, 2009). The essential challenge of venture management and administration is to accomplish venture targets considering its constraints and limitations (Zidane, 2012). This requires applying skills, techniques, tools, knowledge to project tasks in order to achieve project prerequisites (PMI, 2013, Westland, 2007). As indicated by (PMI, 2013), project management includes:

1) Identifying of the Project requirements.
2) Addressing project stakeholder desires.
3) Correspondence administration between the partners.

The projects may vary in duration, size, environment, complexity, objectives, conditions, organization structures, deadlines, financial intensity, uncertainty, and other different dimensions Keung and Shen (2012); Zou et al. (2007). However, in a construction project where time really worth money, time planning and management is vital (Duran, 2006). The delay in construction

projects, which means the non-completion and achievement of the project inside the predefined construction contract's duration, is considered to be a standout amongst the most repeating issues in the construction business (Mahamid et al. 2012). As indicated by Duran (2006), the industry and business of construction has an awful notoriety for familiarizing with delays and postpones. Postpone examination is either disregarded or done subjectively by only including a contingency. Therefore, numerous construction projects fail to meet the planning timetable's due dates (Duran, 2006). Specifically developing countries face this specified problem in their construction sectors and it becomes a common issue for the construction industry, which are primarily caused by poor pre-construction planning and mismanagement of the project at its various stages (Duran, 2006).

Delays in construction ventures are common in the developing countries as well as developed countries' industry (Falqi, 2004). Construction delays and duration issues are frequently responsible of transforming productive ventures into loosing projects. These delays can be reduced or prevented by an increased pre- project planning and successful project management as they are one of the most critical success factors of the construction project accomplishment (Yang et al., 2012). Construction projects' managers ought to deliberately evaluate the likelihood of postponements and delays to secure project achievement. Foreseeing and predicting the likelihood of postponements and project preplanning play a crucial role towards the success and achievement of project within its planned timeframe and budget (Kim et al., 2009).

2.1.2.2 Procurement process related to delay factor

In order to increase the efficiency of the construction industry it is crucial to build and enhance procurement processes. This investigation's goal is to better understand how project performance is impacted by the proses procurement practices. (Eriksson, P. E. & Laan, (2007), Project Procurement Management is the business process of commissioning, outsourcing, and completing projects while selecting, coordinating, and maintaining the products needed to complete the project. This control concept also applies to partnerships entered into with external suppliers to acquire, purchase or store certain goods and services. Most project procurement management partnerships are based on contracts to ensure that the necessary products or services are delivered on schedule and in good condition in order to fulfil the criteria of the purchasing firm. (Cox,A. & Thompson, I. (1997)). Most project procurement management partnerships are based on contracts to ensure that the necessary products or services are delivered on schedule and in good condition in order to fulfil the criteria of the purchasing firms (Saylor.org (2009)).

As a result, project procurement management also entails the change control and contract management procedures needed to create, manage, and implement contracts or purchase orders with a variety of efforts. To complete the project of procurement successfully, Plan procurement management, carry out procurements, keep procurements under control, and conclude procurements are all parts of this process. Project procurement management is an important part of the business and is often managed by an organization's accounting and purchasing departments.

2.1.2.3 Stockholders effects for causes of delays

2.1.2.3.1 Client-related Schedule delay factors

A recent critical literature review on main factors of delay in construction projects by Daba and Pitroda (2018) indicated that the client/owner-related schedule delay factors include corruption, intermittent termination of variation while project is ongoing, less on-time payment for developers, variation of specifications and material type during construction work, delay in checking contract document, variation of project scope, poor coordination with other stakeholders, slow decision making ,inadequate information during project feasibility study ,delay in site delivery, lack of motivations for contractor to finish ahead of schedule ,ineffective representative, poor experience, interference during actual project work, joint-owners disagreement, improper feasibility study ,poor coordination and communication, interruption of work ,slow document approve ,nature bidding and award ,impractical contract duration ,and unrealistic delay penalties. The study by Aibinu and Odeyinka (2006) identified Client-related Schedule delay factors which include the owner’s cash flow problems, variation orders and slowness and delay in decision making. Similarly, Chan and Kumaraswamy (1997) identified Client-related schedule delay factors on construction projects which are the low speed of decision making, unrealistic duration of the contract, and owner-initiated variations.

Contract modifications (replacement and addition of new work to the project and change in specifications) lack of working knowledge, lack of coordination with contractors). Furthermore, Assaf and Al-Hejji (2006) carried out a similar study on the topic “Causes of delay in large construction projects”. The researchers found out that Client-related Schedule delay factors affecting schedule delay are: Lack of incentives for contractor for finishing ahead of schedule and suspension of work by owner, delay in payment for the work, delay to deliver the site to the contractor, changing and modify orders during work, delay in revising and approving design

documents, bad communication and coordination between the client and the other parties, slowness in decision making, suspension of the work and conflicts between joint-ownership of the project.

2.1.2.3.2 Contractor-related Schedule delay Factors

Aibinu and Odeyinka (2006) identified several factors as the main contributors to contractor-related factors for Schedule delay. These include planning and scheduling problems, financial shortage problems, equipment fault, shortage of equipment and materials, slow mobilization, equipment maintenance problems and a shortage of labors. Chan and Kumaraswamy (1997) also identified that factors affecting schedule delay are poor site management and supervision, insufficient project planning and scheduling.

factors related to contractor-related Schedule delay are: financial problems; delay in delivery of materials to site; shortage of materials on site; construction mistakes and defective work; poor skills and experience of labor, low productivity of labor; coordination problems with others; lack of subcontractor's skills; lack of site contractor's staff; poor site management; shortage of site labor; and equipment and tool shortages on site.

Another recent critical literature review on main factors of delay in Construction projects by Daba and Pitroda (2018) indicated that the contractor-related schedule delay factors are "dishonesty/problems in funding by contractor, ineffective site supervision, ineffective scheduling ,revise due to mistakes during work ,sub-contractors work related delay, poor experience of the contractor, delay in site arrangement, delay in preparation of working drawing and sample of material, delay in payment of executed work for a contractor by the owner, slow decision-making ,late approving design documents ,variation by owner, delay in procurement of materials, mistakes in design documents, recurrent changing of subcontractors, poor methods of construction, unskilled project crew, poor technology, poor coordination and communication between them, ineffective contractor's policies, unskilled subcontractors, ineffective economic control on site, inadequate procurement of construction materials, improper equipment, frequent equipment breakdowns ,shortage of equipment, subcontractor turn-over ,lack of labor, slow mobilization of labor, ineffective equipment ,slow equipment deliver, materials damage, strike, conflict between labor and client".

2.1.2.3.3 Consultant -related Schedule delay Factors

The study by Aibinu and Odeyinka (2006) revealed that incomplete drawings, late issuance of instructions and inadequate supervision are some of the consultant related Schedule delay Factors. Similarly, Enshassi et al., (2010) concluded that lack of experience on the part of the consultant; absence of consultant's site staff; lack of managerial as well as supervisory experience on the part of the consultant's site staff; incomplete documents; delayed and slow supervision in making decisions; and delayed instructions are also some of the factors. Al-Khalil and Al-Ghafly (1999) stated that inadequate site supervision by the consultant staff was the major cause of schedule delay.

In the construction sector, delay in approving major changes in the scope of work by consultant, delay in performing inspection and testing by consultant, stubbornness of consultant, late review and approval of design documents by consultants, poor communication and coordination between consultant and other parties, conflicts between consultant and design engineer, insufficient work experience of consultant, design errors made by designers, changes in types and specifications during construction, insufficient communication between owner and consultant during design stage were consultant -related Schedule delay Factors (Assaf et al., 1995). Additionally, a recent critical literature review on main cause of delay in construction projects by Daba and Pitroda (2018) indicated that the consultant-related Schedule delay Factors are "lack of experience ,disagreement with a design engineer ,delay in approving project scope ,delay in performing inspection and testing, poor site investigation, unskilled project management assistance, delay in approving and checking design documents, inadequate coordination and communication between project holders and developers, recurrent change of contractors and sub-contractors, kind of project award and bidding ,variation during construction by owners, unfavorable weather condition during construction work, poor experience of consultant and contractors, delay in checking working drawing, error in design documents and discrepancies, less brief specifications in drawings ,quality pledge".

2.2. Empirical literature Review

Determinants of project construction and management process if for timely completion and sustainability of the projects Assaf, Al-Khalil and Al-Hazml (2005). Hong Kong (1997) a comparative consider of causes of time invades.

The review revealed that most risk factors affecting project completion can be categorized as human and organizational factors and unknown geotechnical conditions that were not known beforehand. Saudi (2019) Causes of delay in Saudi open development project.

A Comparison of Temporary worker execution in Japan (2001), Extend Natural Administration (Canada 1995) and dangerous Components Affecting Quality Items in Development projects (India 2006), development contracts Period (US 1988).

Determinants of helpful completion of street extend financed by Kenya Road Board in Kisumu country (2016. Time is the substance for both owners and temporary workers and might be a visit source of talk about and claims driving to case (Ahmad et al (2003)). Ethiopia, (2020) Determinants of Framework Extend Delays and Fetched Escalations:

In Saudi Arabia Assafet Al, 2006 conducted a research about construction project delay on different type of project in the state. It was concluded that 70% of projects experience time overrun. The survey was conducted with 23 contractors, 19 consultant and 15 owners. Seventy-three cause of delay was recognized and the causes are grouped into nine classes. The outcome of the survey that agreed by all three parties is change order. The overall results are stated that the factor related to labor, contractor, project, owner and consultant are in the highest rank. Consultants play a very important role in design-related delays because they are in charge of the design process in conjunction with the owner of the project. Furthermore delayed in payments categories do not have the same negative impact on project completion times as other factors considered in this study such as code, design and construction related issues.

Al-Ghfly, (2005) identified that, project owner involvement, contractor performance and the early design and planning of projects are important factors for the project delay in Saudi Arabia. The study discussed delay in public water and sewage projects. Sixty causes were identified and classified. He concluded the following: the delay occurred frequently in medium and large size projects, and considered severe in small projects. Important delay causes are related to owner

involvement, contractor performance, and the early planning and design of the project. Important delay causes were found to be: financial problems, changes in the design and scope, delay in making decisions and approvals by owner, difficulties in obtaining work permit, and coordination and communication problems.

The study recommended to owners (Timely payment to contractor, minimum change in order during construction, timely reviewing and approving of design documents, checking resources and capability of contractor), contractors (sufficient number of labors, managing financial resources, proper planning and scheduling, better site management and supervision), and consultants (timely reviewing and approving design documents, flexibility in evaluating contractor works).

Public projects in Jordan have been investigated the causes of delay by Al-Momani, (2000) in year 2000. The whole projects indicated that poor design and carelessness of the owner, change orders, weather condition, site condition, late delivery, economic conditions, and increase in quantities are the main causes of delay. The presence of these factors has an impact on the successful completion of projects.

2.3 Research Gap analysis

This review discusses the literatures related to cause & effect of delays in construction projects and the way to avoid or minimize the effect following the event. It also tries to attempt as to how different scholars & researchers in different countries approaches the delay problem and the methods and techniques used to identify main cause & their related effects on any project or water supply projects. Timely completion was one indicator for successful project. Often, the time required to complete construction of projects is more than specified time in Contract. It is an undertaking slipping over its arranged timetable and was considered as basic issue in construction projects. Failure to achieve: targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects. Usually, when the projects are delayed, they are either extended or accelerated the time and therefore, invite to the additional cost. Although the contract parties agreed upon the extra time and cost associated with delay, in many cases there were problems between the owner and contractor as to whether the contractor was entitled to claim the extra cost.

The aim of this study includes the identification of causes and effects of delay in construction projects in Ethiopia with the special focus on Addis Ababa water and sanitation project in LDWWSP phase II site assessing the way to get reed of these problems by the use of project management approach. This reviews perceptions of stakeholders (contractors, project owners, & consultants) on most important causes & effect of delays in Addis Ababa water and sanitation in construction projects in LDWWSP particular. The defining premise for the framework as derived from the literature review is that manipulation of the (independent (Predictor)) variables consisting of poor planning, procurement and stakeholders are construction contract duration affects the completion time of water supply construction projects is (dependent variables) (Meresa M.(2007).

2.4. Conceptual Framework

The conceptual framework for this research was in line with the theories of Project Management. Kerzner (1998), one of the specialists of Project management, characterizes a project as having a specific objective to be completed within certain specifications, with defined start and end dates, funding limits, and which consume resources (i.e. money, people, equipment). Similarly, Gaddis (1959) underscored that an important goal in the field of project management is to complete the project within the allocated time and budget. In 1916, Fayol was the first pioneer to introduce the managerial thinking concept based on his experience in the early 1900s. He familiarized the main function of management including planning, organizing, staffing, and controlling. Further, project management (PM) theory is a collection of confirmed effective work practices for managing projects (Engwall, 1998).

This conceptual understanding, it is deemed that the construction management sector across the world, in general, has been established with proper planning of a project by identifying the suitable resources to finish the project on time, with the allocated budget and at the required level of quality. The three main important goals of any construction projects are cost, time and quality of the successful construction projects have been achieved by accomplishing the project deliverables and objectives within the specified time, cost and quality by bringing together the project activities and resources necessary to that. However, mostly construction projects

including water supply and sewerage construction projects face schedule due to several determinant factors.

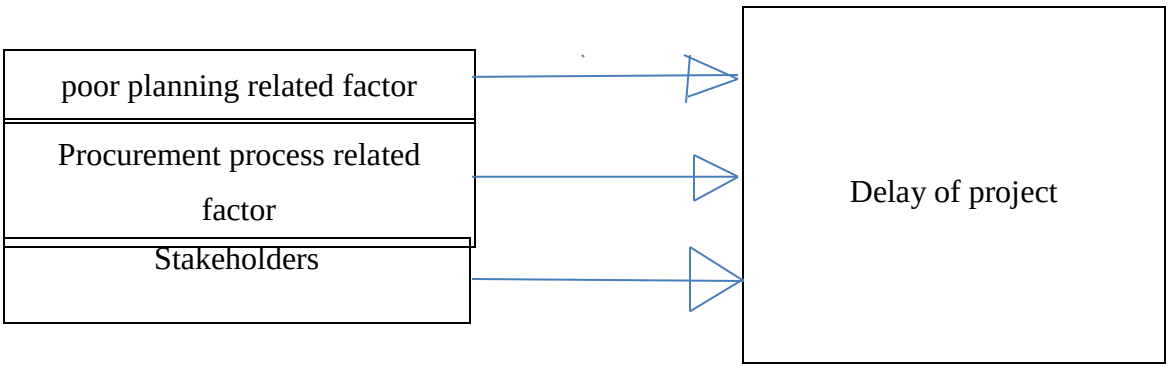
The conceptual framework for the study as illustrated in figure 2.2 indicates the relationship between the variables. The defining premise for the framework as derived from the literature review is that manipulation of the (independent (Predictor)) variables consisting of poor planning, procurement and stakeholders are construction contract duration affects the completion time of water supply construction projects is (dependent variables).
Variable means represented what information can change but the operation on the variable remains the same. According to analytical health research two types of variables.

Independent Variable: - are what we expect will influence dependent variables and independent variables called controlled, input and explanatory variable.

Poor planning: - is a project will not meet the expectation of the clients or customers. They will be dissatisfied with the work and they will not consider the work for any construction in the future this will be loss of profit for the organization.
Procurement process: - is the strategy of procuring stock and organizations, as a run the show insinuating to commerce costs**.** Corporate obtainment frequently requires arranging, securing, and installment planning over distinctive ranges of the exchange.
Stakeholders: - are person assemble or organization with a vested interested, or stake, inside the decision-making and works out of exchange, organization or wander.

Dependent Variable: - is what happens as a result of the independent variable and dependent variable called responding and measured variable.

Causes of time delay project: - is the commencement of a project due to several factors that can cause organizations to miss deadlines.



Source: Own Survey, 2023

Figure 2.2 Conceptual framework of time delay project

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

In this chapter the study were convey out how the objectives of the study were addressed and it includes the research design part, the study areas, target populations, sources of data, and method of data collections, validity and rehabilitee of the collected data, methods of data analysis and seen during the study.

3.2 Research design

This research used descriptive and explanatory research design and follows combination of both quantitative and qualitative data collections approaches to identify the determinant factors affecting time delays on water supply projects within the Addis Ababa water and sewerage authority (AAWSA).

3.3 Research Approaches

Investigate strategy alludes to the approaches of procedures utilized on collecting and analyzing collected information (Colleagues and Liu 2008). A investigate approach and strategy for inquire about cover steps from harsh suspicions to point by point strategies of information collection, investigation and elucidation. This arrange includes a few choices, and it require not be taken within which it make sense to us and introduction here. The general choice includes which approach ought to be utilized to think about a theme. Add up to choice is approximately which approach to use to ponder the subject. The choice of investigate approach is additionally based on this almost the nature about address or point to be tended to; Individual involvement of analysts and investigate subjects. Agreeing to oxford Lexicons (2010), technique is characterized as an organizations of strategies utilized in particular range of inquire about.

The strategy utilized in this inquire about is quantitative inquire about strategy. Since the finding is overview it is more emphasizes quantitative inquire about approach. Utilizing different approaches can capitalize on the strengths of each approach and counterbalanced their diverse shortcomings and gives distant better much better; higher; a stronger; an improved a higher understanding inquire about issues than either approach alone. It seem also provide more comprehensive answers to inquire about questions going past the restrictions of a single approach (Woodley, 2004). It is additionally viable within the sense that the analyst is free to utilize all strategies conceivable to address a investigate issue (Creswell, 2006). It makes utilize

of techniques of request that include collecting information either at the same time or consecutively to best get it inquire about issue. The information collection moreover includes gathering numeric data. “Inquire about plan" alludes to arrange or organization of logical examination, planning of inquire about ponder includes the advancement of or methodology that will direct the collection and investigations of information (Poilt and Hungler, 1985).

3.4 data collection methods and instruments

This study was conducted to answer the research question posed and to achieve the intended objectives of the research and it uses both quantitative and qualitative properties. The proper achievement of the researchers used primary and secondary data collections of sources.

Primary data was collected in a structured manner questionnaire using survey methods. This method uses for measuring respondents opinion and attitude. The data collection tool that is used to gather data from sample respondents is questionnaire and observations of the site. The questionnaire was an instrument by which information is obtained from respondents in written form. Questionnaires are prepare in English and answered the research question posed, the researcher examines a set of data collection procedure. Observation is used in this research to compare the real actual existing site with the reports. These steps help researchers obtain real and relevant data after receiving the letter of approval from the sample unit from Addis Collage University. The first step in the data collection process is asking subjects to Self-introduction questionnaire survey return in a short period of time and collects voluntarily manager of each area. Finally, a questionnaire was distributed to all respondents.

The secondary data sources was collected from published and unpublished various documents, annual reports, Monthly reports, guidelines and various books written on related subjects topics.

3.4.1 Questionnaire structure

Questionnaires are one of the doubtless primary sources of obtaining data in any research endeavor. However, the critical point was that when designing a questionnaire, the researcher ensured that it was “valid, reliable and unambiguous” according to (Richards & Schmidt, 2002, p. 438). On the whole, questionnaires can appear in three types: 1- closed-ended (or structured) questionnaires 2- open-ended (or unstructured) questionnaires 3- a mixture of closed-ended and open-ended questionnaires.

In connection, a well-structured questionnaire was prepared and administered to the various respondents. The survey questionnaire was consisting of two main parts: the first section consisting of the demography of respondents while the second section addressed the specific objectives of the causes, and effects of water supply projects delay. Practically, all the questionnaires have both closed and open ended questions to certify consistency of respondent feedback. As it was not totally possible to design all questions as closed-ended, some of the questions were left open-ended to acquire numerical data or to lobby some written comment.

As a matter of fact, closed-ended questionnaires provide the inquirer with quantitative or numerical data and open-ended questionnaires with qualitative or text information. Seliger and Shohamy (1989) have the opinion that closed-ended questionnaires are more efficient because of their ease of analysis. On the other hand, Gillham (2000, p. 5) argues that "open questions can lead to a greater level of discovery." He too admits the difficulty of analyzing open-ended questionnaires. a five-point Likert scale of 1 to 5 was employed so as to measure the strength of respondent 's view or opinion on the critical causes of delays in project delivery inside the water supply and sanitation projects.

3.5. Target population and sampling

3.5.1 Census Techniques

The target populations for this research work included the staff members of the client (project owners), consultants, and contractors based on their direct exposure to the Water supply projects of the Addis Ababa water and sewerage authority (AAWSA). The research population composition included support staff of the client Project managers, architects, civil/site engineers, site supervisors, planning, monitoring, and evaluation officers. Participants from the client (project owners of AAWSA), Contractors, and Consultant firms were selected on the basis of knowledge of the research problem and direct work experience in water supply construction project activities.

The available selected participants had practical project management experience in the construction of water supply projects. Their knowledge and experience helped as a suitable indication of the determinant factors affecting time schedule on water projects from owners, contractors and consultant's point of view. Of the three different parties namely client, consultants and contractors, fifty four (54) available participants (21 from the Client, 18 from the

contractor, and 15 from the consultants) were invited and taken as a sample. Currently they are around 14 consultants, 16 contractors and 21 clients which lead as to the approximate target population of this research. Which is a total of 54? Therefore respondent distribution was undertaken through census techniques,

Table3.1 Target population

No	Department	No of staff
1	Project Manager	6
2	Project Coordinator	7
3	Site Engineer	17
4	Office Engineer	8
5	Contract administrator	4
6	Site Supervisors	12
Total		54

Source: Own Survey, 2023

3.6 Method of Data Analysis

For this study, descriptive and explanatory method is employed in the data analysis and follows both quantitative and qualitative data analysis methods were used to answer the questions to meet basic research questions and research goals. Quantitative Data analysis, data from questionnaires were entered into a computer using a statistical package for Social Sciences (SPSS) Version 20 Computer Programs for Data Analysis and Quantification Analyze using descriptive statistics such as percentages, frequencies, and standard bins and mean. How Researchers Analyze Data, Understand It, and Succeed A study was conducted and data were collected from a variety of primary and secondary sources Record, process, organize, analyze, interpret and present in relation to a research question. The data collected by the above instruments are qualitative and analyzed quantitatively. Quantitative data are interpreted and presented through questionnaires Graphics and tables with frequency distributions, standard deviations and means.

Deducible statistics were used to identify the degree of correlation between the variables used correlation by Pearson. Further regression analysis will be performed to determine the extent relationship between dependent and independent variables, the independent variables i.e. poor planning management, procurement process and stockholders (Clint, consultant, contractor) have an impact Construction project of time delay to completion (dependent variable).

Descriptive Statistics are used to present quantitative descriptions in a manageable form and to simplify large amounts of data in a sensible way. Descriptive statistics are all about describing the data to make it easier to understand. Descriptive statistics are summary statistics that quantitatively describe or summarize features from a set of information, and descriptive statistics is the process of using and analyzing those statistics. in this study to use descriptive statics using the dependent variable that is called time delay of deep well water supply project and the independent variables poor planning management, procurement process and stockholders (Clint, consultant, contractor) of a project. Time delay of water supply project is a gathers the data points created through a large selection of the above independent variables of a project then average them together and presents a general idea of the determinant of time delay in the case of deep well water supply project.to rate the identified factor on a five-point Likert scale (1 strongly disagree to 5 strongly agree). The weighting given to each factor by the respondent, ranging from 1 to 5, (n_1 = number of respondents that are strongly disagree, n_2 = number of respondents that are disagree, n_3 = number of respondents that are neutral, n_4 = number of respondents that are agree, n_5 = number of respondents for strongly agree).

3.7 Ethical Standards and Procedures

These are the principles or standards that protect research rights. These are measures to ensure your safety and to ensure that your rights are not violated. These criteria include voluntary participation, informed permission and confidentiality of information, obscurity to research participants, and regulatory approval. Participation in this study is voluntary, and potential study participants must be fully informed of the study procedures, benefits, and risks, and voluntarily complete an informed consent form to participate. They were asked to ensure the confidentiality of the information, and to ensure this, participants were asked to provide their names or identify them in research tools and links to research documents and reports was given. Don't give anything useful. In this part of the study, one and all of the independent variables are the sum of

the independent variables that contribute to identify the causes of time delay completion of the project or determine the factors to delay of the dependent variable, which is called delay of water supply project.

3.8 Validity and reliability analysis

3.8.1 Validity

Validity refers to them the extent to which a measure adequately represents the underlying construct that is supposed to measure (Anol Bhattacherjee, 2012), and to ensure validity of instruments, initially the instrument was prepared by the researcher with guidance from the advisor. The validity of the data is determined by the strength of the final conclusions drawn and inferences made (Cook and Campbell, 1979). To ensure the validity of the instruments used in this study (the questionnaire and conceptual framework) were adopted from reliable sources with extensive review of previous research literatures, and customized to fit the research context. In addition, the questionnaire was pretested and necessary adjustments were made to prepare the final correct questionnaire based on the comments given. Interviews and discussions were made with different staffs that have direct experience in water supply construction decision and implementation. These variables included to time delay projects, poor planning, procurement process and stakeholders.

Scale: ALL VARIABLES

Table3.2 Case Processing Summary

		N	%
Cases	Valid	51	100.0
	Excluded	0	.0
	Total	51	100.0

Source: Own Survey, 2023

List wise deletion based on all variables in the procedure.

3.8.2 Reliability

Reliability is the internal consistency of items incorporated in the instrument was checked by using Cronbach's Alpha. Mean of each variable was computed and then the reliability was checked based on the Means. Reliability, as defined by Cohen, et al. (2007), is the consistency, dependability and reliability of the measuring instrument over time, and with the same respondents. It is the extent to which the measuring instrument yields consistent and accurate results when the characteristic being measured remains constant (Leedy&Ormrod, 2001).This involved a set of related questions which designed to measure a certain concept being associated with each other. Alpha Cronbach's coefficient test is applies to test the reliability. Thus, if the association in reliability analysis is high, the scale yields consistent results and is therefore reliability. According to Reynold & Santos (1999), alpha more than 0.7 implies the instrument is acceptable. Therefore according to the above results, the instrument was found to be reliable.

Table3.3 Reliability Statistics Cronbach's Alpha

NO	Detail description on the time delay project factors	No of items	Cronbach's alphas Values
1	Poor planning	8	0.816
2	Procurement process management	8	0 .861
3	Stakeholder	20	0.916
	Overall reliability result	36	0 .941

Source: Own Survey Data 2023

According to the above table the questions are reliable and highly internal consistency. According to Cronbach's coefficient principles if Alpha is more than 0.6318 or 63% then the questions are reliable, in this case the overall total Cronbach's coefficient is = 0 .941 so the questions are reliable and highly internal consistency.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The study findings are presented on to analysis the determinant factors of delay completions of water supply projects in the case of legedadi deep well water supply Project. Data was gathered exclusively from the questionnaire, and document review as the research instrument. The questionnaire was designed in line with the objectives of the study. First, the background characteristics of respondents are shown and following that the internal consistency of the measurements used in the present research context is displayed.

Table 4.1 number of respondent

No	Data collection tools	Total respondents	respondent answered	respondent unanswered	Response rate
1.	Questionnaires	54	51	3	94%

Source: own survey, 2023

Table 4.2.1 Demographic Characteristics of the Respondents

Characteristics and categories	**No.**	**No.**	**%**
Respondent categories	**Number of participant**	**Number of response per respondents**	**Response of percentage**
Consultant	15	14	93
Clint	21	21	100
Contractor	18	16	89
Total	**54**	**51**	**94**

Source: own survey, 2023

Table 4.2.2 Demographic Characteristics of the Respondents

Characteristics and categories	**No.**	**%**
Gender		
Male	39	76
Female	12	24
Educational level		
Diploma	7	14
Degree	23	45
Masters	21	41
Marital status		
Single	16	31
Marred	27	53
Received training on project management		
Yes	28	55
No	23	45
Total	**51**	**100**

Source: own survey, 2023

As indicated in table one above, the response rates of the questionnaire survey for contractors, consultants and clients were 89%, 93% and 100%, respectively. From a total of fifty four participants three were non-responding as they delay to forward their responses on time by deferent reasons. The response rates of clients, contractors, and consultants were very closer to each other proving that a proper ratio has been made earlier for a better reliable and valid value of drawing conclusions.

The above respondents have Diploma, Bachelor Degree and Master's Degree in engineering and other relevant areas of proficiency with a percentage of 14%, 45% and 41% respectively. Therefore, education qualifications of the respondents suggest that sufficient educational qualification has been considered earlier to amount a more reliable and valid data. Moreover, the respondents more of them were in water supply engineers that strengthen the validity of collected data and the findings the result.

Table 4.3; relevant work experience of respondents

Experience in year	**Number of respondent**	**percentage**
< 5	7	14
6 – 10	16	31
11 – 15	12	23
16 – 20	11	22
>20	5	10
Total	**51**	**100**

Source: own survey, 2023

With regard to the work experience of the respondents, the data implies that out of a total of 51 respondents 7, 16, 12, 11 and 5 of them have experiences in the water supply construction with different companies from 0 to 5, 6 to 10, 11 to 15, and 16 to 20 and above 20 years, respectively. Here with the same principle of validity and reliability, respondent profiles and experiences suggest that they have had sufficient or significant exposures to the required data (Table 4.3).

Therefore, of the three categories of respondents (clients, contractors, and consultants) the minimum number of respondents was 16. Based on the sample size, 54 questionnaires were distributed, of which 16 questionnaires to contractors, 17 to consultants and 21 to clients/ owners. From the distributed questionnaire 14, 16 and 21 questionnaires were returned by contractors, consultants and clients respectively.

The data was collected from the experienced respondents of the targeted projects. the analysis of causes of delay in the water supply project using to check the degree of significance and severity by adopting Likert scale using SPSS statistical approach.

The objective of conducting the analysis for this section was to establish the factors under the groups of causes identified from the literature review according to their significant influence towards the delay in water supply projects.

These causes are classified in to three main categories as project related are stakeholder related causes, poor planning related causes, procurement process related causes.

Identifying of the delay causing factors based on tastes calculated to reveal the most influential factors within each category of causes and from all causes in general. The group of respondents (the clients, consultants and contractors) has prioritized the causes of delay from the set of causes in order of their importance.

4.2 Time delay project Descriptive analysis

The average and standard deviation of the scores of time delay project are shown in the table below. The scores causes of time delay are produced by combining all the items/questions that are used to measure each of these variables. Following are discussion on the findings.

Table 4.4 Average mean and standard deviation of the independent variables

Management Areas	Average (out of 5)	Standard Deviation	Average (%)
poor planning	3.897	0.712	78
procurement	3.851	0.781	77
stockholders	3.996	0.665	80
Overall	3.915	0.719	78

Source: Own Survey, 2023

4.2.1 Poor planning management

According to respondents, there is an average of 3.897 rates out of 5 for the time delay project of poor planning management. This rating value indicates there is an average of 78% performance of poor planning process management. It is slightly similar with the overall practice score (78%) of time delay project. Accordingly, this time delay project practice is practiced similar with an

average level. It is also shown in the table that there is a 0.712 standard deviation of the rating on project poor planning management by respondents, which leads to 14.25% standard deviation in terms of percent rating. The average standard deviation of the overall time delay project in terms of percent is 14.32%, the respondents indicated that there is approximately an average level of deviation of poor planning management practice from the overall time delay project that means poor planning is convergent with the overall average standard deviation. As a result, it can be concluded that there is less similar practice of poor planning management across respondents. The study found average project performance in poor planning management. Observed gaps in poor planning management were primarily due to factors such as engineering changes that time schedules; Additional works more than the agreement and overlapping tasks with other projects. Additionally, poor planning management and its inadequate planning and execution impacted project timeliness.

According to Khan, 2006; Nath & Momin, 2014 poor planning management plays a central role for time delay water supply project, when applying poor planning management in a project the output was for time delay of a project. In this case planning management is average so to finish a project on time it was possible there was slightly no problem in poor planning according to the collected data and data interpretation poor planning management is almost applicable in the given project. Time delay Project maturity poor planning management are almost doing the work according to the plane, in this research poor planning management is in addition to working in a plan managing the works limitation according to the agreement for additional work there should be additional time required.

4.2.2 Procurement process management

According to respondents, there is an average 3.8554 rates out of 5 for the practice of project procurement management. This rating value indicates there is an average of 77.0% performance of procurement process management in the organization. It is less than the overall practice score (78.0%) of time delay project. Accordingly, this time delay project is practiced poorly. It is also shown in the table that there is a 0.782 standard deviation of the rating on project procurement management by respondents, which leads to a 15.62 % standard deviation in terms of percent rating. The average standard deviation of the overall time delay project in terms of percent is 14.32%, which means the respondents indicated that there is divergent of deviation of project procurement process management practice from the overall time delay project. As a result, it can

be concluded that there is a less practice of procurement process management across respondents. In general, long purchase requests and processing times and lack of supply management plans can negatively impact projects and increase time and costs. However, in any case, procurement process management is discouraging achievement as it has a negative impact on time performance of the project. Procurement process is improperly managed unless otherwise there is a loss in cost and delayed the project. In this research Procurement process management is below the average this may cause the extensions of the project life cycle.

4.2.3 Stakeholder management

According to respondents, there is an average of 3.9961 rates out of 5 for the practice of project stakeholder management. This rating value indicates there is an average of 80.0% performance of stakeholder management in the project. It is beyond the overall practice score (78.0%) of time delay project. Accordingly, the stakeholder management is practiced well. It is also shown in the table that there is a 0.665 standard deviation of the rating on project stakeholder management by respondents, which leads to a 13.58% standard deviation in terms of percent rating. The average standard deviation of the overall project management in terms of percent is 14.32%, which means the respondents indicated that there is high deviation of project stakeholder management practice from the overall time delay project management practice. As a result, it can be concluded that there is convergent practice of project stakeholder management across respondents. Project stakeholder management is practiced at higher level as that of the overall project practice implying that a good communication with stakeholders by recognizing their expectations and dealing with issues of conflict of interests. Presence of gaps in communication and a defined stakeholder's responsibility might have contributed to the reduced level of time delay activities of stakeholder management practice.

Chart below summarizes the average rate in percent of each management against the average practice of project management time delay as a reference (dotted line). It is shown that project stakeholder managements are far more practiced than the average time delay project practice. Project poor planning management practice is equals with the average. On the average project procurement management are practiced below average and are listed from the very worst to the time overruns of water supply project. According to Pasian, 2011 projects moved the topic beyond the traditional iron triangle and concluded that stakeholders' perception and satisfaction is the key to project success. From the base organization's (project owner) viewpoint, Eskerod

and Jepsen (2013) reconfirmed the importance of stakeholders by stating that a project can only be successful if stakeholders are first motivated and in return have contributed to the project. In this part of the study stakeholder management is good practice its average is above the overall so it has positive side effect for time delay completion of the legedadi water supply project. Even though stakeholder management and poor planning's properly managed due to poor process procurement management of the project was not timely complete. This shows that in order to not complete a project on time, all the three independent variables have their own contribution to delay and success of the project.

Mean average of the independent variables in the given project

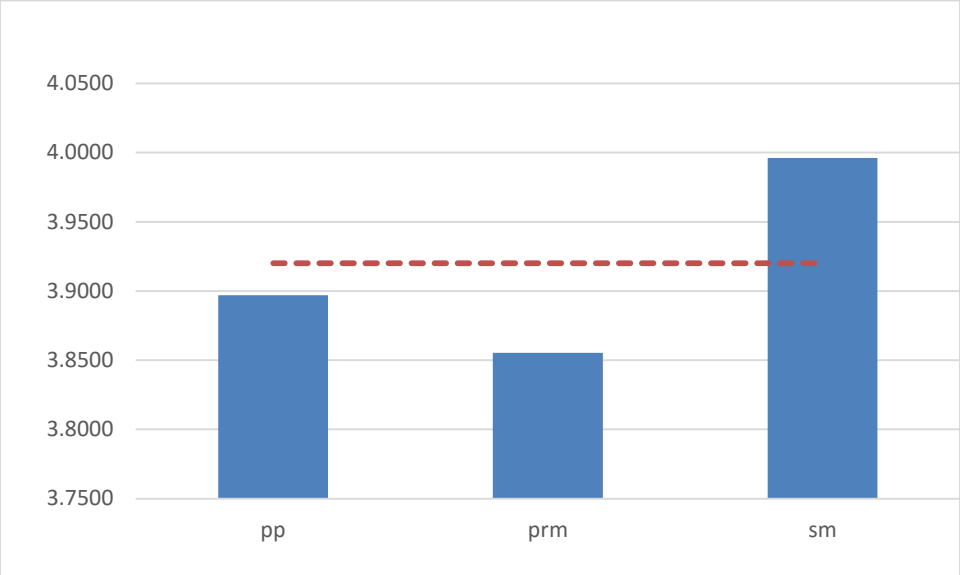


Figure 4.1: Average rate in percent causes of delay using the mean and standard deviations.

The above chart alone (Figure 4.1) cannot since there may be variations in practice, we will discuss the practices of each causes of time delay project. Therefore, it is important to consider the differences in practice. One of the tools for analyzing variation in practice is the standard deviation. This is also illustrated in the analysis above along with the averages for each practice. The chart below summarizes the standard deviation for each causes of time delay project, as well as the overall standard deviation (dotted line). As you can see from Figure 3, there are actually significant differences between poor planning, procurement process and stakeholders. Procurement process is practiced with less variance than the total score for the time delay Project.

Standard deviation of the independent variables in the given project

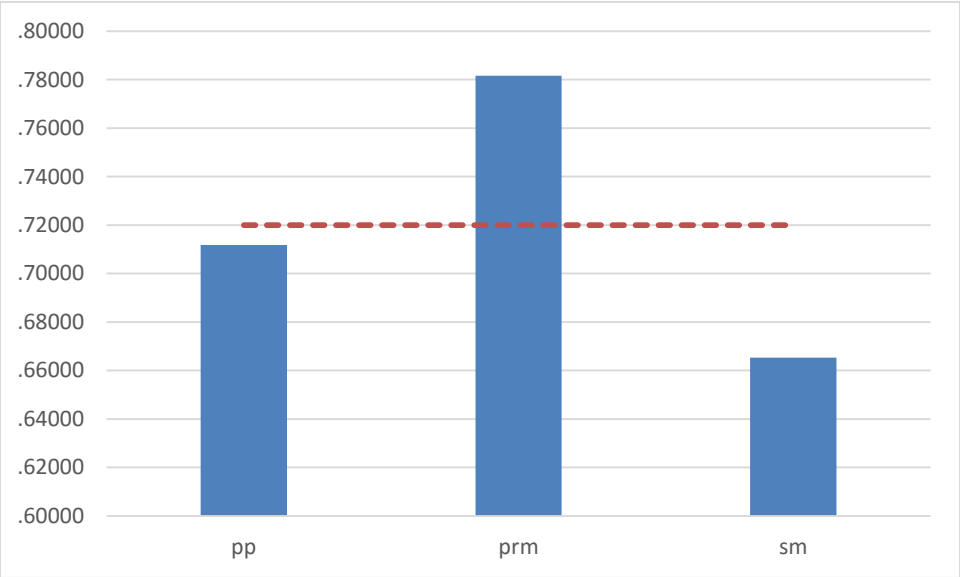


Figure 4.2: Average mean in percent causes of delay using the mean and standard deviations.

4.3 Internal consistency of the measurements

Recreations of the causes of time delay project in order to see the relationship with the dependent variable that is called time delay of water supply projects.

4.3.1 Tests of Assumptions

The dependent variable (DV) is continues variable for this project, because it can be measured by scale and expressed in ordinal. The independent variables (IVs) are continues and ordinal variables because of the unequal interval for their measurements.

Linearity test it is significant linearity between dependent and independent variable of a project.

According to the data interpretation of this project the linearity correlation between the dependent variable/time delay of water supply project and the independent variables the‘t’ values for one independent variables (procurement) are less than two (2) that is not linearly dependent to each other, and poor planning similar or equal with the t value, but Stakeholder has greater than two (2) values, so it is linearly correlation with the dependent variable. The other one in order to check the linearity correlation of independent variables and dependent variables are Collinearity Statistics. In this Collinearity Statistics we check the tolerance of the independent variables for each variables the tolerance of each independent variables should be greater than 0.2 and less

than 0.9. In our case in data analysis of the collected data and interpretations two of the three (3) causes of time delay (poor planning and procurement process) all of the independent variables tolerance is less than 0.2, so it is not fulfil the linearity of the Collinearity Statistics. Stakeholder management has 0.683 values for tolerances which are greater than 0.2 and less than 0.9, so it shows intersession management has good linearity correlation ship with the dependent variables to time delay water supply project.

The other Collinearity Statistics checking method is seeing the values of the variance inflation factor (VIF). In order to check the linearity correlation between the dependent and independent variables in multiple regression the VIF (variance inflation factor) values of the independent variables should less than ten(10) greater than one(1). In our case of data collection and interpretation the VIF values for the causes of time delay project (poor planning, Procurement process and stakeholder managements) is greater than one and less than ten. In the case of all independent variable of the VIF (variance inflation factor) value are (7.88, 8.249 and 1.464) that is less than ten and greater than one so all independent variables According to the data interpretation of this project as a general there are high multicollinearity for dependent variables/causes of time delay water supply project and independent variables (poor planning, Procurement process and stakeholder managements).

Table 4.5 multiple regression Anova table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.395	3	7.132	200.635	.000[b]
	Residual	1.671	47	.036		
	Total	23.065	50			

Source: Own Survey, 2023

The significance of the linearity ‘P’ value is less than 0.05 so the dependent and independent variables for this project is significantly linear because ‘P’ value for this interpreted data is 0.00 which is less than 0.05 of linearity standards. According to the data that is collected from the project and interpreting it in multiple regression among the three independent variables only Stakeholder management has less ‘P’ value than the standards for fulfilling the significant results. Stakeholder management ‘’P’’ values is 0.00 which is less than 0.05 so Stakeholder

management and poor planning has a significant results. the other two independent variables have non-significant results indicates that the probability of getting the specific result is greater than 0.05 (5%).This why with non-significant results we say that 'P>0.05' because the chance of getting such result is greater than 5%.

All values of the outcome for the correlation in table 4.5 on below persons value of this data interspersions is different so this indicate that all questions for the independent variables are independent to each other or the dependent and independent variables are correlate each other.

Table 4.6 Correlations

Correlations

		(PP) Poor planning	(PRP) Procurement process	(SH) stakehol der	(CD) Causes of delay
p	Pearson Correlation	1	.934**	.533**	.435**
	Sig. (2-tailed)		.000	.000	.001
	N	51	51	51	51
pm	Pearson Correlation	.934**	1	.562**	.488**
	Sig. (2-tailed)	.000		.000	.000
	N	51	51	51	51
sk	Pearson Correlation	.533**	.562**	1	.958**
	Sig. (2-tailed)	.000	.000		.000
	N	51	51	51	51
cd	Pearson Correlation	.435**	.488**	.958**	1
	Sig. (2-tailed)	.001	.000	.000	
	N	51	51	51	51

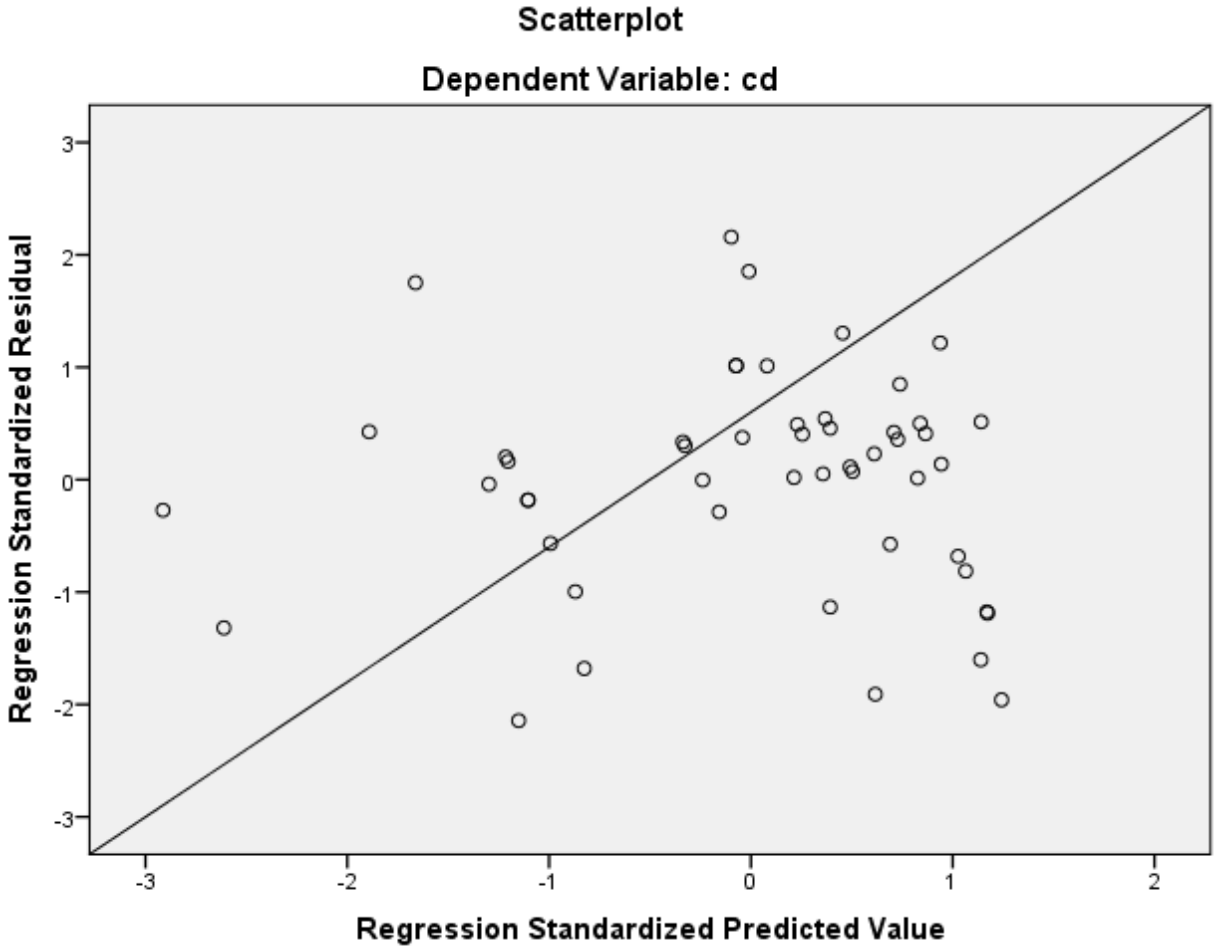
**. Correlation is significant at the 0.01 level (2-tailed).

Source: Own Survey, 2023

Correlation analysis is reported in what is called a correlation matrix. This is a simple matrix because there are only two variables in the analysis. However, if we had many variables in the analysis, the matrix would be appropriately expanded to include all the variables. Each cell in the matrix contains the Pearson correlation coefficient, the 2-tail significance level, and the number of cases in the analysis. Notice that the cells in the upper right to lower left diagonal show coefficients of 1.00. This is because they show the relationship of each variable correlated with

it. The off diagonal cells contain the coefficients showing association between the two variables. The cells are identical because they reflect the relationship between the same two variables. The Pearson relationship coefficient (r) is the foremost common way of measuring a linear correlation. It could be a number between –1 and 1 that measures the quality and course of the relationship between two factors. When a one variable changes, the other variable changes within the same course. A Pearson relationship coefficient of 0.5 shows a direct positive relationship. More by and large, a relationship coefficient between 0.4 and 0.7 is ordinarily considered a direct relationship of emphatically relationship of the factors, though the negative Pearson appears the converse relationship of the factors. In these venture information translation appears extend was not apply all independent variable in great administration, because the individual of most factors are underneath 0.4 that's not moderately connect but there's a relationship among them. A few of the free factors are contrarily relate meaning in that extend the factors are connect in inverse direction of timely completion of the project, that means instead of helping the project for timely completion such variables affect the project in the negative way. Some variables are moderately correlate each other and they help the project to finished on time but a project will complete on time if a corporate management of all knowledge areas.

Independency error/ plotting a scatter diagram to appear the relationship between subordinate and autonomous factors. In this case for any match of perception the mistake terms ought to be uncorrelated to each other.



Source: Own Survey, 2023

Fieger 4.3 scatter diagram for dependent and independent variable relationship.

This scatter plot indicates a relationship between dependent and independent variables. This relation is determining by an interval between negative two and positive two for dependent and independent variables, the relationship shows exactly rectangular shape. In the case of this project data intersession the scatter plot shows curved relationship because the scatter plot of dotes are distributed in a wide ways, it's for curved path. The test for independency error in the case of this data presentation there is a good independency error because of the distributions of variance error is equally.

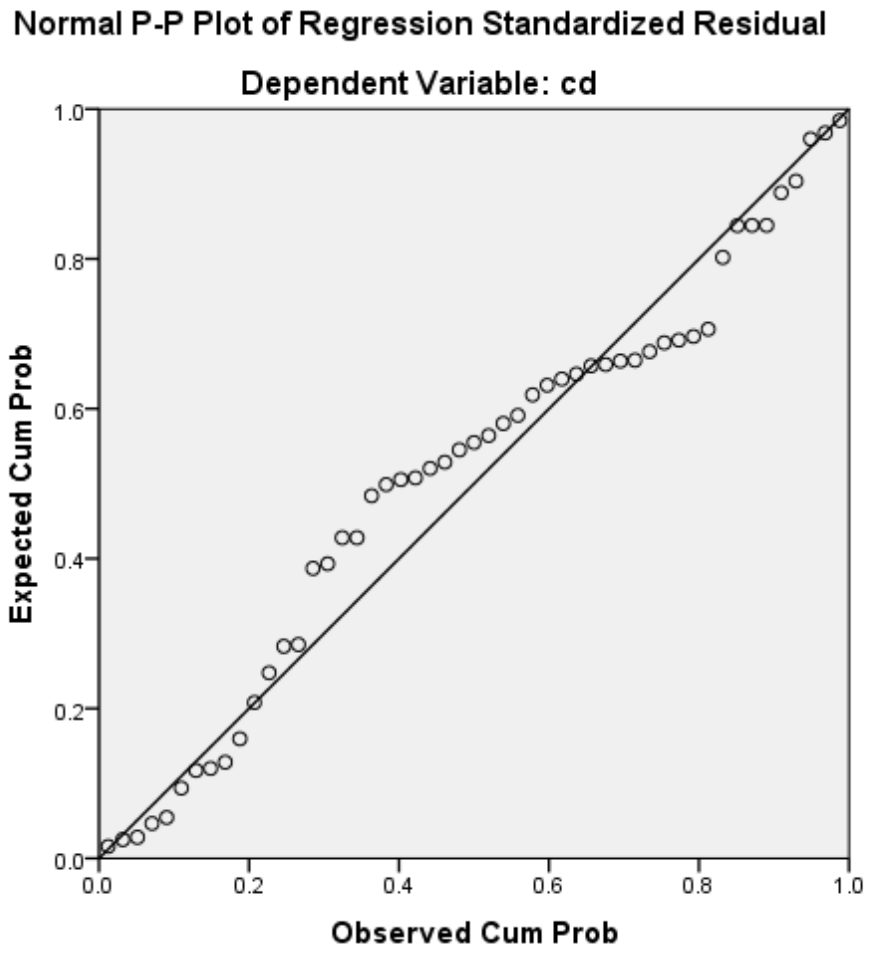
Homoscedasticity in this assumption we test the values of each predicators variances of the error terms constant or not, if it is constant we conclude the relationship is Homoscedasticity if it is not constant the relationship is heteroscedasticity. Homoscedasticity describes a situation in which

the error term (that is, the “noise” or random disturbance in the relationship between the autonomous variables and the dependent variable) is the same across all values of the independent variables. In this data integration of the given project the amount of error for the distance across the line is similarly increasing or decreasing, not move very far away from the line so there is a slightly similar distance from the line so the dependent variable/timely completion of road projects and the independent variables (poor planning, procurement process and stakeholder managements) are homoscedasticity.

In table 4.6.1 shown below the Durbin-Watson has a positive correlation because the independent variables have less than two Durbin-Watson values for the project of data interspersion is 2.1. According to data presentation of this project the Durbin-Watson is 2.1 that tell us the independent variables and the dependent variables have a positive relationship, because for any regression if the value of Durbin-Watson is between1.5 to 2.5 the dependent variables and the independent variables are positive relationship. For Durbin-Watson values between 2.5 to 4.0 the variables has a negative relationship, if the values of Durbin-Watson is between0 to 1.5 the dependent and the independent variables has a weak relationship. In this study the data presentation tells us there is a positive relationship between dependent/time delay of water supply projects and independent variables (causes of time delay).

Multicollinearity assumptions of the regression test if indicator variance inflation factor (VIF) is less than or equal to ten (10) we conclude there is multicollinearity for the dependent and independent variables. According to table 4.6.3 in the coefficient table there is multicollinearity for all independent variables, because of the FIV values for all variables are less than ten (10) because the FIV value is less than ten (10), it is (7.88, 8.249 and 1.464).

Normality test of assumption of multiple regressions is used to test the normal distributed of errors. According to skewness and kurtosis the variables are normality distributed because the skewness and kurtosis is at the range of -1 and +1 based on descriptive taste. While checking the shapiro-Wilk of the data presentation of this project the ‘P’ values of the variables are less than 0.05 it is according to shapiro-Wilk the variables are normally distributed if and only if the ‘P’ value is greater than 0.05.using descriptive and exploring it to check the normality of all three variables only Procurement management is not normally distributed in the project all the others two variables (stakeholder and poor planning) are normally distributed.



Source: Own Survey, 2023

Figure 4.4: Normal P-P Plot of Regression standardized Residual homoscesidity of dependent and independent variables.

This probability- probability plot (P-P Plot) utilized to appear the ordinariness disseminations of the subordinate and free factors, in this information introduction us you see within the figure 4.4 the free factors are dispersed ordinarily since on the off chance that you see the straight line the dab that goes inside the line is similarly conveyed the remove between them is slightly break even with. So typically utilized to conclude that the typicality of the factors are conveyed ordinarily

4.3.2 Multiple Regression

Different relapse examination permits analysts to evaluate the quality of the relationship between result (the subordinate variable) and a few predictors/independent factors as well as the

significance of each of the indicators to the relationship, regularly with the impact of other indicators measurably disposed of.

Regression

Table 4.6.1 Variables Entered/ Removed[a]

Model	Variables Entered	Variables Removed	Method
1	sh, pp, prm[b]	.	Enter

Source: Own Survey, 2023

Table 4.6.2 Variables Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.963[a]	.928	.923	.18853	2.105

Source: Own Survey, 2023

a. Predictors: (Constant), sm, pp, prm

b. Dependent Variable: cd

92.8% of the variance is coming for in time delay of water supply project and the causes of delay (independent variables). The R Square statistic tells us the proportion of variance in the dependent variable that is accounted for by the independent variables. In this case the model accounts for 92.8% of the variance in the independent variables respondents, the adjusted R square is the coming for number of predicted variables that is including in the model. The adjusted R Square is good, indicating 92.3% of the variance is the dependent/time delay of water supply project is accounted for by the model. This is interpreting by 92.3% of the dependent variable/time delay of water supply project variances is explained by the causes of time delay (independent variables).

The "R" column represents the value of R, the multiple correlation coefficients. R can be considered to be one measure of the quality of the prediction of the dependent variable; in this

case. A value of 0.963, in this research, the value of R indicates a good level of prediction. The "R Square" column represents the R^2 value (also called the coefficient of determination), which is the proportion of variance in the dependent variable that can be determined by the independent variables (technically, it is the proportion of variation accounted for by the regression model above and beyond the mean model). You can see from our value of 0.928 that our independent variables explain 92.8% of the variability of our dependent variable.

When doing regression analysis we decide whether or not there's a relationship between the autonomous variable/the causes of information ranges and the subordinate variables/time delay of street ventures by analyzing the ANOVA table. This will be thought of as the generally fit of the regression show. On the off chance that the F measurement is noteworthy, we will expect the autonomous variable, taken together; have a relationship with the subordinate variable. In this case, the likelihood of the F measurement for the regression analysis is 0.00; it is less than the level of noteworthiness of 0.05. So we say that there's a solid relationship between the subordinate variables/time delay of water supply projects and the free variables/the causes of time delay information zones. Within the anova table of this inquire about the critical is less than 0.05(5%) that's 0.00/0% that appears the relapse show has great fit of the information.

Table 4.6.3 multiple regression coefficient table

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.252	.181		1.393	.170					
	Poor planning	-.210	.105	-.221	-2.001	.051	.435	-.280	-.079	.127	7.880
	Procurement	.113	.098	.130	1.153	.255	.488	.166	.045	.121	8.249
	Stakeholders	1.023	.048	1.002	21.106	.000	.958	.951	.829	.683	1.464
a. Dependent Variable: Cd											

Source: Own Survey, 2023

Unstandardized coefficients indicate how much the dependent variable varies with an independent variable when all other independent variables are held constant. Consider the effect of Stakeholder management in this research. The unstandardized coefficient B for Stakeholder management is equal to 1.0 (see Coefficients table). This means that for each one Stakeholder management increase, there is an increase of 1.023.

Table 4.6.4 multiple regression

Residual statistical table

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0511	4.7693	3.9569	.65413	51
Std. Predicted Value	-2.913	1.242	.000	1.000	51
Standard Error of Predicted Value	.029	.087	.051	.014	51
Adjusted Predicted Value	2.0651	4.8274	3.9592	.65471	51
Residual	-.40413	.40687	.00000	.18279	51
Std. Residual	-2.144	2.158	.000	.970	51
Stud. Residual	-2.268	2.363	-.006	1.024	51
Deleted Residual	-.45235	.48773	-.00229	.20432	51
Stud. Deleted Residual	-2.377	2.490	-.009	1.049	51
Mahal. Distance	.222	9.745	2.941	2.289	51
Cook's Distance	.000	.277	.031	.056	51
Centered Leverage Value	.004	.195	.059	.046	51

Source: Own Survey, 2023

a. Dependent Variable: cd

4.4 Effects of delay on water supply project

4.4.1 Introduction

The city of Addis Ababa is one of the cities in a rapid development country in all aspects in Africa. The city is the seat of central Government of Federal Democratic Republic of Ethiopia (FGDRE) and Africa union headquarters (AU) and different diplomatic missions are residing in the city and now a day's Addis Ababa is considered as a capital city of Africa. On the other hand, the population growth of the city is high and different huge investments including Housing projects are undergoing. Due to this, existing water supply scarcity becomes increasing time to time and the need of developing new additional potable water sources become among prioritized tasks of the city Administration of Addis Ababa and central Government.

4.4.2 Effects on legedadi deep well water supply project

Due to this, study legedadi deep well water supply projects (phase-II) to supply north east part of the city specifically expansion areas which is the selected case study. LDWWSP is one of the water supply projects implemented to alleviate the prevailing unsatisfactory water supply situation at the capital city, which is an important service for one of the most water deficit areas of the city-Eastern and North Eastern Addis Ababa. The project is based on ground water source, specifically of 16 deep wells in legedadi well field with a maximum discharge of 86,000m^3/day.

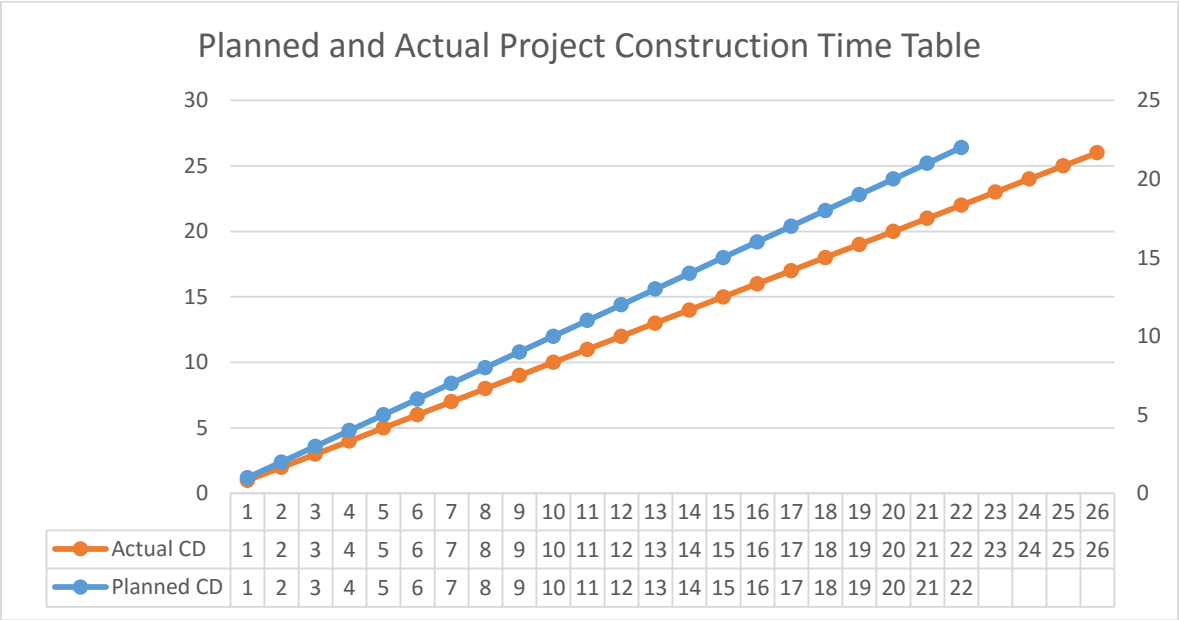
Table 4.7 Key players on the selected project case study

Project Particulars	**Descriptions**
Employer /Project Owner	Addis Ababa Water and Sewerage Authority
Consultant	Ethiopian Construction Design & Supervision Works Corporation
Contractor	*CGCOC* JV with ASER Construction plc
Direct beneficiaries' size	860,000
Contract signed date	April 20, 2019
Project starting date	May 10, 2020
Original Project Duration	22 months
Actual completion date	Feb, 2022
Total delay	4 months
Project Location	North East of A.A, partly in *Oromia* special zone Legedadi locality and partly in North East of AA.
Contract Type	Admeasurements
Project funding agency	Addis Ababa Water and Sewerage Authority
Original Contract Amount	ETB 1,699,421,224.00 including 15% VAT
Variation Amount	ETB 30,000,000.00 including 15% VAT
Revised Contract Amount	ETB 1,729,421,224 including 15% VAT

Source: Own Survey, 2023

The construction work has been given by direct award to the Chinese contractor, CGCOC JV with ASER Construction plc and the contract have been signed in April 20, 2019 and started in

May 2020 to complete and commission within 22 months, Feb 2022. However, due to factors related to poor planning, procurement process and stakeholders has been commissioned and put into service after 26 months in Jun 2022 which shows four-month delay.



Fieger 4.5 planned and actual time table

LDWWSDCP (Phase- II project at the beginning has been designed to produce estimated capacity of 86,000 m^3/d, which has a total capacity of satisfying a daily demand of 860,000 inhabitants at a daily consumption rate of 100 l/c/head and the surplus water after supplying to the residents was planned to distribute to existing system to alleviate water shortage of nearby areas and reinforce the central part of the city. While designing the water supply system, the necessary complete data of all sixteen wells drilling results was obtained, discharge of 16 wells and some other design imputes were assumed. Source of the following problems are caused primarily from using inaccurate assumption design inputs during project designing process;

- Late service delivery and
- Affects revenue collection plan of the client.

4.4.3 Effect on revenue collection.

As per the original plan or signed contract agreement, the project is supposed to be completed in 22 months (One year and 10 months) with the total allocated budget of ETB 1.69 billion while

Table 4. 8 water tariff of AAWSA (Domestic Rate)

No	Water consumption range(M^3)	Rate/ M^3(ETB)
1	1-5	2.4
2	6-20	4.85
3	21-40	9.71
4	41-100	14.57
5	101-300	19.42
6	301-500	24.28
7	>501	26.71

Source: Own Survey, 2023

The first two lowest water tariff rates are considered from domestic rates listed in table 4.2 to calculate the lost revenue by the project owner in four-month times.

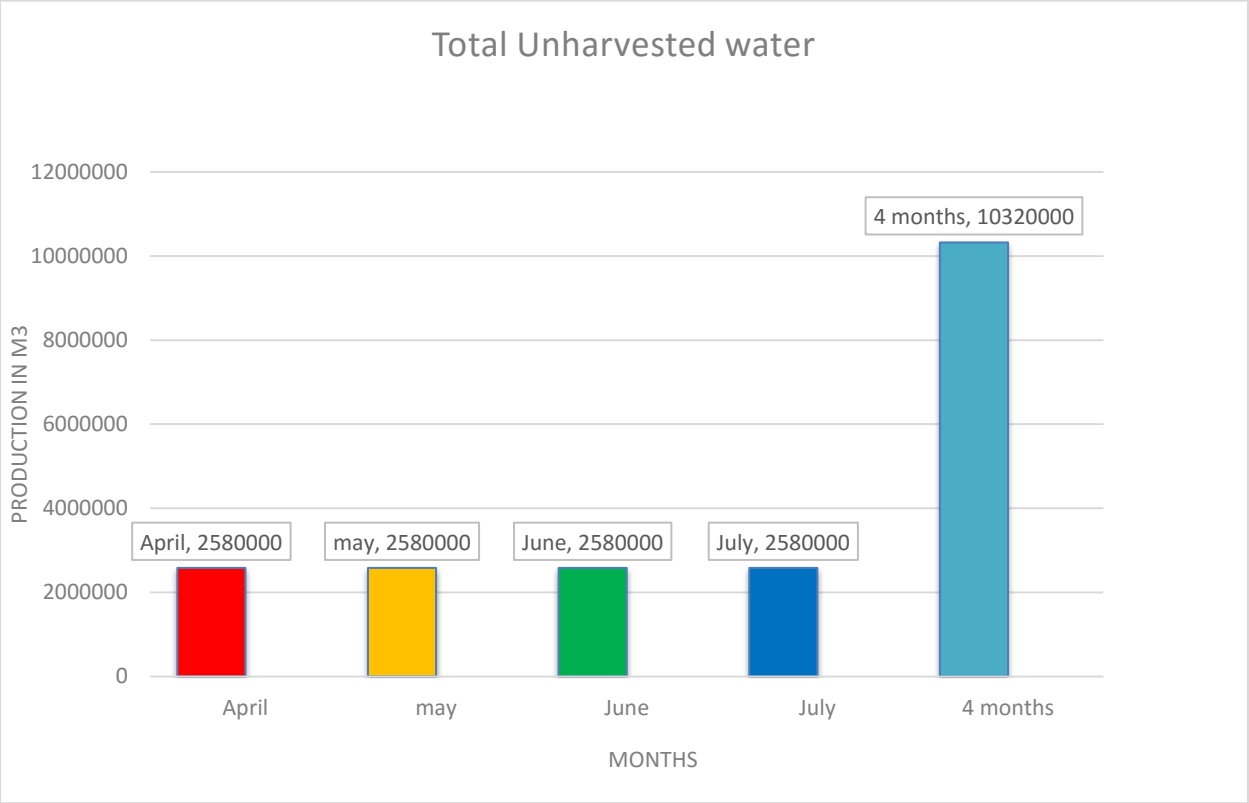
To be on the safe side, 2/3rd of the total monthly water production (1,720,000m^3) is taken and calculated at ETB 9.71/m^3 which is the least tariff and the remaining 1/3rd of monthly water production has been calculated using ETB 14.57/m^3 tariff rate.

Table 4.9 Lost Revenue of AAWSA (Domestic)

No	Water Consumption Range (M^3)	Current Water Tariff (ETB/M^3)	Water Production (M^3/Month)	Revenue Collection plan (ETB/Month)	Revenue Collection plan (ETB/ 4Months)
1	21 - 40	9.71	1,720,000	16,701,200	66,804,800
2	41-100	14.57	860,000	12,530,200	50,120,800
	Total Lost Revenue (ETB)		2,580,000	29,231,400	116,925,600

Source: Own Survey, 2023

Due to four month (March, April, May and June 2022); the project owner revenue collection plan has not been achieved. About a total of ETB 116,925,600.00 has been planned to collect in four months' time based on the daily production of 86,000m3 however due to four-month delay, the planed revenue collection was not realized.



Fieger 4.6 unharvested water

The project owner lost a total amount of ETB 29,231,400 in one month and ETB 116,925,600 in four months' time and this shows clearly how the project owner is negatively affected.

4.4.4 Effect on Good Service delivery.

Promise has been announced repeatedly to the public through mass media about the delivery day of potable water to the residents of condominium houses in the expansion area. However, the project has been completed and put into service in June 2022 after four-month delay and this creates public grievance due to low performance of the project owner.

Clear design error observed on the consultant side and also the Employer is also part of the problem due to unsatisfactory follow-up during study design and construction stage at the end

the employer lost quite a big amount of many which was able to build medium size water supply project for the public. due to time overrun the project have been completed in 26 months (two year and 4 months) and consumed at the end of the project ETB 1.72 billion which is higher by ETB 0.03 billion or 1.78% than the contract amount which creates challenges to allocate additional budget and inefficient service delivery on the client side of Addis Ababa Water and Sewerage Authority.

4.5 Open ended questionnaires of the quantitative data's

According to respondents of the target populations open ended responses most of the respondents agree on the causes of delay other than the mentioned previously were :- payment delay for contractors, mainly the process of material purchase for the project and the delay procedures to the country, financial difficulties, change in foreign exchange rate, inadequate planning; scheduling & coordination, material cost increased by inflation, poor sit management and supervision and, excess quantity during Construction and unavailable material procurement process.

Effects of Legedadi deep well water supply project due to delay of the project has although it is not reliability excessive compared to many similar projects, but From document review results and analysis the owner company (AAWSA) exposure to high cost and price increases and to lose its credibility in the society and the problem of the expansion of the society and the spread of the lack of good governance in their execution. The effect occurs the significant variations in short term, the total amount of cost overrun increase 1.7 % or 0.03 billion birr on the project delay were investigated in this research.

To minimize causes of delay first identify the main causes of delay and requirements of the project, estimated appropriate time required ,all participant parties perfectly take their own responsibility and works according to the plan, select the experienced contractor or knowhow with similar projects and properly designed the time process to purchase of required material.

CHAPTER FIVE: CONCLUTIONS AND RECOMMENDATIONS

5.1 Introduction

In the above data presentation and analysis chapter, time delay of water supply project is assessed in terms of causes and effects of project, major problems faced related to time delay project the extent of practice according to causes of time delay project consistently practiced through process groups.

5.2 Summary of the findings

The purpose of this study was to assess the Addis Ababa Water and Sewerage Authority's the case of legedadi deep well water supply project (phase II). The Authority examined through the department satisfaction level, perception and the project unit performance of time delay project. Most of the demographic characteristics of the respondents are capable of showing the required data. The finding showed that there was a significant relationship between each of the independent variables that means the three causes of delay and dependent variable time delay of water supply projects. All the independent variables have their own significant relationship with time delay of water supply project.

5.2.1 Summary of the findings based on specific objectives

Procurement process managements are practiced less than the averages of time delay project within higher standard deviations than the overall average standard deviations. Poor planning is practiced slightly similar with time delay project and slightly similar with time delay standard deviations than over all of the average standard deviations. Stakeholders are practiced higher than the average means of the overall time delay project within less standard deviation than over all of the average standard deviations.

For multiple regression of a given project variables model summery indicates R square value has 92.8% of the dependent variables variance is depend on independent variables. The Anova table of multiple regressions of dependent and independent variables the 'P' or alpha value is 0.000, it is less than 0.05 or 5% according to the regression rule if the 'P' or alpha value is less than 0.05 the variables have significant result, so this 0.000 'P' value indicates the given project has a significant result of dependent and independent variables.In coefficient of multiple regression stakeholder management has 0.000 'P' value which is less than 0.05 and poor planning has 0.05 'P' value which is equal to the standard of multiple regression and it fulfill significant result for

the given project data interoperation, for the procurement processes the alpha or 'P' value is 0.255 or 25.5% which is greater than the standard for multiple regression that was 5%.

Poor planning correlate with dependent variable the Pearson regression value was 0.435, procurement correlate with dependent variable the Pearson regression value was 0.488 for those two independent variables the correlations was good according to regression rule if the Pearson correlation value is greater than 0.4 the variables have strongly correlate. For the case of stakeholder management and the dependent variable correlate the Pearson correlation value was 0.958 it was greater than 0.9 according to regression rule the Pearson correlation value is greater than 0.9 the relations of dependent and the independent variable is very strongly correlate so in the case of stakeholder and dependent variables the correlation was very strongly .

5.3 Conclusions

The main objectives of this study is to determine the main causes and effects of time delay of water supply project in legedadi deep well water supply project (phase II). The questions are prepared weather the factors of time delay of water supply projects or not. In the above section of findings, major findings are listed. Based on these findings, conclusions are gathered by the study.

- Procurement process management is poorly practiced in legedadi deep well water supply project. Procurement process management is poorly practiced according to standard deviation and the practiced no consistently or (convergent/similarly) across the time delay project.
- Poor planning is practiced slightly similar with the overall average mean of the project but it is not in the comfort zone a little bit improvement is applied on it in order to confidential avoiding delay Couse on this variable.
- Stakeholder managements are practiced above the averages of time delay project management within higher standard dilation than the averages standard deviations and well consistently (divergent) water supply project in the case of legedadi deep well water supply Project (phase II). It means Stakeholder managements have good performance in order to finish the project completion but according to privies study of, - Bekele (2017), Lijalem Mulu (2019), Alemayehu Takele (2020) and Yenehareg Bekele (2021) indicated on similar topics stakeholders are separately discussed. The above comparison confirms our previous

assumption that trigger the researcher to study delay Project specifically. These assumption is different projects have different causes of factors and effects depending on the social, economic and political difference coming from the projects place and time. Most of the researches which were don previously were not done on multiple regression instead they focus on relative important index (RII) case process and they do their own researches by descriptive research design, in this study both descriptive and explanatory research design is used.

- The correlations of dependent variables and independent variables for this study strongly correlation regression, these positive correlations of regression shows the independent variables direct relation with dependent variables and due to positive correlation multiple regressions can apply for this study.
- For multiple regression the dependent and independent variables of data interpretation of a given project there is a strong relationship between dependent and independent variable. Overall multiple regressions show the dependent variable is strongly related with independent variables.

  Finally, from the results obtained at this paper, and compare it with the results and analysis of previous literatures, it's found that there are only few similarities of the important causes and effects on time.

5.4 Recommendation

The objective of this study targeted in identifying the root causes and effects of delay projects in the case of legedadi deep well water supply Project (phase II).

Based on this findings and conclusion there were different Recommendations to be suggestion. The time delay Project will maintain their project stakeholder management practices since strong in applying these causes of time delay By surveying the esteem of these project administration causes on productivity and partner fulfillment within the project; by getting their customer's input to overcome best hone that make to extend fruitful completion in terms of project administration information zones. A project to become timely completion at list there should be a moderate correlation ship between dependent and independent variables. The multiple regressions of the dependent and independent variables are fulfil all summery model, Anova table, coefficient statics and Debrian-Watson standards for the dependent and independent variables relationship. The coefficient statics table will be the 'P' value of less than 0.05 in this

data presentation all tests managed well in order to compute less than 0.05 ‘P’ value for causes of time delay water supply project, therefore

- Addis Ababa Water and sewerage Authority with project office will maintain their Project monitoring and controlling process group in practicing well consistently (convergent/similarly) since they are strong in terms of compere with other projects good running these process groups. The benchmarking the best practice in these process groups, guiding structure for the managing a project from start to finish.
- Addis Ababa Water and sewerage Authority with project office will improve their Project procurement process managements and planning management, and will take causes of not practicing the procurement process management while the plan and make decisions related with on time delivery of projects, in order to take risk measures in advance, in order to have modern project management Information System and prevent procurement related problems in advance.
- Addis Ababa Water and sewerage Authority with project office will have start and develop new ways of procurement process management. These might be segregating vendors and inventory based on organizational consumed inventory, adapting the purchase of used capital items to get best worth, developing adopting others origination of this
  - As concluded and indicated low effective planning and procurement process with according to effectively estimated time required of the project is the first very important value of recommendation in this research paper.
  - The same recommendation will goes to the capacity of having foreign currencies in importing to water supply project materials due to completion on time.
  - Timely decision making practice by the owners, providing appropriate material , avoiding mistakes & discrepancies in drawings, contractors need to have enough capital, efficient Procurement materials of water supply project, owners required to effect all progress payment as requested, tendency of awarding contracts to lowest bidders has to be reconsidered, effective contract management system with qualified personnel& mobilizing water supply construction equipment on time are also the most important and very critical factors to avoid delay of water supply project.

5.5 Moreover additional study should be carried

The immediate benefit of this research study was in obtaining a better understanding of the time delay project at Addis Ababa Water and Sewerage Authority the case of legedadi deep well water supply project phase (II). Recommendations for further research that could broaden the understanding the main causes of delay to legedadi deep well water supply Project (phase II), called procurement process management, with slightly poor planning management included below.

- More researches should don in order to avoid causes of delays on water supply project and to show the effects of the major causes of delay on water supply project.
- Future studies should be conducted by focusing on issue gaps to develop the importance of the major causes of delay on water supply projects
- More researches should don on this topic for the purposes of how water supply projects become successful in avoiding the major causes of delay.
- Uses the experience of others country procurement process system and;
- Future researchers could consider performing a similar study using a population that had a higher percentage of senior manager and substantial suppliers.

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Appendix I: Research Questionnaire

Questioner Organization _____

Dear participants,

Addis Collage University

College of Business School,

Masters of project management

Questioner to fill by Clint, Consultant and Contractors

I am a Project Management student at Addis Collage University, and now I am interested to use the Addis Ababa Water and Sewerage Authority platform as a research ground to fulfill the required academic paper. The research I wish to conduct for my Master's thesis is on the topic "causes and effects of delay project in Addis Ababa the case of legedadi deep wells water supply construction project (Phase- II)**.**This research is aimed to examine the problems why most Water and Sewerage construction projects within the Addis Ababa City Government are delayed beyond their time for completion and require additional cost than agreed contract prices. Identifying the determinant factors that contribute to schedule delays in Water supply project to conduct the analysis and subsequent recommendations of the possible solutions towards minimizing the problems, To successfully undertake this research it is mandatory to look into the issues from different perspectives by involving professionals who have experience in the Addis Ababa Water and Sewerage Authority. In this respect, you are the one who can give the correct and necessary information. The questioner has three parts.

Part I. Respondents Profile

Part II. Rating close ended questions

Part III. Open ended questions

Thank you very much for your time and cooperation, and looking forward to receiving your response. Writing Name is not provided!!!

Part I: Background Information

Please write your answer in the blank spaces provided or Choose from the choices given and circle your answers to the questions that are described below.

Ser. No.	**Questions**	**Enter or circle your answers.**
1	What is your age (in years)?	_____years
2	What is your gender?	A. Male B. Female
3	What is your profession?	_____.
4	What is your education level?	A. Certificate B. Diploma C. First degree D. Masters (Second degree) E. PhD
5	What is your current marital status?	A. Single B. Married C. Divorced/Separated D. Widowed
6	What is your current job title (position) in this company?	_____
7	For how many years have you worked in this company with your current job title (position)?	_____ Years.
8	For how many years have you worked in this company in total?	_____ Years.
9	Have you received any training in project management?	A. Yes B. No

Part II:

Please tick (√) one appropriate response for each statement (item) the level at which you feel that they are implemented by the company you are currently working with Use,

1 = for Strongly Disagree (SDA) 3 = for Neutral (N 4 = for Agree (A)

2 = for Disagree Agree (DA) 5 = for Strongly Agree (SA)

	Cause of delay factor	**Option**				
S.N	**(1) Poor planning related factor**	**SDA (1)**	**DA (2)**	**N (3)**	**A (4)**	**SA (5)**
1	ineffectively estimated time required					
2	Complexity of the water supply project					
3	Inadequate planer experience					
4	Insufficient data collection and survey before design					
5	Bureaucratic process					
6	Ineffective job description with poor plan					
7	Improper Contract duration and formulation					
8	Changing governmental regulations & law					
	(2) Procurement process related factor	**SDA (1)**	**DA (2)**	**N (3)**	**A (4)**	**SA (5)**
1	unclear changed and materials type & specification					
2	Poor coordination and unwilling to take risk					
3	high cost of transportation					
4	Escalation and fluctuations of material prices					
5	Suppliers problem					
6	Construction Material shortage in market					
7	imported materials delay					
8	Shortage of foreign currency					

(3) Stakeholders		**Option**				
S.N	**(3) Stakeholders related (consultant, client & contractors) factors**	**SDA (1)**	**DA (2)**	**N (3)**	**A (4)**	**SA (5)**
1	Delay in approving design documents					
2	Conflicts between consultant and other stakeholders					
3	Late in reviewing and approving design documents					
4	Poor communication and coordination with other					
5	Lack of experience in similar construction projects					
6	Poor sit management & supervision					
7	Slowness in decision making					
8	Delay in handing over the site to the contractor					
9	Too many change orders					
10	Inaccurate sit investigation					
11	Delay in progress payments by owner					
12	Delay in approving design document					
13	Inadequate contractor experience					
14	Financial difficulties (shortage)					
15	Conflict, war & public enemy					
16	Inclement weather conditions					
17	Ineffective planning and scheduling of project					
18	Improper construction methods					
19	Obsolete technology					
20	Unreliable subcontractors					

Part III. Open-Ended questions

1) In your opinion, what are the determinant factors that affect delay in the case of legedadi deep well Water supply construction projects?

A) _____

B) _____

C) _____

D) _____

2. What are the main causes of delay in legedadi water supply project?

_____

_____

_____

3. What would be the effects caused as a result of the delay?

_____

_____

_____

4. What would be the possible solution with recommendation to be done in order to minimize or avoid delays in Addis Ababa water and sewerage authority in water supply project construction?

_____

_____

_____

5. If you have further comments, please indicate in the space provided below.

_____

_____

_____