ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

CAUSES AND EFFECTS FOR THE DELAY OF WATER SUPPLY AND SANITATION PROJECTS: THE CASE OF 15 TOWNS WATER SUPPLY & SANITATION PROJECT IN ETHIOPIA.

By

ALEMAYEHU TAKELE TSEGAYE(SGS/0662/2010)

June, 2020

Addis Ababa, Ethiopia

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ST. MARY'S UNIVERSITY

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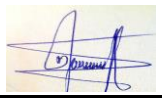
Dr.Muluadam Alemu (Ph.D)	
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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Busha Temesgen. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

Name Signature

St. Mary's University, Addis Ababa **June ,2020**

ENDORSEMENT

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

_____ _____

Advisor Signature

St. Mary's University, Addis Ababa **June, 2020**

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ACRONYMS & ABBREVIATIONS

CWA	Consolidated Wash Account
DFID	Development French International Development
EIB	European Investment Bank
FAO	Food and Agricultural Organization
GBV	Gender Based Violence
MOWIE	Ministry of Water, Irrigation & Energy
OD	Open Defection
OWNP	One Wash National Program
PASDEP	Plan for Accelerated & Sustainable Development to End Poverty
PMBOK	Project Management Body of Knowledge
SNNPR	Southern Nations & Nationality Peoples Republic
UAE	United Arab Emirate
UN	United Nations
UNICEF	United Nations International Children's Education Fund
WASH	Water Supply, Sanitation and Hygiene
WHO	World Health Organization
WSSP	Water Supply & Sanitation Project

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Abstract

The water supply sector is an important pillar in the achievement of Growth and transformation plan (GTP), set by the Federal Government of Ethiopia for the water supply coverage in the country. The water supply construction is characterized by its complexity because it is taking place in public roads, vicinity areas which causes disputes for compensation. Moreover, it is associated with excavation machines & equipment that require continuous maintenance. Therefore, it will take extended time beyond the schedule and as a result it comes to be vulnerable to project delay. This shows that there is a direct link between time and cost of completing a large water supply construction project. Project delays are a prevailing and regular phenomenon in the Ethiopian construction industry. Delay to projects mean the slowdown of development in all other related fields. This study was aimed at empirically identifying factors that cause delays with its effect in 15 towns water supply construction projects in Ethiopia. In addition, it was conducted to identify factors affecting delay in WSS construction projects with recommend possible mitigation measures. The study adopted quantitative and qualitative methods with the help of Primary data collected using self-administered questionnaires on 50 respondents and key informant interviews with ten experienced practitioners in the WSS construction sector. Secondary data was also collected through reviewing of related materials. Analysis of the quantitative data was made using SPSS version 22. The research finding revealed that material import delay, ineffective planning & scheduling of projects, poor site management and supervision, delay in progress payment, slow decision making by the owners & inaccurate site investigation are some of the causes which significantly influenced to delay the completion of the project. Beyond these factors, time overrun, cost overrun, dispute etc. are major effects of the delay. Generally, this study has indicated that the community beer all impacts in terms of increased cost, losing benefits from the projects . Therefore, WSSP demand contractors to employ competent staffs capable of preparing sound planning. On the government side it has to give priority in allocating currency to the water sector in importing materials. Owners in their part should settle progress payments & give timely decisions.

Key words: project delay, delay effects, time overrun, cost overrun

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Water Supply & Sanitations are the public utilities that have been worst hit. These facilities 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.

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).

When we look at water supply & sanitation service in Indonesia it is among the worst in terms of access and service quality too. Out of 240 million population 110 mill has no

access to improved sanitation where the sewerage system in urban area is only 2% and more than 40% of the population are suffering from improved drinking water (WHO, 2017).

Concerning the improved sanitation services in Africa specifically of Lesotho is low. Only 44 percent of the total population has access to improved sanitation solutions (46 percent and 43 percent coverage in urban and rural areas, respectively). About 30 percent of households do not have access to any toilet facilities and therefore they practice open defecation. Diarrhea accounts for 25 percent and is the leading cause of death of children under five years in Lesotho; of these, an estimated 65 percent is attributable to poor sanitation and 73 percent is attributable to unsafe water supply (IHME,2016)

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. Considering the systems in the region as they are frequently broken and not functioning with poor arrangements for maintenance and repair, access to sanitation facilities is reported to be 56%. Despite this high figure for sanitation in the country, latrines are virtually non-existent in rural communities with defecation taking place in fields, bushes or along drainage ditches. Hand washing practice is reported as 7% and open defecation is about 15%. Water and sanitation-related diarrheal disease is among the top three causes of all deaths in Ethiopia, and Amhara region is one of the regions that have faced this life-threatening challenge for many years.

Diarrheal diseases were the second-leading cause of death in Ethiopia in 2017, with lack of access to safe WSS services ranking as the second-highest risk factor for death and disability—just behind under nutrition. With rapid increase in population and increase in GoE's water supply service level standards, an estimated 42 million people are without access to a safe drinking water supply and 94 million have no access to improved sanitation, for many OD is the only option ((IHME), Global Burden of Disease, "Ethiopia bear the burden of water collection over long distances, which has been associated with negative effects on well-being, school attendance, and a higher risk of GBV. A high

prevalence of OD and the poor quality of sanitation facilities also compromise the convenience, safety, health, and dignity of rural women and girls as per the WASH report (One-WASH, May 2017).

Therefore, to avoid all these life challenges of human being a lot has to be done on successful projects implementation. However, projects in every corner of the glob are suffering from severe delays in completing the projects within budget, specified time & expected quality.

Construction industry worldwide is growing on a fast pace in order to support infrastructural and economic development in a country; however, the delays in the construction project are a big concern. Projects of construction can be saved from any kind of postponements if identification of causes is made appropriately (Haseeb et al., 2011).

Delays in a water supply & sanitation construction project can be such a problem and a very serious issue for the parties involved such as client, consultants and contractors. There are many adverse effects that can occur as the results of the delays. One of the effects is slipping over its planned schedule and is considered as common problem in construction projects.

Hence, it is essential to identify the most significant causes of delays in construction projects in order to search the way to avoid rather to minimize their impact on construction projects (Faridi & EI-Sayegh, 2006). As far as projects are different in terms of their contract type, size, contract duration etc so also identifying the causes of each delay varies accordingly which requires a detailed study.

Water supply projects are vulnerable to delay more than others for the fact that they are taking place in public rood, streets, vicinity areas farm areas etc. which requires significant provision. There is also high uncertainty, because the construction by its kind associated with excavation and trenching works in different soil type, geological formations and most of the works performed with machineries, equipment that demands continuous repair and maintenance so it require the approval of official at different level.(AL-Khalil & AI-Ghafly, 1999). These all being the causes for delays in water

supply & sanitation projects in almost all part of Ethiopia and particularly reflected in 15 towns water supply & sanitation project. 15 towns Water Supply & Sanitation Project consists of 15 towns from four Regional Governments, seven towns(Shewarobit, Ataye, Kemise, Mersa, Wereilu, Motta and Injibara) from Amhara, while four towns namely Fiche, Gerbaguracha, Holeta and Dembidolo from Oromiya, the remaining two Weyita Sodo & Bonga from SNNP and Adigrat & Maychew from Tigray Region which were classified in to four lots. All are under a single project known as "15 towns Water Supply & Sanitation Project". The award was given to an international contractor as a turn key contract which later underperformed during implementation and exposed the project for long delay. After so many disputes decision has been given by a court to the extent of total termination by the Federal Government of Ethiopia.

As a result, the project was delayed more than ten years beyond the schedule therefore, this study is destined to identify the root causes of the delay for farther solution and lesson to be learned.

The construction industry is one of the industries that cannot run from problem or challenges. One of the challenges faced by the industry is project delay. The industry of construction has a poor standing as in the industry coping with delays and thus, a number of major projects fails in meeting the schedule deadline.

Delay is known to be the most risky, common, complex and costly problem the industry encountered (Cheung et al, 2001) within both public and private construction projects around the world. Assaf and Al-hajji (2006) defined delay as the time overrun which could either be beyond the date parties agreed to deliver a project or beyond the scheduled time of completion inside a contract‖.

when construction projects are executed successfully the consequences thereof are socio-economic growth, an improved standard of living and creation of wealth, and thus, countries may be assessed as underdeveloped, developed and developing on the basis of quality and quantity of accomplished construction projects inside their province (Abdullah et al., 2011).

In connection a study on the causes of delays in construction projects in the Ghanaian settings was conducted by Fugar and Agyakwah-Baah (2010). They identified; Poor supervision of the works on site; Underestimation of project costs; Delays in honoring payment certificate; Difficulties in accessing bank credit; and Underestimation of project complexity etc.as the main delay factors. Moreover, delay is 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 15 towns water supply and sanitation delay causes with its effects.

1.2. Statement of the problem

A construction project is commonly admitted as successful when it completes on time, with budget, according to the specifications, and stakeholder satisfaction. However, most of the projects did not finish as the expected timetable. Instead, they completed after the schedule due to uncertainties of events and its uniqueness. Although there are different causes of delays in water supply &sanitation project the Ministry of water mentioned some of them only.

As reported in the ministry of water, irrigation and energy of one wash national program of Ethiopia (MWIE,2017),the major factors that contributed to implementation delays are: (i) high cost escalation of proposed urban WASH activities due to increase in service level standards introduced in the GTP II; (ii) reduction of available budget due to diversion of US$26 million equivalent of OWNP-CWA resources (from DFID and UNICEF) in 2016 to address emergency humanitarian efforts; (iii) the complexity of urban water schemes that require large quantities of imported goods such as electro-mechanical equipment, steel casings, pipes and fittings and timely availability of hard currency to procure imported goods; and (iv) volatile security situation that hindered access to some project sites and discouraged contractors from mobilizing machinery to finalize activities. However, the recent delay factors need to be considered and studied as one of the most common problems causing a multitude negative effect on projects, and its participating parties. Moreover , identifying the main causes of the 15 town water supply and sanitation project delay with its effects is the main concern of this study paper as project delay affects the counters' economic growth with all its other adverse effects .

1.3. Research Questions

What are the causes of water supply and sanitation delay in the 15 towns project of Ethiopia?

What are the effects of water supply and sanitation delay in the 15 towns project of Ethiopia?

What should be done to reduce water supply & sanitation projects delay in Ethiopia?

1.4. Objectives

1.4.1. General Objective

The main objective of this study is to identifying the major causes of delay, effect of delay and methods to minimizing delays in water supply & sanitation projects in Ethiopia based on the output of the study.

1.4.2. Specific Objectives

- To assess the causes of water supply and sanitation delay in 15 towns water supply & sanitation projects of Ethiopia.
- To assess the effects of water supply and sanitation project delay in 15 town water supply & sanitation project of Ethiopia from different perspectives (contractor, project owner and consultant)
- To indicate the methods of reducing the delay in construction projects based on international experience.

1.5. Significance of the Study

The occurrence of a delay in the construction projects is common and significantly affects by enormous ways. This study tries to assess and identify the causes for delay of water supply & sanitation construction project systems and the effect resulted from the delay in Ethiopia at large and in 15 towns water Supply & Sanitation Project in particular. This study is pertaining to the sever wastage of resources caused by project delays so that it has significant contributions. It will also be used for farther research on the area for

different scholars as an input. This study will also be important to the government in formulation of construction industry policies and the way these policies are implemented. An informed policy provides useful guidelines to the industry which minimizes project failures, reduces risks and severally enables order in the construction industry. This study also intends to spawn practical and theoretical further research questions that can become useful study basis for future researchers. Its findings are expected to contribute in the debate about how to improve the efficiency and effectiveness in the construction industry particularly with regard to scheduling and time & cost management too.

1.6. Scope of the Study

In construction projects, as well as in other projects where a schedule is being used to plan work, delays happen all the time. The delays cause a significant impact upon the country's economic development and public interest. It also arises the question of good governance by the citizens. Therefore, this study is limited to the identification of main causes of delays of 15 towns water supply & sanitation project with their corresponding effects. The study is limited to the stakeholders namely contractors, consultants & project owners engaged in construction projects specifically in water supply & sanitation projects as a partner.

1.7. Limitation of the Study

This study was limited in accessing in person all the 15 town clients geographically due to Covid 19 pandemic infection. The conflicts earlier arisen in Ethiopia like the Oromo liberation front against the federal democratic government of Ethiopia specifically in Oromia region of Dembidollo, and Fiche has barred the researcher to access the study subjects. Moreover, in the southern nations, nationalities and peoples' region at Bonga & Wolayta Sodo a similar case of conflict was the same which resulted instability in the region.

The leading contracting company Mattioli S.P.A of Italy which contract all the 15-town water supply and sanitation projects was terminated due to a delay in the project and the researcher lack to have an access for root cause reasons of delay.

1.8. Definition of terms

Project delay is time overrun beyond the planned work schedule or it is construction time extended more than agreed upon between the contractor and the project owner (Assaf and Al-hajji, 2006).

Effects of delay is any consequence directly attributed to the project delay based on the perception of the client, contractors and consultants (Werku and Jha, 2016).

Time overrun is the duration of period out of the existing contract life caused by the delays in project construction (Elinwa and Joshua,2001).

Cost overrun.is the the amount of expenditure beyond the original project cost or budget(Y.N. and M.O,2013).

Project is a temporary endeavor undertaken to create a unique product, service or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. A Guide to the Project Management Body of Knowledge, 4thed, p.5

Access to water refers to the ability to obtain sufficient drinking water of guaranteed quality and quantity to meet GTPII requirements of all household members.

1.9. Organization of the paper

This study is organized in to five chapters. The first chapter states the general introduction of the study which comprises the background, problem statement, research questions, objectives, scope, limitation & significance of the study.

The second chapter comprises of the literature review regarding, the study area of project delays with its causing factors and their consequences. Therefore, it sets out the theoretical foundation for the study.

The third chapter briefs the research methodology. This part has included the research type, instruments, research subject approaches, data type, collection approaches, analysis approaches and data edition approaches.

The fourth chapter deals with the results of the study and the discussion of results which included result presentations and interpretations.

While the last and fifth chapter included conclusions and recommendations with implied research gaps in the area.

2. CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1. Introduction

This chapter 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 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.

The delay often results in additional project cost and time laps. Construction project delays also result in conflicts and mistrust among the concerned stakeholders (designer, contractor worker, and consultant). (Khattri et al. 2016).

The aim of this study includes the identification of causes and effects of delay in construction projects in Ethiopia with the special focus on 15 towns water supply & sanitation project and assessing the way to get reed of these problems by the use of project management approach.

This chapter reviews perceptions of stakeholders (contractors, project owners, & consultants) on most important causes of delays & effect in water supply & sanitation construction projects in Ethiopia at large and 15 towns water supply & sanitation projects in particular.

2.2. Theoretical Concept

A construction project is basically a temporary endeavor having a defined beginning and an end, undertaken to meet particular goals and objectives. Usually to bring about beneficial change or added value (PMBOK.2004). Every construction project has a defined goal or objective, defined tasks to be performed and a defined time frame (Levy, 1994).

Construction industry plays a very important role for the economy development. Construction Delay is a major problem facing in any developing country including Ethiopia. This study is to review past studies on the factors causing delays in Water Supplies & Sanitation projects in Ethiopia, and identify the main causes of delay for the case of 15- towns water supply & sanitation project.

Every year a considerable amount of loan and grant from development partners is channeled to the water sector for the improvement of water supply facilities along with the health & Education sectors. However, every construction process in Ethiopia is subject to delay resulted from performance of stake holders like contractor, consultant and client or project owner in addition to various internal and external reasons. It is rarely happened that a project is completed within the specified time (Assaf & Al-Hejji, 2006).

Abdullah et al. (2011) stated that, countries are classified as "underdeveloped"," developed", and "developing" on the basis of quality and quantity of accomplished construction projects inside their territory.

Ethiopia one of the fastest growing, developing country; uses construction industry as the main input for growth, employment, and infrastructure expansion. Yet, not contributed to the development of the country as desired due to it faces various problems, limitations, and drawbacks. Among those, impact of delay in construction project is a common, and a predominant. Various researchers had been studying the causes and effects of delays in construction projects all over the world and in domestic in numerous manners for decades. The problem studied in different countries with different scholars; due to the reason that, it differs from one country to another; in time variation or even one project to another.

According to Aibinu and Odeyinka (2006), construction projects still continue to face the challenge of delays even in this current phase of knowledge in technology as well as organization management.

According to Ogunlana (1996), when projects are delayed, they are either giving time extension or the project activities augmented and thus causing extra cost. Delays that pertains to construction schedule have negative impact on both the contractors and the owners to the extent that delays cause owners to absorb or pay additional cost and still are not able to use or occupy their property for its intended purpose (Ochoa, 2013).

Several attempts by researchers as well as project professionals to tackle the effect and causes of delays in construction project have not met the positive results needed as Sambasivan and Soon (2007) suggests.

There are several causes or factors of delay that have been identified by researchers in the construction industry. Some of these which are supposed to be universally applicable in many areas of the world were selected and classified under nine categories.

Project related, These were identified as a ninth and final group of causes of delay; Consultant related, were identified as one of the groups of causes of delays in construction projects; Owners related, This category was identified as an eighth group of causes of delays; Contractor related, These factors comprised a second group of causes of delay; Design related, identified as another group of causes of delays; Material related, were identified as another group of causes of delays; Equipment related, group of factors was identified as a fourth group of causes of delay; Labor related were identified as a sixth group of causes of delays & External related were identified as another group of causes of delays. under which various causes of delay are incorporated. (Assaf and Al-Hejji 2006).

2.3. Construction delay

Delay is a situation when the contractor and the project owner jointly or individually contributed to the non-completion of the project with in the original or stipulated contract period. On time completion of any project is beneficiary both for contractor and project owner (Levy S.M. 1994 pp 54-65). Project delay is the time overrun either beyond the completion date specified in a contract. Or beyond the date that the parties agreed upon for delivery of project (Assaf and Hejji, 2006).

Moreover, delay in construction is a state in which the actual progress of the phases of a construction project becomes slower than as planned or completing the project late (CIOB, 2008). It is a prolonged period of construction and interruptions of events that distracts the program of the construction.

According to (Cheung et al., 2001) delay is acknowledged as the most risky, costly, common, and complex problem encountered during projects implementation.

From experience of other countries, it was known that the problem of project time overrun is of international concern. According to Kaming et al. (1997) and Trigunarsyah (2004), time overrun is the extension of time beyond planned completion dates usually traceable to contractors. Elinwa and Joshua (2001) defined it as the time lapse between the agreed estimation or completion date and the actual date of completion. they also describe time overrun as the time during which some part of construction project is completed beyond the project completion date or not performed as planned due to an unanticipated circumstance

Time overrun affects the project owners, contractors and other project participants. Project owners may be affected through lost benefits that could have accrued from the completed facility, while contractors may have to spend more on labor and plant, pay penalties as per the contract or even lose other profitable contracts because resources for the next job are tied up on delayed projects

Delays in construction projects are frequently expensive, since there is usually a construction loan involved which charges interest, management staff dedicated to the project whose costs are time dependent, and ongoing inflation in wage and material prices.

Although not much studded about different causes of delay in construction projects in Ethiopia this study tries to view some of relevant papers from abroad. According to Doloi, Hemanta, Sawhney, Anil,Iyer, and K. C. Rentala, Sameer (2012) categorized the cause of delay in India: as Site related, project related, process related, human related and technical issue related. On the other side Mohamed M. Marzouk *, Tarek I.

ElRasas(2014) of Egypt also study to analyze the cause of delay in Egypt construction and accordingly he tried to group the causes of delay in to project holder, advisors, developer, Material, workers & machines, Project, External related delay factors.

There are also 32 different causes of delay which were categorized in to nine groups namely material, manpower, equipment, financing, environment, changes, Government action, contractual relationship and scheduling & controlling techniques (Fugar,2010).

According to Pourrostam et al. (2011) project delays form the major challenges for the industry of construction in the emerging countries. However, delays are not only experienced in the emerging countries, delays are a global phenomenon (Memon et al., 2011).

As per Chan and Kumaraswamy (2002) investigation in 11 countries causes of delay in projects are identical in developing countries. like improper planning and estimation, weak project management and lack of materials are of the most important delay causes. However, delay causes in developed countries such as The United States and Britannia are justified delay factors like unfavorable weather and human resources performance.

There are several causes of delay based on different stakeholders' perspectives involved in projects such as Contractors, Consultants and project owners. Some of the causes are owners interference, inadequate contractors experience, finance & payment, labor productivity, slow decision making, improper planning, sub-contracting, poor project design, shortage of construction materials, delays in site handover, scope changes, inadequate specification of materials, inadequate project duration, improper contract formulation, (more contract for a single contractor as package), government procurement rules etc.(Odeh & Battaineh ,2002)

The construction industry tends to fluctuate with the general economy, and it has quick response to the changes in the economy. According to Chitkara, K. (2004), the construction industry in many countries accounts for 9 % of the Gross Domestic Product (GDP). However, it is becoming more complex because of the sophistications of the construction process itself and the large number of parties involved in the construction

process. As projects require time extension due to delay in construction process its implication on costs of the project is more significant to the owners and negatively affect countries economy.

In connection to the above and some other causes for delays of water supply construction, resulted in adverse effect on both parties (contractor & project owner). The effects are like that of losses of potential revenue through production facilities, depending on existing facilities, increased cost of contract administration and supervision in terms of project owner. By the side of contractor higher overhead cost due to extended work period, higher material cost through inflation, increased labor cost, tied-up capital cripple, lost opportunity for new projects(because its financial capability diminishes) etc.(Chan & Kumaraswamy,1997).

The previous study in this area shows that delays occur in almost every type of construction project including water supply construction but the magnitude and effect of the delays varies considerably from one type of project to the other. The project delays are measured comparing the progress with the original schedule.

In construction projects, as well as in other projects where a schedule is being used to plan work, delays happen all the time. It is what is being delayed that determines if a project, or some other deadline such as a milestone, will be completed late.

the top greatest main causes of delay in the Ethiopian construction project identified from previous research. According to research analysis, the highest rank of the cause of delay in Ethiopian construction is corruption. Also, unavailability of services (utilities) at the site, inflation, less quality material, late design and design documents, less speed of material supply, late in agreement of contract and receiving of completed project work, poor site management and performance, late release of budget/ funds, and unsuccessful project preparation and scheduling. The result of this research shows that the two most basic effects of causes of delay in Ethiopian construction projects are cost overrun and time overrun (Tsegay and Hanbin , 2017).

Figure 1:Long journey for Water

Avoiding water supply delay is avoiding Long journey for Water

Wasting productive labor by walking a long journey in searching of water for existence by itself was time wastage. time is money. Therefore, setting proper planning & scheduling of projects and in line with it properly managing and supervising the project site has significant contribution towards the completion of projects within agreed upon period between the parties (Owner & Contractor). The owner receives the service on time the contractor delivers the project & benefit in terms of capital & goodwill.

2.4. Types of delays

Before analyzing construction delays, a clear understanding of the general types of delays is necessary. However, it is important to understand the types or categories which a delay

falls into before analyzing construction delays. To initiate the further mitigation efforts and to convert it into a merit, a clear understanding of types of delays is necessary.

Therefore, Theodore (2009) classified delays in to four basic categories:

1) Critical or Noncritical delays, 2) Excusable or Non-excusable delays, 3) Compensable or Non-compensable delays, 4) Concurrent or Non-concurrent.

Delays that affect the duration or completion of project are critical delays. While the delays that do not affect duration or completions of project are noncritical delays. The delays which are not predicted under any activity which is apart from the control of contractor are excusable delays. In this type, no one is responsible by law for penalty. In non-excusable delays, the responsible party is the contractor. Hence, the contractor will not be entitled for any extension of time but the owner will recover liquidated damages from him.

A compensable delay is a delay where the contractor is designated to prolong the time and to add the compensation. Excusable delays are able to compensate. In Non-compensable delays, the contractor is not able to claim for the compensation from the excusable delays. A concurrent delay is the concept of presenting an analysis for common construction delays. The argument of concurrency is not to determine the critical delays point of view but from an attitude responsible for damages connected with the delay to the critical path.

The selected 15 towns water supply & sanitation project is the subset of the water supply & sanitation program included in the plan for Accelerated & Sustainable Development to end Poverty (PASDEP).

However, it is important to understand the types or categories which a delay falls into before analyzing construction delays. To initiate the further mitigation efforts and to convert it into a merit, a clear understanding of types of delays is necessary. According to Theodore (2009) The delays are classified or categorized into four basic ways:

A) Critical or non-critical delays, B) Excusable or non-excusable delays, C) Concurrent delays, D) Compensable or non-compensable delays

2.4.1. Critical or non-critical delays

A delay that is responsible for extending project duration is a critical delay or an event which causes the delay to the completion of the work project within stipulated period. Few results are mentioned below: Extended Field Overhead, Unabsorbed home office overhead, Liquidated Damage, Idle labor & equipment cost, Labor & Material Cost, Escalation and many more. If these activities are delayed, the project completion date or a milestone dater will be delayed. (Trauner et al., 2009)

A delay that is not the cause of extended project duration is a non-critical delay; however, it will have an effect in terms of activities getting completed late than scheduled completion or affect the work progress. These activities will also affect project cost estimates as reiterated below; a) Idle labor & equipment cost, b) Labor & Material Cost Escalation and many more.

2.4.2. Excusable or non-excusable delays

A delay where the contractor is entitled for extension of time or compensation or both, under the terms & conditions of contract is excusable delay. Generally, it is as a result of an unanticipated occurrence that exceed the control of contractor and the subcontractors (Trauner et al., 2009).

In this case, contractor does not have any control on the activity getting delayed. It is also defined as delay that is due to an unforeseeable event beyond the contractor's or the subcontractor's control. The causes may be; Force Measure Clause, Natural Calamities (fire, flood etc.), Political/Social Unrest(labor strike, boycotts, etc.), Terrorist Attacks, Delay from Client (Approvals, Decisions, etc.), etc.

A delay where the contractor is fully responsible for the activities getting delayed and resulted in extending project duration (responsible for critical delays) are non-excusable delays. It is under the control of contractor or that are foreseeable. In this case, the contractor has to bear the risk of cost consequences including the liability to pay damages for itself but possibly for the other parties as well. The causes may be: Delayed

Mobilization, Delayed Procurement, Delayed submission of important documents, Planning & Scheduling, Critical events that were not highlighted to client on the right time etc.

2.4.3. Concurrent delays

A situation where more than one delay event occurs at the same time affecting multiple activities simultaneously/independently affecting the completion is concurrent delay. However, not all those events enable the contractor to be entitled for extension of time & cost claim. Importantly, it is the causes of delay rather the delay themselves, that must overlap. It is the issue of assigning responsibility for damages associated with delays to the critical path. (Mubarak, 2005)

2.4.4. Compensable or non-compensable Delays in in Construction Projects

A compensable delay is a delay where the contractor is entitled to a time extension and to additional compensation. it is where contractor is liable for Time Extension & Cost compensation which is caused by the owner like that of late release of drawings from the owner's architect. All compensable delays fall under excusable delays-Whereas, if the contractor is solely at fault for a delay event, it is termed as non-compensable delay. Non-compensable delays are caused by third parties or incidents beyond the control of both the owner and contractor such as weather, strikes, fire, natural crises etc. However, non-compensable may fall under critical, non-critical, excusable or non-excusable; depending upon the situation it has created and conditions of contract. Ahmed et al. (2003) and Mubarak (2005).

15 towns project was intended to improve access to safe water and sanitation in a sustainable manner in 15 selected small towns in four regions (Amhara, Oromia, SNNPR and Tigray) by providing adequate potable water supply and sanitation services for about 600,000 inhabitants.

The project includes rehabilitating and extending the water supply and sanitation infrastructure as well as providing training for Town Water Supply Services. The

construction of this project like other similar water supply & sanitation projects will particularly benefits the women and children as they represent a vast majority of all persons involved in fetching water.

2.5. Empirical literature review

2.5.1. Causes and Effects of construction delay

The success of construction projects is based largely on the satisfaction of the objectives defined in the project specifications (Doloi et al. 2012). A successful project is carried out according to the pre-defined execution time, the budget allocated for the project, the quality requested by the client while respecting the safety condition of the workforce (Frimpong et al. 2007, Bajjou et al. 2017a).

In Hong Kong, a research carried out to determine the ―major causes of delays in construction projects revealed that extreme low bid, insufficient labour and equipment resources that turns to affect the contractor‘s capital, inexperience contractors, unexpected conditions of ground works that conflict that of utilities, and poor consultants‘ supervision (Lo et al., 2006). In Ghana, Frimpong et al. (2003) carried out a study to find out the major causes of delays in construction projects and identified five factors that cause delay in the construction industry, these include; (i) poor payment to contractors; (2) material procurement challenges (3) poor contract management, (4) lack of knowledgeable performance as well as escalation in price of materials. However, an enhanced project management technique was suggested to be the best way out in overcoming overruns of time in the implementation of project.

The most common causes of delay in various countries are similar to that of UAE like unrealistic contract duration imposed by the client, incomplete design at the time of tender, too many scope changes and change orders, inadequate planning and scheduling, and poor project planning and control (Mpofu et al.,2017).

2.6. Effects of delays

Most of the time in any kind of project the effects caused by the delays are almost similar, the major ones are time overrun & cost overrun followed by dispute, arbitration, litigation and total abandonment (Sambasivan & Soon, 2007).

Ahmed et al. (2000) stated that impact of delays in construction project could cause; provocative relationship, cash flow problem, disbelief, project rejection, general sense of trepidation among parties and lawsuit. The study by Kikwes, (2012) also revealed that disruption and delays in construction project create negative social impact, misunderstanding causing dispute, time overrun, resources wasting in relation to equipment as well as labor, and work going beyond budget. The effect of delays on projects can cause confrontational relationship, general sense of trepidation, lawsuit, project rejection, disbelief, and cash flow problems (Ahmed et al., 2000).

Nwachukwa (2009) adopted a systematic strategy to analyze the effect of material constraints to the success of managing projects in construction industry of Nigeria. He established that the attitude of a project client together with the management team towards the management of material resources is significant as it has an effect on achieving the objectives of the project.

when delay happens there exist conceivable conditions that a manager of project might face the challenge of extra money to finish the task conceding the quality of the project by reducing specification and standard as well as rework consequently to amend the project. The research conducted by Aibinu and Jagboro (2002) on effect of the delivery of project in the construction industry of Nigeria discovered the following; cost overrun, time overrun, project budgeted cost, work exceeding schedule, arbitration, disagreement, lawsuit, and complete abandonment.

In the research ‘s quest to examine the effect pinpointed by other researchers and their related studies universally, it was observed that the main effect in project adversarial relationship are time overrun, cost overrun, distrust, cash flow problems, arbitration,

litigation and complete abandonment. Although these are also carried for 15 towns water supply and sanitation project, it needs farther research to identify the main causes & effect of delays of Ethiopian's construction Industry with special emphasis on 15 towns water supply & sanitation project**.**

Figure 2: Polluted Water

Let us avoid project delay & save our children from water borne diseases

As it was known from this study the final effect of project delay has been revealed that time overrun, cost overrun, dispute… termination were the outcomes. However, it is not only the mater of cost or economy but in the real sense it was and have been life determinant. All stake holders (Clients, Contractors, Consultants) including Government officials please take a look for a moment and do something to save the life of those children throughout the country. that is nothing else but devotion to complete projects on the schedule.

3. CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1. Research design

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact, it constitutes the blueprint for the collection, measurement and analysis of data. This study followed descriptive research which is a method that describes the characteristics of the population or phenomenon studied. This methodology focuses more on the "what" of the research subject than the "why" of the research subject.

The descriptive research method primarily focuses on describing the nature of a demographic segment, without focusing on "why" a particular phenomenon occurs. In other words, it "describes" the subject of the research, without covering "why" it happens. Descriptive research can be either quantitative or qualitative. It can involve collections of quantitative information that can be tabulated along a continuum in numerical form, or it can describe categories of information. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection.

It often uses visual aids such as tables & graphs to aid the reader in understanding the data distribution. Because the human mind cannot extract the full import of a large mass of raw data, descriptive statistics are very important in reducing the data to manageable form.

When in-depth, narrative descriptions of small numbers of cases are involved, the research uses description as a tool to organize data into patterns that emerge during analysis. Therefore, the researcher utilized and applied it to this study.

3.2. Population &Sampling technique

The study first defined the population to which the result has been generalized. The population of interest may differ for each study we undertake, for this research **non-probability** sampling was selected and **purposive** sampling technique was used instead of random sampling. Purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. Moreover, it is useful for this research since the focus was on a particular subset of people (Water supply engineers, civil engineers, planning specialists, environmentalist etc. participated in water supply construction).

Therefore, The target population being comprises experts from three sources namely clients, consultants and contractors which are directly and indirectly involved in the construction of 15 towns Water Supply & Sanitation projects. This has helped the researcher in collecting quality and more relevant data which is reliable and is competency based.

3.3. Sample characteristics

The respondents were composed of 18 from clients, another 18 from contractors & 14 from consultants. These respondents are professionally more relevant to the specified project of which 2 are diploma holders, 14 are1st degree and 24 Msc degree holders. They are also characterized by their experience in constructions of water supply projects and were the ones who knew better of the causes and effects of water supply and sanitation project delays in Ethiopia. Besides most of them were those who has a significant role in the construction of 15 towns water supply & sanitation project.

3.4. Sample size

The population size was 50 in number. Out of which 40 respondents were responded on time while the remaining ten were lately submitting their responses and so are not considered. 16 respondents from client group, 13 respondents from contractors and 11 respondents from consultants are taken for analysis that signifies a satisfactory response rate of much more than 50 percent.

3.5. Types of Data & Instruments of Data Collection

3.5.1. Data source

In order to come up with appropriate responses to the research problem at hand, both primary and secondary data were collected.

a. Primary Data

The researcher used primary data collection techniques such as questionnaire and key informant interview in order to address the extent of the delay causes & effects in water supply & sanitation projects in the implementation of the project.

b. Secondary Data

To collect secondary type of data, the researcher reviewed published and unpublished literature, periodic reports, monitoring and evaluation findings as well as policy documents. Reviewing literature and the corresponding findings has helped the basis for organizing thematic areas and analyzing the issues in relation with the practices and challenges caused by projects completion delay and the effects followed.

3.5.2. Instruments of Data Collection

The main instruments used in this study were the mixed method of data collection approaches which consist of closed-ended, open-ended questionnaires, interviews and observations. These different ways of gathering information has supplement each other and hence boost the validity and dependability of the data. That is to mean, the **quantitative** data were obtained through closed-ended questionnaires and the **qualitative** data through open ended questionnaires, interviews and site observations. It also content analysis by extracting the desired information from different texts. The items of the questionnaires are mainly developed based on the research objectives and research questions.

3.5.2.1. 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 and sanitation 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.

The important issue in open-ended questions is that the responses to these types of "questions will more accurately reflect what the respondent wants to say" (Nunan, 1999, p. 143). Therefore, the researcher utilized both closed-ended and open-ended questions that complement to each other.

3.5.2.2. Interview

The second main type of data to be collected in the mixed method design is the interview. Burns (1999, p. 118) contends that "Interviews are a popular and widely used means of collecting qualitative data." To this end, the researcher applied and obtained firsthand information directly from some knowledgeable informants of the target population. The inquirer intends "to obtain a special kind of information" (Merriam, 1998, p. 71) and investigates for himself/herself what is going on in the respondents‟ mind. With this regard the researcher interviewed a key informant among the three stakeholders namely

Client, Contractors and Consultants to understand what and how they perceived and interpreted the project delay & its effect on projects.

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.

3.6. Methods of Data analysis

After the data have been collected, the task of analyzing, establishing categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences has been applied.

Data were analyzed using Microsoft Excel to produce the summaries of the various responses. Moreover, it has been analyzed through SPSS statistical methods of research on version 22 using two sources of data identified for this study, namely structured interviews and questionnaire. The relative importance index (RII) for each factor on delay cause and effect was calculated using the frequency data for each response category generated from SPSS in a similar manner as shown in the equation below El-Razek et al. (2008).

$$RII = \sum_{i=1}^{4} aiXxi/A * N$$

where RII is the importance index; ai the weight of the ith response; xi the frequency of the ith response; and i the response category index; and N the number of respondents. For this study N=40. A response of “strongly agree” was given a weight of “5,” moderately agree” was given a weight of “4,”“slightly agree” was given a weight of “3,” and “neither agree nor disagree” was given a weight of “2.” And “disagree” was given “1” for degree of significance. Whereas degree of severity measured as “4” High, “3” moderate, “2” for slightly and “1” for little.

Findings of the study also has been categorized and presented under thematic areas and analyzed using different descriptive statistical tools such as graphs, tables and percentages accompanied by supporting qualitative information.

3.7. Validity and Reliability of Research

3.7.1. Validity

validity is concerned with whether our research is believable and true and whether it is evaluating what it is supposed or purports to evaluate. In this regard, Burns (1999, p. 160) stresses that "validity is an essential criterion for evaluating the quality and acceptability of research." Generally, researchers use different instruments to collect data. Therefore, the quality of these instruments is very critical because "the conclusions researchers draw is based on the information they obtain using these instruments" (Fraenkel & Wallen, 2003, p. 158).

To this end the researcher validated the research instruments in terms of content analysis by forwarding the research instruments and the data to be reviewed by the advisor. Based on his review & comments the unclear and obscure questions were revised integrated.

Moreover, the internal validity has been done which deals with the degree to which the researcher observes and measures what is supposed to be measured. To strengthen its internal validity data collected and the findings were triangulated using different sources like that of questionnaires, interviews and observations. Therefore, information was collected from a variety of sources and with a variety of techniques and confirmed the findings. The similarity of results obtained indicated that the data are valid.

3.7.2. Reliability

reliability deals with the consistency, dependability and replicability of "the results obtained from a piece of research" (Nunan, 1999, p. 14). the purpose is not to attain the same results rather to agree that based on the data collection processes the findings and results are consistent and dependable, Lincoln and Guba (1985, p. 288).

Therefore, to ensure its dependability and consistency Cronbach Alpha test has been made separately for degree of significant and degree of severity with the help of SPSS version 22 and the following results were obtained:

Degree of Severity	
Cronbach's Alpha	N of Items
0.938	**79**

Degree of Severity	
Cronbach's Alpha	N of Items
0.938	**79**

This Cronbach Alpha confirmed that the data collected and instruments utilized were more dependable and consistent.

3.8. Ethical consideration

The researcher used different data collection instruments from different sources. Utmost effort exerted to acknowledge materials cited while taking all the responsibility to keep confidentiality of respondent's opinions &reliability of the rest of the information.

3.9. Confidentiality and privacy

Confidentiality has been referred to handling the information concerning the respondents in a confidential manner. Respondents will be assured that their names have been dealt with in the strictest confidence.

4. CHAPTER FOUR: RESULT & DISCUSSION

4.1. Characteristics and Profiles of Respondents

The respondents were categorized mainly into three groups, namely contractors, consultants and clients which are implementing agencies and financiers. Table one has included the number of participants and their rates in percentage as represented here below.

Table 1: Response rate of the structured questionnaire

Respondents in Category	Participants in number	No. of responses per responding category	Response in Percentage
Client	18	16	89
Consultant	14	11	79
Contractor	18	13	72
Total	50	40	80

As indicated in table one above, the response rates of the questionnaire survey for contractors, consultants and clients were 72%, 79% and 89%, respectively. From a total of fifty participants ten were non-responding as they delay to forward their responses on time because of Covid 19 pandemic infection impacts . 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 drawing of drawing conclusions.

Table 2: Education level & proficiency:

Level of education as Proficiency	Diploma	1st Degree	Masters Degree
Civil Engineer	1	4	5
Water Supply Engineer		6	15
Hydrologist		1	
Economist		2	**3**
Environmentalist			1
construction technology & management			
Hydraulic engineer	1	1	
Total	2	14	24
Percentage	5	35	**60**

The above respondents have Diploma, Bachelor Degree and Master's Degree in engineering and other relevant areas of proficiency with a percentage of 5%, 35% and 60% 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, out of 40 respondent 21 of them or 52% were water supply engineers that strengthen the validity of collected data and the findings (Table 2).

Table 3: Relevant work experience:

Experience in years	Number of Respondents	Number in Percentage
0 to 5	6	15
6 to 10	10	25
11 to 15	8	20
16 to 20	5	13
>20	11	27
Total	40	100

With regard to the work experience of the respondents, the data implies that out of a total of 40 respondents 6, 10, 8, 5 and 11 of them have experiences in the water supply construction with different companies from 0 to 5, 6 to 10, 11 to 15, 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 3).

Therefore, of the three categories of respondents (clients, contractors, and consultants) the minimum number of respondents were 11. Based on the sample size, 50 questionnaires were distributed, of which 18 questionnaires to contractors, 14 to consultants and 18 to clients/ owners. From the distributed questionnaire 13, 11 and 16 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 construction project was using relative importance index (RII) 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 and ranking them according to their significant influence towards the delay in construction projects.

These causes are classified in to nine main categories as project related, Client/owner related cause, contractor related causes, consultant related causes, design related causes, material related, equipment related, labor related and external related causes.

Ranking of the delay causing factors based on RII was 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) have prioritized the causes of delay from the set of causes in order of their importance.

The delay factors as per the Clients perception was viewed the first cause from material related, the second from Owners related and the third from Consultant related factors and ranked accordingly. On the other hand, Consultants perceived and ranked first & third material related and contractor related respectively & ranked as second most important delay factor. While the Contractor prioritize owners related, material related and project related factors first, second & third respectively.

Table 4: Top ten Client Related delay factors

Category	Delay factors	RII	Rank
material	material import delays	0.379487	1
owner	Slow decision making	0.358974	2
consultant	Late in reviewing and approving design documents	0.353846	3
owner	Poor contract management of owner	0.353846	4
contractor	Poor site management and supervision	0.353846	5
equipment	Slow mobilization of equipment	0.353846	6
contractor	Ineffective planning and scheduling of projects	0.348718	7
design	Mistakes and discrepancies in drawings and BOQ	0.348718	8
owner	Poor communication & coordination with other parties	0.343590	9
contractor	Financial difficulties	0.343590	10

As it was perceived by the owners the most important cause or delay factor for 15 towns water supply & sanitation project is material import delay which is material related, according to the respondents the main reason for this delay cause is the shortage of currency to procure materials from abroad the Government can not avail on time the required amount which was stated by the respondents' they also underlined that appointment given by National bank of Ethiopia who is in charge of managing foreign currency at a county level was so long to the extent of three to six months. The reality also revels the fact as per the researcher's opinion. However, it requires farther detail study. Slow decision making was owners related, according to the respondent this is due to the negligence of client staffs or lack of qualified contract administration staff, long chain of bureaucracy such as: taking long time to approve bid evaluation, to give no objection for procurement of goods, progress reports etc. and late in reviewing & approving design document which is consultant related factor. The reason noted during the interview is mainly related to lack of sufficient experience and unqualified staffs of the consulting firm. This happens because the firm doesn't have the capacity to buy

qualified personnel from the market. As it was shown in the above table, they are ranked first to third respectively.

Table 5: Top ten delay causes as per Consultant Perception

Category	Delay causes	RII	Rank
material	material import delays	0.251282	1
contractor	Ineffective planning and scheduling of projects	0.241026	2
material	Changes in material types & specializations	0.241026	3
material	Poor procurement of water supply materials	0.241026	4
owner	Slow decision making	0.235897	5
contractor	Financial difficulties'	0.230769	6
contractor	Shortage of project staff	0.220513	7
contractor	Poor coordination/ communication	0.220513	8
equipment	Slow mobilization of equipment	0.220513	9
consultant	Inaccurate site investigation	0.215385	10

With respect to the consultant the main causes for the delay of the project was perceived by prioritizing material import delay first which is material related, the reason behind was given in the above paragraph or similar to the client. ineffective planning & scheduling of project which is contractor related cause is most important. Here the main reasons suggested by participant was frequent turnover of qualified staffs due to better payment in the labor market, not considering the prevailing situation in terms of machines, labor weather condition etc. change in material type & specification are the third ranked cause of delay. As per the opinion of respondent the specification was not exhaustively done at the beginning by the consultant based on the specific requirement of the client & the project type, it does not consider the project area the land scape, soil etc.

Table 6: Top ten delay causes as per Contractors perception

Category	Delay causes	RII	Rank
owner	Delay in progress payment by owners	0.292308	1
material	material import delays	0.292308	2
project	Unfavorable contract clauses	0.282051	3
project	Tendency in awarding the contracts to lowest bidder	0.271795	4
consultant	Delay in approval of shop drawings and samples	0.271795	5
owner	Delay in approving design documents	0.271795	6
contractor	Ineffective planning and scheduling of projects	0.271795	7
material	Escalation of material prices	0.271795	8
project	Inadequate contract	0.276923	9
consultant	Inaccurate site investigation	0.266667	10

Contractors response was analyzed and ranked based on their RII as follows: delay in progress payment by owners, material import delay, unfavorable contract clauses which is project related factor as first, second and third most important delay factors respectively. For the unfavorable contract closes the respondent reason out with example that contract does not consider the economic devaluation, availability of currency etc. Therefore, one can conclude from those stake holders that material import delay has been agreed being the most serious cause for the delay of 15 towns WSSP.

A combination of the perception of each group was also stated. This is based on each causes or factors of delay without considering the category of the respondent. Taking the aggregate sum of the frequency of response for each participant against the listed factors. Therefore, from the combined (clients, consultants and contractors) view it was perceived that the first cause is from the material related category and the second & third causes refer to contractor related while the fourth and fifth causes are related to consultant and client/project owner category respectively.

The top 10 most events that cause delay to construction projects was indicated and listed according to the three responding groups and ranked based on their relative importance index (RII). Therefore, a significant attention should be given to material import delay,

inefficient planning & scheduling of projects and poor site management & supervision. In order to minimize the delays in project implementation. farther consideration should also been given to the causes from fourth to tenth top causes of delays identified. (table 7)

Table 7: Top ten combined causes for the three parties

Category	Cause factor	RII	Rank
Material related	Material import delay	0.923077	1
Contractor related	Ineffective planning and scheduling of projects	0.861538	2
Contractor rel.	Poor site management and supervision	0.835897	3
Consultant related	Inaccurate site investigation	0.820513	4
Owners related	Slow decision making	0.820513	5
Material related	Changes in material types & specializations	0.815385	6
Contractor related	Financial difficulties/shortage	0.810256	7
Design related	Mistakes and discrepancies in drawings and BOQ	0.805128	8
Equipment related	Slow mobilization of equipment	0.805128	9
Consultant related	Late in reviewing and approving design document	0.800000	10

The contribution of each of the factors to overall delays was examined and the ranking of the attributes in terms of their criticality as perceived by all the respondents was done by use of Relative Importance Index (RII) which was computed using equation and the results of the analysis are presented in the above Table. To determine the ranking of different factors from the viewpoint of all respondents, the Relative Importance Index (RII) was computed using RII Equation El-Razek et al. (2008).

When it comes to the degree of severity of the above ten top delay causes the combined severity analysis indicated that material import delay (material related factor) was the first most sever cause, slow decision making by owners/client ranked as the second most

causes of delay (contractor related) while ineffective planning & scheduling of projects evaluated as the third most sever cause of delay. It also requires to give similar attention for the sever causes ranked forth to tenth. (table 8)

Severity of the causes was ranked by the respondents accordingly, top ten sever factor were identified as in the table below:

Table 8: combined severity of the top 10 causes

Category of causes	Causes of delay	RII	Rank
Material related	Material import delay	0.839744	1
Owner related	Slow decision making	0.826923	2
Contractor related	Ineffective planning and scheduling of projects	0.820513	3
	Poor site management and supervision	0.814103	4
	Financial difficulties/shortage	0.807692	5
Project related	Tendency in awarding the contracts to lowest bidder	0.782051	6
Owners related	Poor contract management of owner	0.782051	7
Consultant related	Late in reviewing and approving design documents	0.775641	8
Equipment related	Slow mobilization of equipment	0.74359	9
Owners related	Delay in progress payment by owners	0.737179	10

It can be seen that most of the causes that are identified as top ten causes for the delay of water supply projects in general and delay causes for 15 towns water supply & sanitation project in particular are also selected as most sever for the project. It alarms the stakeholders of the project to pay farther attention and investigation.

Along with this the respondents gave significant emphasis as to how easily access the project site. To avail any construction materials to the project site and facilitate the civil construction there must be access road which always be the cause for dispute between the project owner and the land owner. The compensation issue to hand over the site was identified as the cause for delay.

Impacts of the delay factors identified from different literatures were included in the questioners. Accordingly, the respondents commented over the nine main effects in addition to their brief opinions on key informant interview. Therefore, the responses were summarized with the following table:

Table 9:Effects of delay causes on the project

Effects caused by project delay	RII	Rank
Time overrun	0.970000	1
Cost overrun	0.960000	2
Dispute	0.815000	3
Arbitration	0.760000	4
Litigation	0.705000	5
Total termination	0.820000	6
Funding difficulties	0.805000	7
Delay in commissioning other related projects	0.745000	8
Develop unfair relationships with organizations	0.675000	9

As it was shown on the above table time overrun was the first and most important effect of project delay. Delay factors such as inefficient planning & scheduling of project by the contractors, poor site management & supervision by the contractors, financial shortage of contractors, delay in progress payments for the work completed by owners and material import delays directly affected the completion of the 15 towns water supply & sanitation project and caused significant time overrun.

The time overrun has its direct impact up on the cost of the project which is identified as cost overrun, that is the exceeding of project cost over the original planed cost caused by delays of the project performance beyond planned schedule. They are related to inefficient planning of project schedule as compared to the project duration. Moreover, poor site management & supervision has its significant pressure up on the time and cost of the project.

Due to the above time overrun of 15 towns WSS project, completion time was extended beyond the scheduled 36 months or three years to ten years. Accordingly, the original

project cost of 37.5 million Euro has been escalated & completed with 52 million Euro. 14.5 million Euro additional cost was imposed on the borrower towns and has negatively affected the country's economic growth at large as a result of substantial project delay.

As long as, the time overrun & cost overrun problems were not resolved on time, stake holders move to the last resort which is litigation that may be considered as remedy for the dispute aroused between the contractor & the owner. Clients are becoming more demanding, more discerning, and less willing to accept risk without proper recompense. They do not want surprises, and are more likely to engage in litigation when things go wrong.

There may be amicable solution between the parties if at all there is unclear project design and misunderstanding of contract documents; arbitration might be preferable other than court. Under all circumstances if the parties are not satisfied, the total termination of contract will take place which is the worst option for all and has its own negative contribution to economic growth of the Ethiopia since the country losses significant amount every year due to delay of mega projects including water supply projects.

15 towns water supply & sanitation project is the victim of this bad opportunity, the documents of the project history witnessed that it was forced to be totally terminated.

As a result, the Ethiopian economy at large and the water sector specifically the 15 towns under this project were the losers. Because, the project has been delayed more than seven years beyond the schedule. Due to time extension project costs were escalated which brought over burden on the town duelers. According to the on-lending agreement signed between Water Resources Development Fund Office (WRDF the lender) and the towns under the specified project (the borrower), the project was constructed by long term loan to be paid from water sales by the community. Therefore, any cost overrun following the delay were imposed on the borrower (the town water supply & sewerage service utility).

4.2. Discussion

As shown above in table one of this study, the number of respondents in percentage were 80 % which was very big when compared with other similar studies. For example, according to Sekaran (2001), a response rate of 30% is acceptable for a study to be valid.

Having had this in mind, the response rate in this study has indicated to be 50% above the requirement of other similar experiences.

Taking into account of table two which represents the educational background of this study participants, more than 50% of them were with master's degrees following 37.5% first degree participants. This can assure that their level of understanding and relevant experiences would amount better reliabilities and valid responses in this research. Many similar researches have used lesser percentage of participants in their studies compared with this research participants.

Moreover, as indicated in table three above, the number of work experiences with respect to participants revealed that 85 % of them are more than 6 years of experience. Participants who have less than five years of work experience were less than 15%.

A combination of the perception of each group was also stated. The first cause is material import delay factor which is material related factor and the second cause was in effective planning and scheduling of projects, and the third cause poor site management & supervision both refers to contractor related while the fourth and fifth causes in accurate site management & slow decision making are related to consultant and client/project owner category respectively.

A similar study on causes of delay on public building construction project in Addis Ababa city administration, the research result from the combined (clients", consultants" and contractors") view perceived that the first and second causes are shortage of finance & poor site management which are from the contractor related category and the third & forth, causes of delay namely delay in issuing design & delay in material import are from consultant and material related category respectively. Abdurezak M. and Neway S. (2019). This study prioritizes material import delay as the most significant factor due to shortage of foreign currency at a country level as per the informant interview. it is very difficult to open letter of credit for procurement of construction materials such as pipes, fittings, electromechanical equipment etc. from abroad.

Another research conducted on construction project delay and their antidots: the case of Ethiopian Construction Sector, it was identified as shortage of cash flow/financial

difficulties, poor site management, improper planning, all are contractor related ranked from first to third while slow decision making & delay in delivery of material which are owners and material related respectively ranked forth & fifth .Zenebe T.Z.(2016).

Although the ranks differ with in the range of first to fifth, their importance was similar or they are within the same basket of argument with this study. It shows that the study is reliable and pave the ground and give highlights for the next scholars for their detail researches.

According to Worku and Jah, (2016) identified five significant delay factors in Ethiopian public building construction namely; contractors' financial difficulties, escalation of material price, ineffective planning & scheduling by contractors, delay in progress payment for completed work, lack of skilled professionals in construction projects. This also shows that except material price the rest of delay causes are among top ten delay causes identified in this study.

Being late in reviewing and approving design documents has been indicated to be the least important factor in this study. With respect to severity, material import delay, slow decision making, and ineffective planning and scheduling of projects were taken as the first three important factors and delay in progress payment by owners to be the least important factor.

While the study analysis result in Sri Lanka ranked ineffective planning and scheduling of projects, contractors' financial difficulties and rejection of imported materials as the most sever causes of delay. Similarly ineffective planning and scheduling of projects is identified in this study as the second most important sever causes of delay which shows that they coincide and strengthen the reliability of this study.

Top ten causes for the delay of water supply projects for 15 towns in particular are also revealed by this study. It alarms the stakeholders of the project to pay farther attention & investigation. As it was shown on the above table, time overrun, cost overrun and dispute was the most important effect of project delay. Factors such as inefficient planning & scheduling of project by the contractors, poor site management & supervision by the contractors, financial shortage became a bottleneck for contractors. Delay in progress

payments for the work completed by owners and material import delays directly affect the completion of the project and causes time overrun.

Similarly, time overrun, cost overrun and dispute are the most frequent effects of delay factors in Sri Lanka construction of medium scale drinking water supply project. The same effects have been identified as the most frequent effects due to delays in Nigerian construction industry through a study carried out concentrating the building construction industry, Aibinu, A., & Jagboro, G.(2002)

Material import delays were the first most important project delay concerns in this study. With this in mind, this research has resulted ineffective planning and scheduling of projects as the first top delay factor of contractors. Contractor inefficiency, shortage of working capital, and lack of experience were suggestions collected using informant interview approaches too. Taking this approach into consideration, giving different components of contract to different contractors at different periods, awarding all procurements to a single contactor, misunderstanding of local contractor's capacity, unrealistic project design, additional works included which were not in the original design documents were listed in order of concern respectively.

On the other hand, poor site management and supervision has been found as the first delay factor for consultants, delay in progress payments and slow decision making were factors for clients and inaccurate site investigation has been considered as the first delay factor for owners. The effects of delay have been resulted as time overrun, cost overrun, and dispute being the first top three effects respectively.

In a conclusion, right off way has been indicated as a great effect by the respondents when assessed through interviews as the first serious problem to implement the project on time which affects the vicinity and the community at large. It has affected the contractors good will and the financial budgets also. Moreover, they have suggested that these projects need to be classified in Lots in terms of towns (clustering two or three towns in one lot) or in terms of components.

Being late in reviewing and approving design documents has been indicated to be the least important factor in delaying water and sanitation projects in this study.

Time and cost overruns occur in most construction projects and the magnitude varies considerably from project to project as Ahmed (2000) stated. It was stated as an essential factor to define the actual causes of time and cost overruns to minimize and avoid the delays and increasing cost in any construction project and the same has happened in this study.

According to key informant interviews of respondents Access road is also one of the causes for the delay of 15 towns WSSP since it is a means to deploy the construction materials to the site. However, it may cross the farm land highways etc. which requires negotiation & compensation by the client.

They also mentioned that shortage of working capital, and lack of experience were believed as the causes of delay as per the data collected using key informant interview approaches too. Taking this approach into consideration, giving different components of contract to different contractors at different periods, all procurements were given to one contactor, misunderstanding of local contractor's capacity, unrealistic project design works included which were not in the original design documents were listed in order of concern respectively.

In a conclusion, right off way has been indicated as a great cause factor by the respondents when assessed through interviews as the first serious problem to implement the project on time which affects the vicinity and the community at large. The delay has a negative effect by eroding the contractor's good will and the financial budgets in addition to black listing also. Moreover, they have suggested that these projects need to be classified in Lots in terms of towns or in terms of components beyond structured questionnaire assessments of material delay, ineffective planning and scheduling factors.

5. CHAPTER FIVE: RECOMMENDATION & CONCLUSION

5.1. Summary

The study was meant to identify factors causing project delay in 15 towns WSS construction project in Ethiopia. The factors were categorized under project related, Client/owner related cause, contractor related causes, consultant related causes, design related causes, material related, equipment related, labor related and external related.

The findings identified material import delay, insufficient planning& scheduling, slow decision making, financial difficulties in accurate site management & supervision as five most significant determinants of project delays in 15 towns WSS construction projects in Ethiopia.

Project delays are a common problem not only avoiding the community from getting the service on time and exposing for unnecessary cost, but also result in conflicts and mistrust among the concerned stakeholders.

Several attempts by researchers as well as project professionals to tackle the effect and causes of delays in construction project have not met the positive results needed as Sambasivan and Soon (2007) suggests.

Although causes of delay in WSS construction projects have been explored widely in other sectors A similar study on causes of delay on public building construction project in Addis Ababa city administration, revealed that the first and second causes are shortage of finance & poor site management and the third & forth, causes of delay namely delay in issuing design & delay in material import are significantly affecting the project. Abdurezak M. and Neway S. (2019). construction projects are some of the main pillars towards the achievement of Ethiopian's dream towards the achievement of the millennium development goal. Every year the government of Ethiopia and its development partners allocate huge amount of budget/fund for the water sector following the health sector. Therefore, an investigation into the causes of delays WSS construction projects was of great importance. It will help to put in place measures to control delays in construction projects. This study therefore examined the stakeholders in the WSS

construction industry. The survey involved a sample of 50 respondents comprised of 18 project owners, 14 consulting firms and 18 contracting firms in the study area.

5.2. Conclusion

This paper has presented the perceptions of three stakeholders (Client, Contractors & Consultants) on the frequency of occurrence and degree of severity and impact of various causes of delay and their effects on 15 towns water supply & sanitation projects (WSSP) in Ethiopia. This was done through literature review and questionnaire survey key informant interview administered to the above-mentioned project parties working on water supply project in Ethiopia with special case of 15 towns WSSP. RII was calculated for 74 listed causes of projects delay, 9 effects of delays and 23 key informant interview questions. The causes and effects of delay factors were then ranked based on their RII values. Based on degree of significance, degree of severity and degree of impact rankings. the top ten. most critical factors of delay in the 15 towns WSS construction Project of Ethiopia were found by the study they are: material import delay, ineffective planning & scheduling of project, slow decision making, inefficient site management & supervision, financial difficulties, delay in progress payment, tendency in awarding contract to lowest bidder, poor contract management of owners, late in reviewing & approving of design documents and slow mobilization of equipment. Moreover, it identified the following as the six most important effects of the 15 towns WSS construction project delays in Ethiopia; time overrun, cost overrun, dispute, arbitration, litigation & total termination ranked in their order of occurrence.

The results will help project managers and policymakers to consider the effects of these delays during project implementation and hopefully improve the efficiency of project management and contract administration in Ethiopian construction sectors. It will also provide academicians i and other experts in the water supply construction to farther investigate delay causes in the construction industries in Ethiopia.

5.3. Recommendations

The objective of this paper was targeted in identifying the root causes of delay for water supply projects in Ethiopia with special emphasis on 15 towns water supply & sanitation projects. Taking into account of importer delay and time overrun as the major factor in these fifteen town projects of Ethiopia, the following recommendations have been drawn here below for water supply policy makers, construction industry activists, related practitioners and their clients in the area.

5.3.1. As concluded and indicated above effective planning and scheduling is the first very important value of recommendation in this research paper.

5.3.2. The next most important value of recommendation rests on the proper site management and supervision skills.

5.3.3. The same recommendation will goes to the capacity of having foreign currencies in importing construction materials on time and due time.

5.3.4. Timely decision making practice by the owners, providing appropriate material , avoiding mistakes & discrepancies in drawings, contractors need to have enough capital, efficient Procurement of water supply materials, 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 of recommendation in this research.

5.3.5. In addition to the factors deduced from key informants, handling over the project site as per the schedule, facilitating access roads to the project site by settling every claims of the community, avoiding awards of all contract components to a single contractor beyond its capacity need to be considered as recommended.

5.3.6. Finally, similar studies have to be conducted with in this area of water and supply project construction using a large survey and with a better expert coalition for a better reliability and valid conclusion of importance. This study can give a clue for farther look at the identified causes and effects followed in formulating policies or updating the existing policy to the extent of

maintaining truck records of contractors and consultants for the water sector. Specially for urban towns water supply and sanitation projects. As long as ‘water is life” and a base for any economic, social and political stability and growth of the country the scholars and experts with in the water sector and construction sector must give considerable attention for the above cause and effects findings ranked from one to ten both in terms their degree of significance and severity.

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Appendix I: Research Questionnaire

Questioner Organization _____

Dear participants,

This questionnaire was prepared to obtain information from key informants with semi-structured questions. The information was required for the academic research entitled "Causes for the delay of water supply and sanitation projects in Ethiopia, the case of 15 towns water supply & sanitation project"

It is going to be conducted as partial fulfillment of MA in project management. The main objective of this research was to identify the main causes (factors) that lead to delay and the effects /Consequences/ this delay has on the achievements of the water supply & sanitation projects. Your response, in this regard, is highly valuable input to the outcome of the research. All information obtained will be kept strictly confidential, and will be utilized only for this academic research purpose. This study examines the cause & effect of delay in water supply & sanitation projects and give more emphasis on the perceptions of contractors, consultants & project owner towards the causes of delays and the effects resulted.

I thank you for taking your valuable time

With best Regards,

Alemayehu Takele

St. Mary University March, 2020

Contact address: Mobile: 0911-33-34-33

Email: alemayehut2013@gmail.com

Part I: GENERAL INFORMATION

Please specify the choice that belong to you below, please tick (X) in the box provided.

1. Please specify your gender: Male ☐ Female ☐
2. Age category: ☐ 18-30 ☐ 30-40 ☐ 41-50 ☐ Above 50
3. The level of education: ☐ Diploma ☐ First Degree ☐ Master Degree ☐ PhD ☐
4. Your area of proficiency

   ☐ Civil Engineer ☐ Project management ☐ Water Supply Engineer ☐ Hydrologist ☐ conomics ☐ Sociology ☐ Environmentalist ☐ Procurement Specialist ☐

   Any other_____
5. Service year (experience) in water supply project construction work

   ☐ Under 5 year ☐ 6-10 years ☐ 11-15 years ☐ 16-20 years ☐ Above 20
6. Marital status: ☐ Single ☐ Married ☐ Divorce

Part II during the construction period, which of the following factors you think contribute to delays in the project?

Please, tick in the appropriate columns to indicate how much you agree that the following being the causes for delays in water supply & sanitation projects. And also put a tick mark to show the degree of severity of the delay causes. Each scale represents the following;

SA= strongly agree (5), MA= Moderately agree (4), SLA= Slightly agree (3), NAND= Neither Agree nor Disagree (2), DA= Disagree (1)

E=Extreme (4), G=Great(3), M=Moderate(2), L=Little(1)

	Degree of Significance					Degree of Severity			
Project related	DA (1)	NAND (2)	SLA (3)	MA (4)	SA (5)	E (4)	G (3)	M (2)	L (1)
1. Inadequate Contract duration									
2. Complexity of the project									
3. Unfavorable contract clauses									
4. Improper contract formulation									
5. Tendency in awarding the contracts to lowest bidder									
Consultant related									
1.Lack of experience in water supply projects									
Project related									
1. Inadequate Contract duration									
2.Conflicts between consultant and design engineer									
3.In accurate site investigation									
4. Late in reviewing and approving design documents									
5. Poor communication and coordination with other parties									
6. Delay in approval of shop drawings and samples									
7. Delay in inspection and testing of works									
8. Inadequate application of Liquidated damages									
Others if any									
Owners related factors									
1. Delay in progress payments by owner									
2.Delay in handing over the site to the contractor									
3.Too many change orders									
4.Poor contract management of owner									
5.Slow decision making									
6.Lack of experience in projects									
7.Delay in approving design documents									

8. Poor communication and coordination with other parties									
	DA (1)	NAND (2)	SLA (3)	MA (4)	SA (5)	E (4)	G (3)	M (2)	L (1)
9. Suspension of work by owner									
Others if any									
Contractor related									
1. financial difficulties (shortage)									
2. Mistakes during construction and rework									
3. Shortage of project staff									
4. Poor coordination/ communication									
5. Ineffective planning and scheduling of project									
6. Improper construction methods									
7.Inadequate contractor experience									
8.Obsolate technology									
9.Poor site management & supervision									
10. Delays in sub contractors' work									
11 Insufficient delegation of power to the site									
Others if any									
Design related									
1. Delays in producing construction drawings									
2. Unclear and inadequate details in drawings									
3. Mistakes and discrepancies in drawings and BOQ									
4. Complexity of project design									
5. Design change by owner									
6. Inadequate specifications for materials									
7.Misunderstanding of owner's requirements by design engineers									
Others if any									
Materials related									
1. Shortage of construction materials									

2. Material import delays (Pipes, fittings etc.)									
	DA (1)	NAND (2)	SLA (3)	MA (4)	SA (5)	E (4)	G (3)	M (2)	L (1)
3.Changes in material types and specifications									
4. Escalation of material prices									
5. Rejection of imported materials									
6.Poor procurement of water supply materials									
7.Poor quality of water supply materials									
Others if any									
Equipment related									
1. Equipment breakdowns									
2. Shortage of equipment and hiring delays									
3. Low productivity of equipment									
4. Slow mobilization of equipment									
5.Improper equipment									
6.Low efficiency of equipment									
Others if any									
Labor related factors									
1. Shortage of labor									
2.Labor union actions									
3.Absenteeism									
4.Low motivation and morale of labor									
5.Slow mobilization of labor									
6.Unqualified/inadequate experienced labor									
Others if any									
External factors									
1. Inclement weather conditions									
2.Delay in obtaining permits services etc.									
3.Conflict, war, and public enemy									
4. Changes in government regulations and laws									

	DA (1)	NAND (2)	SLA (3)	MA (4)	SA (5)	E (4)	G (3)	M (2)	L (1)
5.Delay in providing services from utilities (such as telephone, electricity)									
6.Natural disasters (flood, hurricane, earthquake)									
7.Price fluctuations									
8.Unexpected surface and subsurface conditions (such as soil, gw table)									
Others if any									
5.Delay in providing services from utilities (such as telephone, electricity)									
6.Natural disasters (flood, hurricane, earthquake)									
7.Price fluctuations									
6.Natural disasters (flood, hurricane, earthquake)									
7.Price fluctuations									

Part III: During construction which of the following effects or consequences would you expect due todelays in construction?

Please indicate the significance of each effects by ticking the appropriate boxes. You can add any other effects if you think are significant.

HS= Highly significant (5), MS= Moderately significant (4), SS= Slightly significant (3), NS= Not Significant (2), IR= Irrelevant (1)

Effects due to Delays

	HS (5)	MS (4)	SS (3)	NS (2)	ER (1)
1.Time overrun					
2.Cost overrun					
3. Dispute					
4.Arbitration					
5. Litigation					
6. Total termination					
7. Funding difficulties					
8.Delay in commissioning other related projects					
9.Develop unfair relationships with other organizations such as MoWIE, WRDF, RWB, DPs etc.					

Part IV: Key informant interview

Project implementing unit (PIU)

1. What are the main challenges during the construction of 15 towns water supply & Sanitation?

_____

_____

_____

2. What are the critical causes of construction delay in Ethiopia in general & in 15 towns water supply & sanitation project in particular?

_____

_____

_____

_____

3. What are the effects encountered due to the delays of the project in terms of stake holders (contractors, Consultants & project owners)?

_____

_____

_____

_____

Water supply & Sanitation projects contractors

4. Do you have experience in constructions of water supply & sanitation projects?

Y Yes ☐ No ☐

5. How many projects?

2projects ☐ 3 – 5projects ☐ 6 – 8projects ☐ more than 8 projects ☐

6. Have you accomplished your project as per the schedule? If no what are the causes?

_____

_____.

_____

_____

_____

_____

7. How do you explain the causes of delay in 15 towns water supply & sanitation project?

._____

_____

_____

8.What do you think of the effects caused by the delay of the project?

_____

_____

_____

Water supply & Sanitation projects Consultant

9. Do you have experience in consulting of water supply & sanitation projects?

Yes ☐ No ☐

10. How many projects?

2projects ☐ 3 – 5projects ☐ – 8projects more than 8 projects ☐

11. Have you accomplished your project as per the schedule? If no what are the causes?

_____

_____

_____

_____

12. What are the main causes of delay in 15 towns water supply & sanitation project?

_____

_____

_____

_____

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

_____

_____

_____

_____

15 towns water supply & sanitation project owner(client)

14. Do you have experience in implementing water supply & sanitation projects?

Yes ☐ No ☐

15. How many projects?

2projects ☐ 3 – 5projects ☐ 5 – 8projects ☐ more than 8 projects ☐

16. Have you accomplished your project as per the schedule? If no what are the causes?

_____

_____

_____

_____

17. How do you explain the construction delay of the project?

_____

_____

_____

_____

18. What are the problems resulted from the delay of the project?

_____

_____

_____

_____

Project financing body (Ministry of Water, Irrigation & Energy (MoWIE), Water Resources Development Fund (WRDF)

19. Do you have experience in implementing water supply & sanitation projects?

Yes ☐ No ☐

20. How many projects?

2projects ☐ 3 – 5projects ☐ 6 – 8projects ☐ more than 8 projects ☐

21. Have you accomplished your project as per the schedule? If no what are the causes?

_____

_____

_____

_____

22. What main causes are identified for the delay of 15 towns water supply & sanitation project?

_____

_____

_____
_____

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

_____
_____
_____
_____

24. What would be the possible solution to be done in order to avoid delays in water supply & sanitation project construction?

_____
_____
_____