Causes and Consequences of Completion Time Delay of Urban Water Supply Projects: In the Case of Kafa Zone, Southwestern Ethiopia

A Thesis Submitted to Jimma University, School of Graduate Studies, College of Business and Economics, Department of Accounting and Finance in Partial Fulfillment of the Requirements for the Master of Arts (MA) Degree in Project Management and Finance

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College of Business and Economics

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June, 2024

Jimma, Ethiopia

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Under the Guidance of

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And

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June, 2024

Jimma Ethiopia

DECLARATIONS

This is to certify that the thesis was prepared by Kibralem Wodajo Mekuria entitled: ***Causes and Consequences of Completion Time Delay of Urban Water Supply Projects,*** in partial fulfillment of the requirements for the Degree of Master of Art in Project Management and Finance, complies with the regulation of the university and meets the accepted standards with respect to originality and quality. I also declare that this work is my original work and it has not been submitted partially or in full requirement by any other person for any award of a degree in any other university or institution.

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DEPARTMENT OF ACCOUNTING AND FINANCE

Thesis On: ***Causes and Consequences of Completion Time Delay of Urban Water Supply Projects: In the Case of Kafa Zone, Southwestern Ethiopia***

APPROVED BY BOARD OF EXAMINERS;

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External Examiner	**Signature**	**Date**

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ABSTRACT

Nowadays, completion time delay of water project is common problems in our country and other developing countries. With regard to this the delay of urban water supply projects in Kafa zone is also common problem. Due to this, the current study was conducted in order to identify the causes and consequences of delay and to provide recommendation. In order to achieve the objectives of the study, explanatory research design with mixed research approach was used in this study. To get appropriate data, 47 respondents were selected by purposive sampling techniques. The data for this study were collected by questionnaire, interview and document analysis and, finally analyzed both quantitatively and qualitatively depending up on the nature of data. Based on the finding of the study, the average delay extent of urban water supply projects in the study area were 372%. In relation to the causes of delay, the most significant causes for delay of those projects were; inconstancy of the price of construction materials, unrealistic contract duration, improper project feasibility study, ineffective planning and scheduling by contractor and lack of particular material accessibility in market. Additionally, delay in approving design documents and decision-making process, referral of bid to the lowest price, poor contract management, poor procurement programming of material and unexpected geological and weather conditions plays a great role in affecting completion time of water supply projects. Then, the delay of those projects was leads to the different consequences. So, the main consequences were; time and cost overrun, reduced profit or total loss and, extended site and general overhead expenses, dissatisfaction by project owners and consequently by end-users, public grievances were high due to delay of the project and late service delivery, arbitration, create stress on stakeholders, bad public relation and mistrust of the client (government) by the people and quality problems on the constructed project. In addition, challenges in providing clean water access to the community, bad public - government relationship and raise issue of good governance, loss of competitive advantage and market share to contractors and negative impact on the contractor's reputation were the other consequences of delay of those projects. In generally, this all causes and consequences of completion time delay of projects are more or less related to the project management system of those projects. Therefore, in order to complete the projects with in planned time and to avoid unnecessary delay, effective project management system should have to be implemented.

Key words; Projects, Water, Causes, Consequences, Urban, Kafa Zone

ACRONYMS AND ABBREVIATIONS

BTMO	Bonga Town Municipality Office
BTWSS	Bonga Town Water Supply Services
CSA	Central Statistics Agency
EGIA	Ethiopian Geospatial Information Agency
FI	Frequency Index
KZPCD	Kafa Zone Plan Commission Department
KZWMED	Kafa Zone Water Mine and Energy Department
LC	Letters of Credit
NWCO	National WASH Coordination Office
OWNP	One WASH National Program
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
SI	Severity Index
SPSS	Statistical Package for Social Science
RII	Relative Importance Index
USA	United States of America
UAE	United Arab Emirates
WASH	Water Supply Sanitation & Hygiene

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CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

A project is complex, non-routine, one-time effort limited by time, budget, resources, and performance specifications design to meet customer needs (Gray, C.F. and Larson, E. W., 2008). So, the successful completion of project is utmost importance to both the sponsors as well as the intended beneficiaries as it helps to realize the intended benefits and alleviate the suffering of the beneficiary community. The performance and success of projects are measured by the triple project constraints (Cost, time, and quality). And it is commonly acknowledged as successful, when it is completed on schedule, within budget and within the agreed quality, in compliance to the specifications and to stakeholders‟ satisfaction (Assaf& Al-Hejji, 2006).

However, based on different literatures, 52.7% of projects were not able to complete on time and over cost, and 31.1% not fulfilled the scope (Belay, 2017). Delays in a construction project is counted as a common problem and became a cause for projects completion with huge cost overrun (requiring higher budget than estimated), extended completion time, inferior quality deliverables and contract termination (Derege, 2021). According to Faridi et al. (2006) delays have impact on success project in its cost, time, safety and quality. In addition, delay might happen alongside other delays, and all of them may have an impact on the project's completion schedule (M. Jackson, 2005). And it can lead to overruns in time and costs, disputes, court proceedings, poor quality, deliveries, and ultimate abandonment (Sambasivan and Soon, 2007).

According to Rajakumar (2016), cost and time overruns due to delay of projects are common in developing countries and, impacts more for developing countries than developed once. Ethiopia is one of developing country where its construction sector is affected by cost and time overrun (Derege 2021). Ethiopian News Agency (2018), reported that Ethiopian Construction Project Management Institute found that completion of the projects within time frame and budget become increasingly difficult due to lack of effective construction management capacity. According to Ethiopian Construction Project Management Institute (2018), projects budget and time overrun reached 76% and 124% respectively.

From different types of construction projects, water supply projects in Ethiopian are victims of this problem (Derege 2021). 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).

In Ethiopian construction practice, it is very rare that water supply scheme construction projects are completed on the time specified or agreed upon. Despite lack of empirical evidences specific to the sector, the water supply construction projects are also suffering from a massive delay (Derege 2021). The same holds true in Ethiopian One WASH National Program. I.e., water supply construction in medium town are suffered in delay or in some cases suffered suspension or abandonment. Out of 20 medium town water supply projects, only three completed with a delay of 200 – 270% (National WASH Coordination Office, 2019).

The major factors that contributed to implementation delays of medium town water supply construction project of the program are high cost escalation and the complexity of urban water schemes that require large quantities of imported goods such as electromechanical equipment, steel casings, pipes and fittings (NWCO, 2019).

With regard to this, completion time delay of urban water supply projects in Kafa zone is common problems. Even if, water supply projects play a critical role in ensuring the availability of clean and safe water to communities, these projects often face challenges in meeting their completion timelines, resulting in significant delays. Understanding the causes and consequences of completion time delays in urban water supply projects is essential for effective planning, management, and mitigation of such issues.

By bearing in mind, this problem of completion time delay of urban water supply projects in Kafa zone, the current study is intended to identify the major causes and consequences of completion time delay of water supply projects and provide recommendations.

1.2. Statement of the Problem

In order to solve a given problems of the community and to promote the social-economic well-being of the society different types of projects are implemented by different bodies. Among those projects urban water supply project is one. With regard to this, Ethiopia has been implementing various urban water supply projects to improve access to clean and reliable water for its growing urban population. However, the main problems while implementing those projects is delay in completion time. According to Aibinu and Jagboro, (2002), 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.

In relation to the delay of projects, there are a lot of research were done to examine the causes of delays and their effects on construction projects in generally. However, with regard to the completion time delay of water projects, few studies were done. Among those some of them are; Lielti et al. (2023); Teketel, (2018); Ndungu, (2014); and Innocent, et al. (2019). According to the finding of those studies the main causes for delay of water projects were design errors and changes, shortage of construction materials, adverse weather condition, delay in approval of documents, contractor's capacity, costs estimation and projects funding policies and, these leads to time and cost overruns. One important thing here is, all of the above-mentioned study were done by quantitative approach and they were not regarded qualitative data. However, all the important data may not be quantified and qualitative data are important and increase the validity of the study.

Furthermore, in the study area the completion time delay of water supply project is the common problem. Due to fast growth rate of urban population and increased needs for clean water, different water projects were ongoing in the different towns of Kafa zone. However, they are not completed within estimated time. According to the Central Statistics Agency, the urban population growth rate in Kafa zone in last 15 years was 3.6% (CSA, 2023). Consequently, due to this fast population growth rate, the need for clean water supply is increasing directly. But, the current the coverage of urban clean water supply in Kafa zone is 56.09% (KZPCD, 2023). Due to this minimum level clean water supply, different water supply projects are launched in the different towns in order to fulfill the growing need of the population and to reduce the supply and demand gap of clean water. However, those projects were not completed with the expected time and did not solve the problem of water supply shortage of the towns.

In generally, this all implies that, as there were the problems in completing the water supply projects with in estimated time, and it is obvious that, the delay in completion time of projects has their own consequences. Since, the issue of delay in projects are common, and delays can be reduced when

their causes are identified and analyzed. But in the study are even if, there is completion time delays in water supply projects, there is no studies done, in order to identify cause and consequences of delay, and to provide recommendation to solve the problems. By taking into consideration this, the current study was done to identify the causes and consequences of completion time delay of water supply projects by applying mixed research approach in order to get both detail qualitative and quantitative data, and finally to provide recommendations in order to solve the problems.

1.3. Objective of the Study

1.3.1. General objective of the study

The main aim of the study is to assess the causes and consequences of completion time delay of urban water supply projects in Kafa zone.

1.3.2. Specific objectives

Specifically, the study is designed;

1. To analyze the delay extent of urban water supply projects in the study area.

2. To identify the main causes for the completion time delay of urban water supply projects in the study area.

3. To identify the consequences of completion time delay of urban water supply projects in the study area.

1.4. Research Questions

1. How long the water supply projects delay from their planned time in the study area?

2. What are the main causes for completion time delay of water supply projects in the study area?

3. What are the major consequences of completion time of water supply projects in the study area?

1.5. Significance of the Study

Beyond its academic requirement, this study may have its own significance for different bodies. It may show way to the stakeholders in those projects to develop different methods to reduce further delaying of the projects. In addition, understanding the causes of completion time delays in water supply projects is crucial for improving project management practices. So, this study may give an indication by identifying the specific factors contributing to delays, and project managers can take proactive measures to mitigate risks and enhance project efficiency. Delays in completing these projects can negatively impact communities, leading to prolonged water scarcity or reliance on unsafe water sources. So, by studying the consequences of completion time delays, the study may contribute in creation of awareness on the stakeholders to recognize the social, economic, and health implications, and work towards improving service delivery to communities. And finally, the study is hoped to provide the necessary information to the concerned bodies, and other researchers.

1.6. Scope of the Study

The study was conducted in Kafa zone, particularly, in the different administrative towns, where delayed water supply projects were obtained. It focused on the identifying and analyzing causes and consequences of delayed water supply projects. Temporally, it was conducted from February, 2024 up to May, 2024. And, methodologically it was designed to carry out through mixed research approach.

1.7. Limitations of the Study

Most of time while conducting research, facing different challenges is obvious. So, throughout conducting this study the researcher was faced different challenges. However, the researcher has tried to solve these challenges in order to achieve the objectives of the study. From the challenges, the major one was, the willingness of participants to answer the research question was less. But, in order to encourage respondents to answer the question, the researcher was made tactful and smooth approach with them and clearly explained the purpose of the study and confidentiality of the information.

1.8. Organization of the Paper

The thesis paper was organized in five chapters. The first chapter deals with background of the study, statement of the problem, objectives, research questions, significances, scope and limitation of the study. The second chapter deals with the review of related literatures; the third chapter contains description of the study area and methodology of the study. The fourth chapter was contained the result and discussion of the study. And, finally the last chapter five; deals with conclusion and recommendation of the study.

CHAPTER TWO

2. REVIEW LITERATURE

2.1. Concepts and Definitions

2.1.1. Projects

Different scholars and institutions define the concepts of project in the different times. However, almost all definitions are relatively similar. According to Project Management Institute (2000; 2013) project is a temporary endeavor undertaken to create a unique product, service, or results. A project is defined as a complex, non- routine, one- time effort limited by time, budget, resources and performance specifications designed to meet customer needs (Gray, and Larson, 2008). Lester (2006) defined a project as unique set of coordinated activities, with definite starting and finishing points, undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters. A project is an investment activity encompassing a current or future outlay of funds in the expectation of futuristic benefits (Chandra, 2010). A project is said to be temporary because it has got the start and finish time where temporarily it does not necessary for project to take few period of time it may range several years. The end of the project can be either of the following situation; Project objectives are met, Project objectives will not be met or can't be met, client wishes to terminate the project or Project is no longer needed.

2.1.2. Delays of Projects

Definition of delay stated by various scholars in different ways. Assaf and Al-Hejji (2006) defined construction delay as the time over run either beyond completion date specified in a contract or beyond the date that parties agree upon for delivery of a project . It is slipping over its planned schedule and is considered as common problem in construction projects. Delay was also defined as an "act event which extends required time to perform or complete works of the contract manifests itself as additional days of work" by Zack (2003). Similarly, Pickavance, (2005) defined delay as referred in construction is the prolonged construction period beyond the date specified in the contract or beyond the date that the parties agreed up on for the delivery of the project. So, in generally, delays can be defined as vents or occurrences that affect the time required to complete a particular task. It has an impact on critical activities which need a more detailed analysis to determine whether additional time extension is warranted or not.

2.2. Theoretical Literature Review

Sekaran (2010) termed the theoretical review as a logically developed, described and elaborated network of associations among the variables believed relevant to the problem situation identified.

It describe theories that attempt to explain the research problem under investigation focusing on specific variables being sought. Different theories were developed to guide the understanding of several research questions in doubt. This study was done in reference to the following theories namely Project management theory, Agency theory and financial distress theory.

2.2.1. Project Management Theory

The Project Management Institute (2000; 2013) describe elements of control known as the Project Management Body of Knowledge Areas (PMBOK). They entail the guidelines for managing projects and define project management related concept, also describe the project management life cycle and its related processes. It is accepted as general theory and can be used in many projects of different fields. The theory covers crucial issues in project management and divides those issues into ten knowledge areas. Susilo et al., (2007) elaborated further that these knowledge areas are derived from best practice in project study cases and can be considered as the most important elements in project management.

Morris (2001) argued that although each knowledge area consist of number of processes some differences in detail of the project management knowledge area across various project types varies e.g. success criteria, requirement management, information management, and performance management. This study adopted the PMBOK to investigate and analyze potential factors that are likely to cause project delay.

2.2.2. Agency Theory

The owner of a project is the person or group that provides the financial resources for its delivery, accepts the project milestones, and project completion (PMI, 2000; 2013). Normally a project owner/principal hires a contractor/agent to execute all the activities required to accomplish a project. Turner and Müller (2004) argued, the responsibility of project success lies on the hands of project owners who holds the business case however, undertaking of all activities pertaining to a particular project are delegated to contractors. Eisenhardt (1989), narrated that Agency theory developed in positivist and principal – agent relationship sharing a common unit of analysis that is contract.

2.2.2.1. Positivist Perspective

Eisenhardt (1989) argued, in positivist the focus is on identifying the situations that are likely for principal and agent to have conflicts and describe the mechanisms that limit the tendency of agents to have self-serving behavior.

2.2.2.2. Principal – Agent Relationship

Eisenhardt (1989), For this model between the two parts the focus is on determining the optimal contract (behavior versus outcome), the model assumes goal conflict between principal and agent, an easily measured outcome, and an agent who is more risk averse than the principal. This model can be described easily by the following cases; first, if the principal has a complete information on agent's doings then a contract that is based on behavior is more favorable. Second case, given the self-interest of agent and if the principal does not know what exactly the agent has done whether agent acted or not acted according to the agreed terms. If agent violate the agreed term then agency problems arise due to two parts having different goals and the principal is not sure/believe whether the agent has done as agreed and forming so called information asymmetry.

Ceric (2012) suggest that Information asymmetry can be hidden characteristics, hidden information and hidden intention in turn they generate three risks which are adverse selection (misrepresentation of ability/skills by the agent), moral hazard(lack of effort on the part of the agent) and hold-up respectively. Eisenhardt (1989) argued further information systems such as budgeting systems, reporting procedures, board of directors, additional layers of management can be invented to reveal agents' behavior to the management so as to have a complete information. Turner and Müller (2004) argues also this theory addresses the way project owner and agent communicate in their principal – agent relationship and contract complications associated by information asymmetry.

2.2.3. Financial Distress Theory

Beaver et al., (2011) defined financial distress as inability of a company to pay its financial obligations as they mature and argued further, in the stakeholder perspective it is important to asses likelihood of financial distress since it determine the payout distribution associated with their particular investment.

Brigham and Earnhardt (2013) argued, intrinsic value of a company is the present value of its expected future free cash flows. There exist the value that may decline these future cash flows including general economic conditions, industry trends, and company-specific problems suchas shifting consumer tastes, obsolescent technology, and changing demographics in existing retail locations.

The theory help to addresses the firm's financial capability to fund the projects, organizing and securing timely release of project funds to prevent unnecessary delays. Many organization

suffers project delays associated with financial problems such as late funding and poor estimation of budget, therefore this theory comes to help on elaborating the financial feasibility.

2.3. Empirical Literatures Review

2.3.1. Causes for Completion Time Delays of Water Projects

In this section most relevant empirical literatures from global to local scale on the Causes of completion time delay of construction projects in generally and particularly on the water supply projects are reviewed. So the major causes for delay of construction are more or less similar.

Delays happen in construction projects, but the magnitude of these delays vary from project to project. A number of researches have been conducted on the causes of construction delay worldwide. In preventing delays, the most effective solution that has been emphasized in the literature was to identify the main causes and then find solutions to mitigate the risk of their occurrence. The findings of these studies, conducted in different regions, indicate that criticality of the various causes might depend on the area where the project was carried out.

Mohammad soroush Tafazzoli et al. (2017) conducted a nationwide survey to assess the relative criticality of causes of delay in USA and the identified ten major causes of delay. These are excessive change order by the client during construction, time consuming decision making process of the owner during construction, design error, delay in approving design document by the owner, errors in contract document, unrealistic schedule, delay in getting permits and acquisitions, complexities and ambiguities of project design, poor communications of the owner with the other parties and delay in providing the design document by the designer.

In Egypt, Mohamed M. Marzouk and Tarek I. El-Rasas (2014) conducted a research through interview and questionnaire survey and the top ten delay causes of construction projects in Egypt determined are ineffective planning and scheduling of project, difficulties in financing project by contractor, variation orders/changes of scope by owner during construction, poor site management and supervision, type of project bidding and award (negotiation, lowest bidder), low productivity level of labors, effects of subsurface conditions (e.g., soil, high water table, etc.), unqualified workforce, shortage of construction materials in market, and delays in sub-contractors work.

In Tanzania, Valentine G.M. Luvara et al. (2018) conducted a research to determine factors causes delay and cost overruns in public building construction projects in Tanzania and delay in decision making, incomplete design and estimate at the time of tender, Improvement of standard drawing during construction stage and omission and errors in the bill of quantity were the top most severe factors with high severity index i.e. Above 70%.

In relation to completion time delay of water supply projects in our country and as well as in the different parts of the world different studies have been done by different researchers. Then, the cause for delay of those water projects are also more or less similar.

Shreyansh and Rajeev, (2023). Studied on the Delay Analysis in Water Supply Projects in India. According to their finding the most delaying factors are repeated in every project such as financial issues, shortage of material, labor, improper supervision, communication, real-time changes.

Hasibullah and Bhawna, (2021) was studied on the Causes of Delay on Bist Hazer Water Supply Construction Project, Kabul Afghanistan. The study takes an attempt to identify the causes and effects of delays in construction of medium scale water supply projects. Accordingly their finding indicate that inclement weather conditions, contractors' financial difficulties, shortage of labor, rules and regulations of road authorities, delays in sub contractors' work, material import delays and ineffective planning and scheduling of project.

In United Arab Emirates (UAE), Ghiasur Rehman conducted a survey research in Abu Dhabi. Based on the outcome of study the top ten reasons of delay are; lack of coordination with electro mechanical works, selection of lowest bidder commercially, Delay in approvals and late decision, Materials delivery delay, Client introduction of additional works during construction period, Inefficient planning and scheduling of the projects, Labor and equipment non productivity, Coordination issues and quality of works, delay in approvals by client and Original contact duration is not realistic.

In our country, in order to identify the Cause of Delay in Medium Town Water Supply Projects in the Case of Ethiopian One WASH National Program the study was done by Derege Mengistu, (2021). Then, the findings show that the main critical factors that cause construction delays in water supply project of One Nation Program in Ethiopia are: fluctuation of price/rising cost of material, late material supply, scarcity of material in the market, delay payment to the contractor, ineffective planning and scheduling, less emphasis to planning, client's finance shortage, unrealistic contract duration delay payment to the suppliers and subcontractors and underestimating the complexity of the project.

Bedru, (2023). Studied the causes of delays in sewerage and water projects in Addis Ababa water & sanitation infrastructure development division office. According to the findings of this study, the top six potential causes of sewerage construction project delays were right of way problem, difficulty in accessing Letters of credit/LC, delays in procurement management processes, delays

in getting permit s approval from municipalities, slow decision making, and slowness in decision making process.

Another study which was done by Fitsum Fanuel, (2021). On the factors influencing the completion time of water projects in Jimma town showed that the most affecting factors on project completion time are financing, market related factors, contract variation, monitoring, and physical and environmental factors. In addition; natural and manmade disasters (most importantly the current political instability) and project leadership, shortage of labor force, unrealistic deadline, and low relevance of the projects for the community (poor design) found to be factors affecting the project completion time.

According to Tsegay and Hanbin,(2017),the vital causes of delay in the Ethiopian construction project known and ranked are corruption, unavailability of utilities at site, inflation or price increases in supplies, not having worth materials, delayed design and design documents, sluggish delivery of materials, late in approving and receiving of complete project work, poor site management and performance, late discharge budget/ funds, and unsuccessful project planning and scheduling.

According to Mathiwos, (2018); the top ten factors causing delay of water supply construction project in Ethiopia were, adverse weather condition, delay in approval of documents, equipment failure, scarcity of materials in the market, poor supervision, poor site management, fluctuation of prices/rising cost of materials, change in subsurface conditions, slowness in decision making process and low skills of labor.

2.3.2. Consequences of Completion Time Delay of Projects

The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the Owner, Contractor and Consultant. Delay usually result in losses of one form or another for everyone. Murali et.al, (2007) studied the effects of construction delays on project construction industry. The six effects of delay identified were: Cost overrun, Time overrun, Dispute, Arbitration and Abandonment.

Sunjka, and U. Jacob, (2013) stated that poor quality completed projects and bad public relations are also the effects caused due to delay in construction projects in addition to the above six effects.

Cost, time, and quality have proven their importance as the primary success factors of a project. According to Ahmed, et al. (2002) delays on construction project is a universal phenomenon. They are usually accompanied by cost overruns. Delay has a negative effect on clients, contractors, and

consultants in terms of growth in adversarial relationships, mistrust, litigation, arbitration, and cash-flow problems. A project may be regarded as a successful endeavor until it satisfies the cost, time, and quality limitations applied to it. However, it is not uncommon to see a construction project failing to achieve its goal within the specified cost, time, and quality.

Biruk Zegeye (2008), studied Cause and Effects of Delay on Construction Projects in Addis Ababa. The effects of delay have been ranked according to the frequency of their occurrence and the result have showed that the three most frequently occur effects are time overrun, cost overrun and dispute. (Zegeye, 2008)

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. The six effects of delay that were identified includes: time overrun, cost overrun, dispute, arbitration, total abandonment and litigation. Koushki and Kartam (2004) concluded that time and cost overrun were the impact of the material selection time, their availability in the local market and the presence of the supervising engineer. Delays influence negatively on the contractors performance and contribute to adverse impacts in construction projects such as contract disputes, low productivity and increase in construction costs that will also influence on the pre-determined of construction project objectives. Similarly, Sambasivan et al. (2007) identified six most frequently observed effects of delays in his survey on causes and effects of delays in Malaysian construction industry. These were: (A) time over-run, (B) cost overrun, (C) disputes, (D) arbitration, (E) litigation, and (F) total abandonment.

A. Time Overrun

Murali et al., (2007) argued that contractor related factors and client related factors such as inadequate contractor experience and owner interference have impact on time overrun. On the other hand, Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. They identified time overrun as one of the major effects of delay.

B. Cost Overrun

Regarding cost overrun Koushki et al., (2005) identified three main causes that were contractor related problems, material-related problems, and owners6 financial constraints, whereas Wiguna and Scott (2005) identified the most critical factors included: high inflation/increased material price; design change by client; defective design; weather conditions; delayed payment on contracts and defective construction work.

C. Disputes

Disputes are the effects of major causes of delays in construction projects such as causes of Client related, Contractor related, Consultant related and external related that may be arisen during the construction projects among the project parties. Lack of communication may also leads to misunderstandings, conflicts and disputes. Hence it necessitates the project managers to have effective communication skills which are one of the significant soft skills (People skills) with the project parties involving in construction projects. Based on Murali et al., (2007)the factors such as lack of communication between the various parties, problem with neighbors, unforeseen site conditions, delay in payments for completed work, improper construction method, delay caused by the subcontractor and discrepancies in contract documents will give rise to disputes between the various parties. Furthermore, if the disputes cannot be solved amicably or easily it can lead to arbitration or litigation.

D. Arbitration

According to Murali et al., (2007) delays caused by either client or contractor related factors such as change order, delayed progress payment, contractor‘s non-performance and lack of communication between parties which may rise disputes will be settled through arbitration process. For these circumstances, it is necessitate having a competent third party that can settle the disputes amicably or easily without going to court.

E. Litigation

Based on Murali et al., (2007) when the delays caused by client related, contract related, labor related and external related factors such as delay in payment for completed works, problems with site conditions and less labor supply where eventually rise the disputes to be settled by the litigation process. The parties involved in the construction projects use litigation as a last alternative to settle the disputes.

F. Total Abandonment

The most critical adverse effect of delays in construction projects is abandonment that could be temporary or in worse condition for permanent duration. The major causes of client related, consultant related, contractor related and external related may lead to project abandonment that will lead to delays in construction projects. Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. They identified total abandonment as one of the major effects of delay.

2.3.3. Types of Completion Time Delays of Projects.

Different scholars classify completion time delay of projects based on the different criteria's. So, mostly they are classified based, source, compensability, nature and responsibility.

2.3.3.1. Types of Delays by Source

Construction delays are normally caused by either the contractual parties such as client, contractor and consultant or factors beyond the control of the parties or force majeure (Alhaji&Danladi, 2012).

Client

Delays are caused by the client's actions emanating from his need or inactions contrary to provisions stipulated in the contract. Examples include late payment to the contractor, change order, differing site condition, interference, late decision making, etc. In this case, the contractor will be entitled to claim for time extension and financial compensation (Alhaji&Danladi, 2012).

Contractor

Delays are also caused by the contractor's non-performance of activities due to his own problem or problems within his control which finally result in time overrun and cost overrun. Examples include inadequate experience, poor site management, problems related to subcontractors and suppliers, shortage of material, labor and finance, improper project planning, mistakes during construction, etc. In this case, the contractor will not be entitled to time extension and financial compensation, rather pay liquidated damage to the client (Alhaji & Danladi, 2012).

Consultant

In fact, delays may result from consultant problems which include design errors, late approval of tests and drawings, poor project administration etc. In this case, the contractor will be entitled to claim for time extension or/and financial compensation whereas the client will not be entitled to claim for liquidated damage as the consultant is the representative and within control of the client (Alhaji & Danladi, 2012).

Force Majeure

Delays are caused by force majeure, which are beyond the control and without the fault of the client or the contractor. Examples include the unforeseeable act of a third party for whom the contractor is not responsible, an official prohibition preventing the performance of the contract, a natural catastrophe such as an earthquake, flood, international or civil war and the death or a serious accident or unexpected serious illness of the contractor (Alhaji & Danladi, 2012).

2.3.3.2. Types of Delays by Compensation

Construction delay is classified into two major types of delay by compensability such as non-excusable (contractor-caused) delay and excusable delay. The excusable delay is further classified into compensable (client-caused) delay and non-compensable (force majeure-caused) delay as discussed hereunder (Alhaji & Danladi, 2012).

Non- Excusable Delays

Non-excusable delay is any delay caused by the contractor, his subcontractors or suppliers only. The contractor is responsible for the delay and the owner is entitled to claim any delays to the project as per the contract. The contractor gets neither a time extension nor financial compensation rather the client is entitled to liquidated damages or actual damages provided there is no liquidated damages clause in the contract. These delays include, for example, late commencement of work, poor site management, shortage of material, low productivity of labor, equipment failure, problems with sub-contractor etc. The contractor is generally not entitled to relief and must either make up the lost time through acceleration or compensate the owner. (Alhaji & Danladi, 2012).

Excusable Compensable Delays

Excusable compensable delay is caused by either the client or the consultant. The client is responsible for both the time and cost effect of the delay. Contactor gets both a time extension and financial compensation. Examples include failure to pay the contractor, the client's intervention with the work, change order, differing site condition, late decision making etc. (Alhaji & Danladi, 2012).

Excusable Non-Compensable Delays

Excusable non-compensable delays are caused by third party or force majeure. Contractor is normally entitled to a time extension but no compensation for delay damages. Examples include an official prohibition preventing the performance of the contract, a natural catastrophe such as an earthquake, lightning or flood, international or civil war and the death or a serious accident or unexpected serious illness of the contractor (Alhaji & Danladi, 2012).

2.3.3.3. Types of Delays by Nature

Construction delays are classified into three categories such as independent delay, serial delay and concurrent delay based on their time of occurrence (Arditi& Robinson, 1995; Stumpf, 2000).

Independent delays

An independent delay is defined as a particular delay occurring solely and without concurrency with other delays (Arditi&Robinson, 1995). Analyzing this type of delay is simple and the effect can be identified easily by imposing the delay on the project schedule, but independent delay may cause serial delays. Example is when a contractor fails to supply material solely.

Serial delays

Serial delay is a series of sequential, non-overlapping delays that are linked together (Arditi & Robinson, 1995; Stumpf, 2000). It is caused by the action or inaction of one of the parties (Raid et al., 1991). Measuring the impact of serial delays is comparatively simple as none of the individual delays interferes with one another. Example is when client fails to pay the contractor and then the contractor fails to supply material sequentially (Arditi & Robinson, 1995).

Concurrent delays

Concurrent delay is defined as two or more delays that occur at the same time, either of which would cause project delay (William et al, 2011). Concurrent delays can be caused by a combination of delays.

2.3.3.4. Types of delays by responsibility

Delay responsibilities are categorized in to client responsible, contractor responsible, neither party responsible, and both parties responsible so as to identify which party will be entitled for compensation as discussed hereunder (Ahmed et al. 2002).

Client Responsible

Such delays occur when the client is responsible for the occurrence of delay, then Contractor will be granted time extension and financial compensation and client will not be entitled to claim for liquidated or actual damages. Examples include change order, failure to pay the contractor, differing site condition etc. (Ahmed et al. 2002).

Contractor Responsible

Such delays occur when the contractor is responsible for the occurrence of delay, client will be entitled to claim for liquidated or actual damages. Contractor will not be granted time extension and financial compensation. Examples include failure to deliver material and equipment, low productivity of workers, failure of equipment etc. (Ahmed et al. 2002).

Neither Party (e.g. force majeure) Responsible

Such delays occur when a delay occurs due to force majeure, neither parties are responsible. However, Contractor will get time extension to complete the project but no financial compensation and client will not be entitled to claim for liquidated or actual damages. Examples include civil war, occurrence of a natural catastrophe such as earthquake, flood etc.(Ahmed et al. 2002).

Both Parties Responsible

Such delays occur when a delay occurs due to both parties concurrently, Contractor will get time extension to complete the project but no financial compensation and client will not be entitled to claim for liquidated or actual damages. Example include concurrent delays like contractor fails to supply material and the client fails to pay the contractor at the same time.

Many studies have investigated, among the main contractual parties, which one is the most responsible stakeholder for construction delays. Joseph, (2004) showed that in building construction projects in Botswana public sector, contractors were responsible for 48% of the total delay experienced on their projects while the employer or the government was responsible for 31% of the delays. The rest of the delays were due to force majeure. Ahmed et al. (2002) came up with the responsibility proportion for delays in Florida, and contractor was responsible for 44%, owner for the 24 %, government for the 14%, shared for the 12% and consultant for the 6% of the construction delays in Florida. Abdo, (2006) revealed that contractors are responsible for 38.5% of the causes of delays in public building projects of Ethiopia whereas consultants for the 25%,clients for the 18.2 %, government for the 9.1%, designers for the 4.6 %, and the rest 4.6 % shared by the stakeholders.

2.4. Conceptual Framework of the Study

Mugenda (2008), defined conceptual framework as the brief description of the phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study. After reviewing of different related literatures, the following conceptual framework was developed for this study. This conceptual framework helps to synthesize major variables and the relationships between them. As presented in conceptual framework, there are different causes for the completion time delay of water supply projects and, the delay of projects lead to the different consequences.

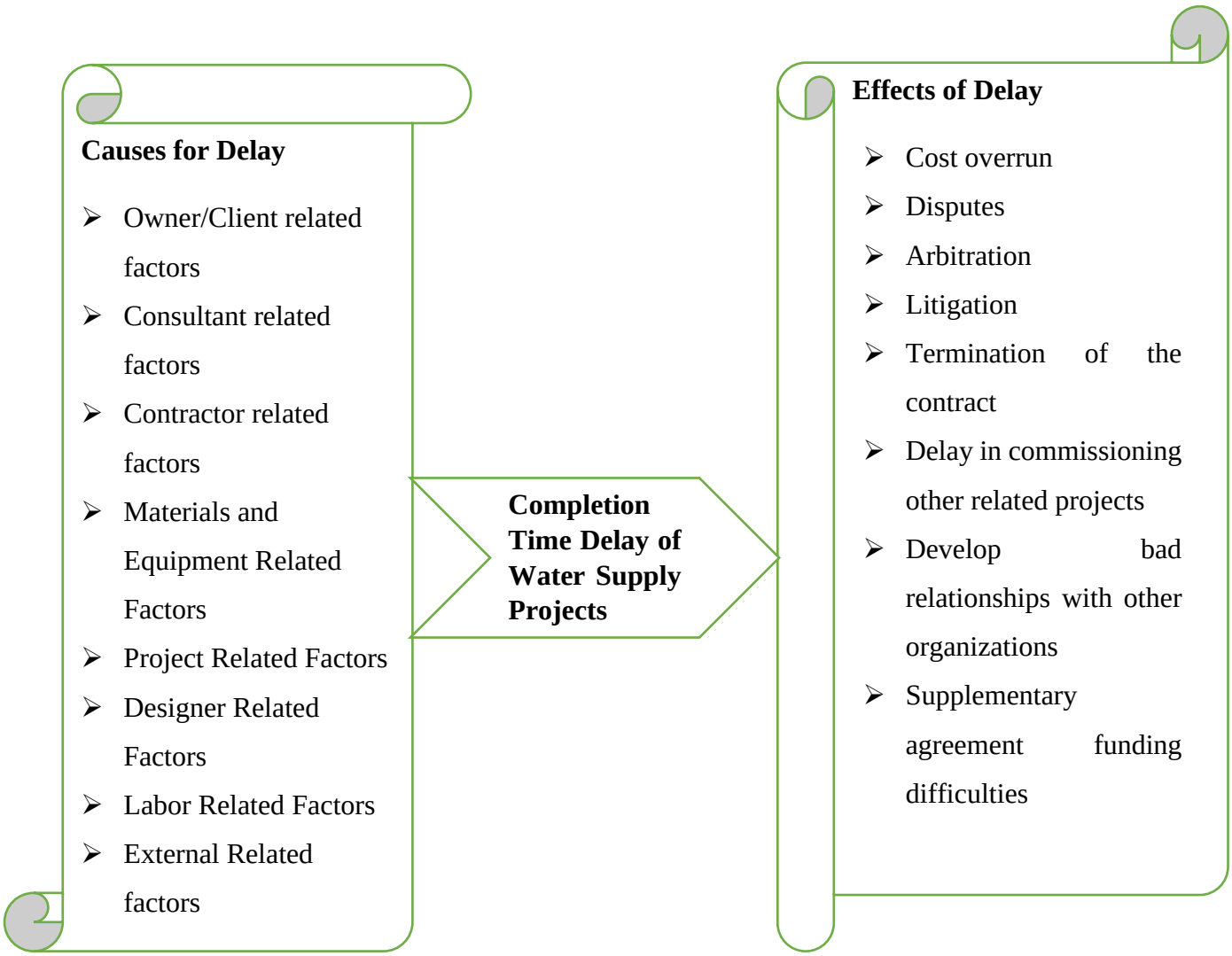


Figure 1: Conceptual Framework of the Study

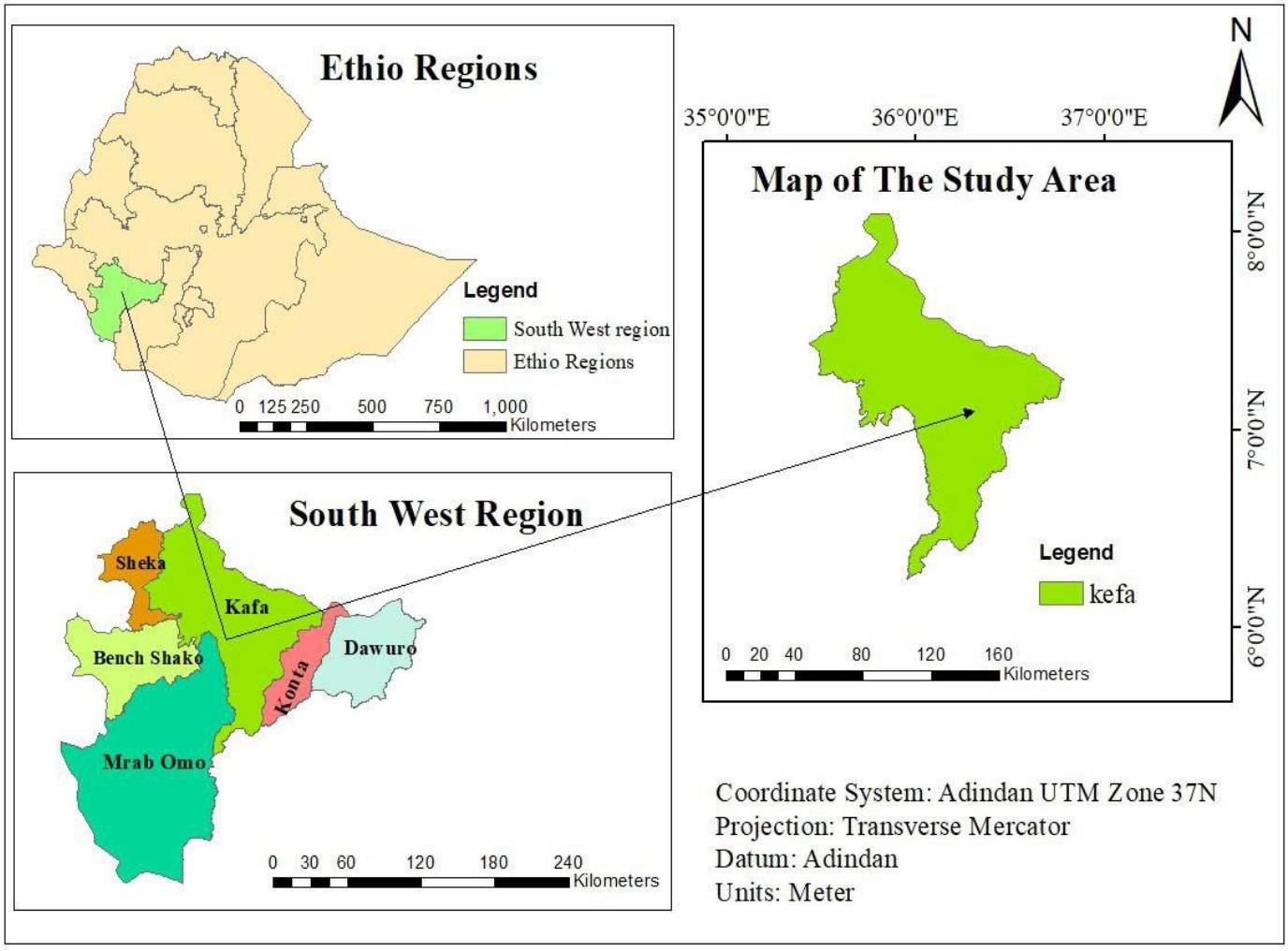
Source: The Author, After Reviewing Different Literature, (2024)

CHAPTER THREE

3. METHODOLOGY OF THE STUDY

3.1. Description of the Study Area

Kafa zone is one of zone which is located in South West Ethiopian Peoples' Regional state. It is located in 5°20′- 8°30′N and 34°50′-37°50′E coordinates. Relatively, it is located in south west of Jimma zone. The delayed water projects are located in some of towns of Kafa zone. These towns are Bonga, Awrada, Kaka, Boba Gecha, Bita, Nechit and Techib towns. So, the study was conducted under the administrative boundary of those towns. With regard to the population, nowadays the total population of Kafa zone is estimated above 1.4million (CSA, 2023).



Source: EGIA, (2023)

Figure 2**:** Map of the study area

3.2. Design and Approach of the study

A research design is a plan, structure and strategy of investigation so conceived as to obtain answers to the research questions or problems (Creswell, 2014). In order to achieve the objective of this study and, by taking into consideration the research questions and purposes, the research design which was used in this study is explanatory research design. So, this type of design was selected, to clearly identify and analyze the causes and consequences of completion time delay of urban water supply projects.

With regard to the research approach, mixed research approach was used in the current study. So, both qualitative and quantitative data collection and analysis methods were applied to answer research question. In the study both quantitative and qualitative data was collected simultaneously or at the same time and quantitative phase was given higher priority and qualitative data was used to support quantitative.

3.3. Types and Sources of Data

In order to achieve the objective of the study, both quantitative and qualitative types of data was collected from primary and secondary sources, for the purposes of analysis by different methods of data collection. The primary data are information gathered by the researcher firsthand. So, in the current study, they were collected from the participants of the study through questionnaire and interview. In addition to primary data, the secondary data, which are relevant and important for the purpose of analysis was collected from different sources like; from literatures, progress reports, contract documents and annual plan of the projects, books, articles, journals, and other research papers through document analysis or desk study.

3.4. Population and Sampling Design

In the study area, there are eight delayed urban water supply projects and the sample for this study was taken from the participant of those projects. Then, target populations of this study were stakeholders who have direct involvement in those delayed water supply projects like, (project owner/Kafa Zone Water Mine & Energy Department, contractors and engineers who are working in contractors' side and consultants in that water supply projects). Based on the information obtained from the project managers of those projects and the project owners, there are about 220 participants on these delayed water supply projects.

In order to identify the right sample, the participants in the study were identified from population by inclusion and exclusion criteria. So, the inclusion criteria was: Expert employees who have practical experience in the construction of water supply projects and, who were directly involving

in the implementation process of that water projects from each category (project owner, contractor, engineers and consultants). And, the Exclusion criteria was: Daily labor workers in cite works were excluded from the study purposively, since, they do not have full information about the project.

3.4.1. Sampling Technique and Sample Size

The sampling technique which is used in this study was purposive sampling technique. Purposive sampling is very suitable for such kind of research to answer the research questions and also to have the required information from the experts of water supply construction (contractors, consultants, project managers, and client's construction team members) with regard to the research objectives (Mugenda, 2003).

Through this purposive sampling technique, by taking into consideration the number of available experts on each party, forty seven (47) respondents, who were fulfilled the inclusion criteria, and directly participating in those delayed water projects and, have practical experience in the construction of water supply projects were selected from different categories. Then, the sizes of sample from each category were; from the clients sixteen (16), twenty two (22) from contractors and engineers, who are working in contractors' side and nine (9) from consultants in that water projects. So, their knowledge and experience help as a suitable to identify the causes and consequences completion time delay of those water projects.

3.5. Methods of Data Collection

In order to achieve the aim of the study and to get appropriate data for the analysis in this study different instrument of data collection were used. So, these method of data collections were questionnaire, interview and document analysis.

3.5.1. Questionnaire

In line with the objectives of investigation, a questionnaire was designed to get data from the respondents. Before designing the questionnaire, detail related review of literature were made in order to develop appropriate questions which imply the cause and consequences of completion time delay of water supply projects. Then after, the questionnaires were designed to evaluate the frequency of occurrence and degree of severity of the identified causes and consequences of completion time delay factors. The questions were intended to assess the opinion of different parties like; owners, contractors, engineers and consultants with regard to causes and consequences of completion time delay of the water project with closed ended questions in the form of likert scale.

3.5.2. Interview

The other data collection tool which was used in this study is key informant interviews. This method was used to obtain detailed information about causes and consequences of completion time delay of water supply projects and to increase the validity of the research instruments, by which this is one way to fill information gap that were not covered by other methods of data collection. So, in-depth interview was done with selected key informants from clients and contractors, and finally the interview with these respondents was structured and semi-structured.

3.5.3. Document Analysis

The official and unofficial documents which are relevant to the study were assessed in detail. Especially, document related to the water project like, contracts, amendments, performance reports and actual progress reports were reviewed to add-on information to questionnaire and interview.

3.6. Method of Data Analysis

The data that were collected through different methods was analyzed by quantitative and qualitative data analysis techniques depending up on the nature and types of data. The quantitative data that were collected through questionnaire was analyzed by quantitative data analysis techniques. The relative importance index (RII) was applied to analyze the causes and consequences of completion time delaying of water project quantitatively. Before implementation of relative importance index (RII), frequency index (FI) and severity index (SI) of the delaying factors were analyzed first. So, relative importance index (RII), frequency index (FI) and severity index (SI) was used in this study in order to analyze the data. During the analysis time, the factors were also ranked and five-point Likert scale was used to categorize the frequency of occurrence and severity. Then, the respondents forwarded their opinion; chance of occurrence: 1= very rarely 2= rarely 3= Sometimes 4= often 5 = usually and, for the degree of severity: 1= very low2= low 3= medium 4= high 5= very high and, finally relative importance index were analyzed.

Frequency index: An equation that is utilized to rank reasons for delay of completion time based on the frequency of occurrence as identified by the respondents.

$$\textbf{Frequency Index (FI \%)} = \sum_{i=1}^{5} \left(\frac{a_{if} * n_{if}}{5*N}\right) * 100$$

Severity index: An equation that is utilized to rank reasons for delay of completion time based on the severity as identified by the respondents.

$$\textbf{Severity index (SI \%)} = \sum_{i=1}^{5} \left(\frac{a_{is} * n_{is}}{5*N}\right) * 100$$

Where:

$\mathbf{a_{if}}$ **and** $\mathbf{a_{is}}$= Numbers of respondents who choose acertain frequency and severity respectively.

$\mathbf{n_{if}}$ **and** $\mathbf{n_{is}}$ **=** Degrees of frequency and severity respectively (1 or 2 or 3 or 4 or 5)

N = the total number of respondents

Finally, important index: The importance index of each cause is calculated as a function of both frequency and severity indices as follows:

Relative Importance Index (RII %) $= \left\lfloor \frac{FI(\%) * SI(\%)}{100} \right\rfloor$

Where, FI= Frequency index and, SI= Severity index

In order to process this all, Microsoft office Excel 2013 was used to undertake the calculations.

Furthermore, to the above quantitative data analysis techniques, qualitative data that were collected through interview was analyzed qualitatively, through direct quotation of the words of participants in the form of statement by grouping similar responses together.

And finally, findings were presented in the form of text, chart and table**.**

3.7. Reliability and Validity

The data were gathered through questionnaires were checked by Cronbach's alpha (α) coefficient for reliability or consistency. Cronbach's alpha is a measure of reliability of the data on a questionnaire and ranges from 0 to 1.0. It indicates the extent to which the respondents rate the same question. For example, if all respondents give same answer to all questions, the alpha for these questions would be 1.0. The minimum level for reliability when using Cronbach's alpha coefficient is 0.7 and any value below this indicates that the variables are inconsistent and unreliable (Fellows & Liu, 2007).

The validity of instrument content was done by using research expert who read the questionnaire and do necessary adjustments. This is to check the items included in the instruments can enable the researcher to obtain the relevant information or not. This was realized by seeking the advisors view on the contents of questionnaires. In addition to the advisors, senior colleagues were invited to provide their comments.

3.8. Ethical Considerations

Ethical issues were considered or taken as a key in this study. This enables the researcher to communicate easily with participants in the study. Before starting of data collection process, statements were explained clearly to those participants about the purpose of the study and procedure of the data collection process. The respondents were asked to participate voluntarily for their informed consent. They were also assured about the confidentiality of the information i.e., their identity, address, and name of participants through the interview and the questionnaires were kept and not passed to any individual and institutions. The responses given by them were used only for the purpose of this study. Throughout the research process, the researcher was neutral in collecting and interpreting the data.

CHAPTER FOUR

4. RESULT AND DISCUSSION

In this chapter the data that were collected through different methods from the participants of the study about the causes and consequences of completion time delay of urban water supply projects in Kafa zone was analyzed, interpreted, discussed and presented.

4.1. Background of Respondents

Before discussing major objectives of the study, it is quite necessary to explain the background of respondents. So, in the study first sought is to explain the background of respondents. With regard to this, the following table was to present the background of respondents.

Table 1.Background of respondents

Variables		**Frequency**	**Percent**
Sex of respondents	Male	37	88%
	Female	5	12%
	Total	**42**	**100%**
Educational background of respondents	Diploma	3	7.2%
	BA degree	28	66.6%
	MA/MSc	11	26.2%
	PhD		
	Total	**42**	**100%**
Working experiences of respondents in year	0_5	5	12%
	6_10	7	17%
	11_15	8	19%
	16_20	13	31%
	Above 21 Years	9	21%
	Total	**42**	**100%**

Source: Own survey, (2024)

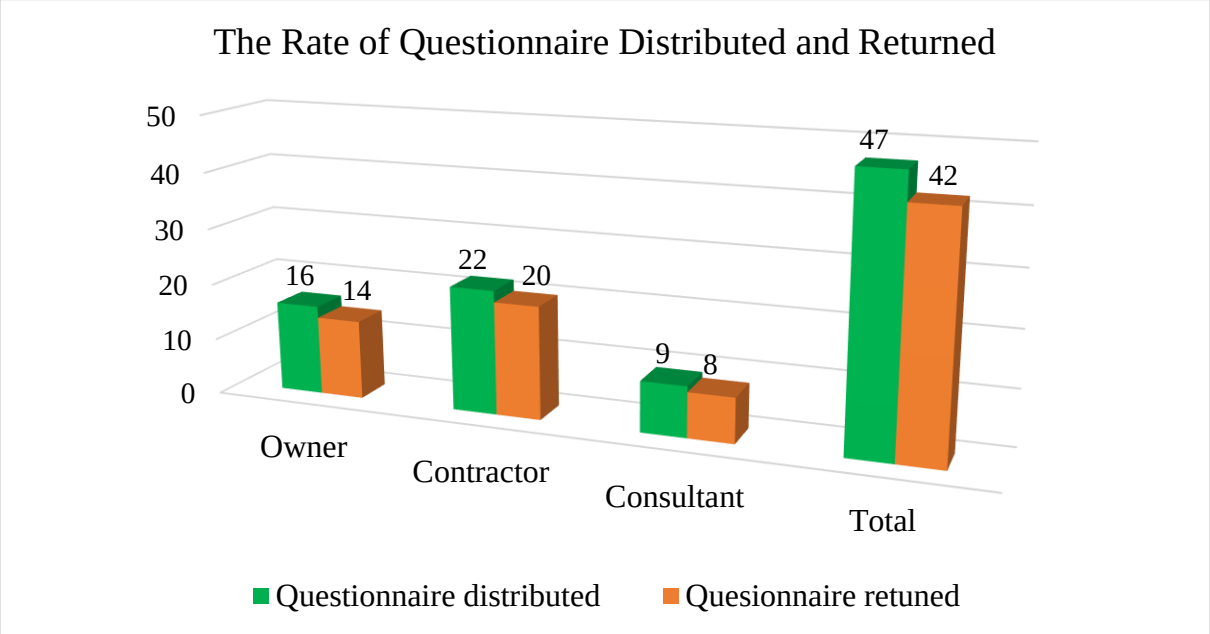
As indicated on the above table, from the total respondents about (88%) of respondents were male and the only remaining (12%) of respondents were female. So, this indicates that most of participants in water supply projects were male rather than female. With regard to educational background of respondents as shown on the above table, majority of respondents, which accounts about (66.6%) were first degree (BA) graduated. Whereas, about (26.2%) of respondents were MA/MSc graduate and the only remaining (7.2%) of respondents were diploma graduate. So, this

implies that most of participant in this study and water supply projects were more or less educated. In relation to working experiences of respondents in water supply construction projects, as it was depicted on the above table, the majority of respondents which accounts about (31%) have about (16-20 year) working experiences. Whereas, about (21%) of respondents have above 21 year working experiences. Furthermore, about (19% and 17%) of respondents have 11-15 year and 6-10 year working experiences respectively. The only 12% of respondents have below five year working experiences. This implies the majority of participants in water supply construction projects have good working experiences.

4.1.1. The Response Rate of Questionnaire

Total response rate is the number of sample respondents who answered the questionnaire divided by the total number of people in the sample. It is usually expressed in the form of a percentage (Fitsum, 2021). A low response rate can give rise to sampling bias. Evans SJ. Good surveys guide, stated that getting a high response rate above 80% from a small, random sample or judgmental sample is considered preferable to a low response rate from a large sample (Choung, et al., 2013).

So, with regard to this in the current study, out of total 47 questionnaire which were distributed; 16 to clients, 22 to contractors and 9 to consultants; 14(87.5%), 20(90.9%) and 8(88.8%) were returned respectively. So, the overall response rate of questionnaire is 42(89.3%) This implies that, the response rate is very good and the sample bias in the study is too low.



Sources: Own survey, (2024)

Figure 3. Questionnaire response rate

4.2. The Delay Extent of Water Supply Projects in the Study Area.

Completing water supply projects within planned time has a great significant to the different participants on that projects and as well as to the end users. However, in the study area, they are not completed within estimated time. With regard to this, the delay extent of delayed urban water supply projects were assessed. Then, the eight delayed water supply projects delay rate was analyzed and presented in the following table.

Table 2. The delay extent of water supply projects.

No	Project Name	Contract Signed date	Handover date	Total contract period (month)	Status of project	Total delay (month) till May 2024	Delay rate	Actual work Progress %
1.	Bonga town water supply expansion construction project	9/14/2014	12/14/2014	4	Not completed	24	600%	90%
2.	Bonga town water supply pipe line distribution project	7/15/2014	1/15/2015	6	Not completed	20	333%	95%
3.	Boba Gecha water supply project	10/16/2014	4/16/2015	6	Not completed	16	266%	70%
4.	Bita town water supply project	8/8/2013	2/8/2014	6	Not completed	30	500%	62%
5.	Awurada town water supply project	8/15/2013	1/30/2014	4.5	Not completed	20	444%	85%
6.	Adiyo deep well digging	7/12/2015	3/12/2015	8	Not completed	17	212%	65%
7.	Nechit town water supply project	10/9/2013	4/9/2014	6	Not completed	28	466%	57%
8.	Techib town water supply project	10/16/2014	7/16/2015	9	Not completed	14	155%	65%
9.	**Average delay extent**						**372%**	

Source: Kafa zone water mine and energy department, (2024)

As indicated on the above table, in the study area, completing water supply projects on estimated time is challenging issue. From eight urban water supply projects which were launched since 2020, none of one is completed on the planned time. This implies that, in the study area as there is great challenges to complete water supply projects on time. As it was depicted on the above, the average delay rate of those projects was 372%. Even, in some projects the delay rate reach to 600%. For instance, the delay rate of Bonga town water supply expansion construction project was 600%. Next

to it, Bita town water supply project delay rate was 500%. In addition to those, the delay rate of Nechit town water supply project, Awurada town water supply project, Bonga town water supply pipe line distribution project, Boba Gecha water supply project and Adiyo deep well digging were 466%, 444%, 333%, 266% and 212% respectively. The minimum delay rate was 155% which was Techib town water supply project. So, in generally in the study area the extent of water supply project delay is high. Therefore, the delay of those projects was caused by different factors and leads to the different effects.

4.3. Causes of Delay for Water Supply Projects

Completing water supply projects with estimated time and cost is common problems and it raise from a number of causes and come up with a number of consequences. With regard to this, the main sources of causes for the delay of water projects are not come from one source rather it comes from different sources. Due to this, in this study the causes for the completion time delay of water supply projects were assessed and analyzed. In the process of identifying the main causes for the delay of water supply projects, the sources for delay of those projects were categorized into seven main sources and the causes which were related to each of source were listed. So, those seven main sources of causes for the delay of projects are; project team, owner/client, and contractor, consultant, material and equipment, labor and external factors. Then, the respondents were forwarded their opinion in five-point Likert scale and the finding was analyzed in relative importance index and, the finding was presented and discussed as follow.

4.3.1. The Sources of Causes for the Delay of Water Supply Projects in the Study Area.

As it was explained on above the major sources of causes for the delay of water supply projects in the study area were; project team, owner/client, and contractor, consultant, material and equipment, labor and external factors. So, the severity of those sources of causes for the delaying of water supply projects were analyzed and ranked, and presented on the following table.

Table 3.Causes of delay based on category of sources for delay

No	Category of sources of delay	FI	Rank	SI	Rank	RII	Rank
1.	Material and equipment	0.732	2	0.724	2	0.728	1
2.	Owner	0.721	1	0.715	1	0.718	2
3.	Project Team	0.719	3	0.713	3	0.716	3
4.	Contractor	0.649	4	0.639	4	0.644	4
5.	Consultant	0.640	5	0.606	6	0.623	5
6.	External factors	0.631	6	0.609	5	0.620	6
7.	Labor	0.538	7	0.570	7	0.554	7

Source: Own survey, (2024).

As it was presented on the table above, the main causes for delay were material and equipment related factors with (RII=0.728) and ranked as a first for the completion time delay of water supply projects in the study area. The next one is owner related factors with (RII=0.718) and ranked as the second. The third and fourth sources of causes for delay were related to project team and contractor with (RII=0.716 and 0.644) respectively. The fifth and sixth sources of causes for the delay were consultant and external related factors with (RII=0.623 and 0.620) respectively. With (RII=0.554), labor related factors were identified as a last source of causes for the delay of water supply projects in the study area.

So, this implies that the main causes for the completion time delay of water supply projects in the study area are related to the material and equipment related factors. That is related to the lack of particular material accessibility in the local markets and inconstancy of the price of construction materials. In line to this finding, Eshetie, (2021) revealed that rise in the prices of material, shortage of required materials; poor economic conditions (currency, inflation rate, etc.) were significant factor for the delay of construction projects. In addition to this, the factors related to the project team like owner, contractor and consultants, and external factor related causes were playing a significant role for the completion time delay of water supply projects.

4.3.2. Analysis of General Causes for Completion Time Delay of Water Supply Projects

In order to identify the causes for completion time delay of water supply projects, 60 factors, which are relevance to the delay of those projects were identified and categorized into seven sources of category. Those sources of category were project team, owner, contractor, consultant, material and equipment, labor and external factors. On these identified factors, sample respondents from owners, contractors and consultants were forwarded their opinion on the chance of occurrence (FI) and degree of severity (SI). Finally, after calculation of FI and SI, the relative importance index was compute and combined ranking of causes of delay were made. So, the general finding was shown in the following table.

Table 4. General causes for completion time delay of water supply projects

Source of delay	Causes of delay	FI	Rank	SI	Rank	RII	Rank
Project Team	Unrealistic contract duration	0.829	1	0.805	2	0.817	2
	Parties having legal disputes	0.486	60	0.514	60	0.500	60
	Ineffectiveness of penalties on delay	0.567	33	0.600	33	0.583	33
	Different categories of contract used in construction	0.552	35	0.552	50	0.552	42
	Poor contract management	0.729	7	0.733	10	0.731	8

	Poor communication and coordination with other parties	0.614	23	0.643	24	0.629	24
Owner	Delay in providing and delivering of location of work to the contractor	0.671	16	0.710	15	0.690	17
	Referral of bid to the lowest price	0.729	7	0.757	7	0.743	7
	Improper project feasibility study	0.771	3	0.800	3	0.786	3
	Holdup of work by proprietor	0.519	49	0.529	55	0.524	54
	Frequent change orders during construction	0.638	21	0.657	21	0.648	21
	Delay in approving design documents and decision making process	0.762	6	0.771	6	0.767	6
	Poor financial control mechanism	0.586	30	0.605	31	0.595	30
	Bureaucracy in bidding method	0.629	22	0.652	22	0.640	22
	Delay in progress payments by owner	0.648	20	0.667	20	0.657	20
Contractor	Poor contractors experience	0.576	31	0.610	29	0.593	31
	Stop work without valid reason	0.614	23	0.629	26	0.621	26
	Cash flow problems faced by the contractor	0.538	39	0.576	38	0.557	38
	Ineffective planning and scheduling by Contractor	0.771	3	0.795	4	0.783	4
	Problems in subcontractors schedule for finishing the project	0.605	27	0.610	29	0.607	28
	Frequent change of sub-contractors because of their inefficient work	0.662	18	0.671	19	0.667	19
	Revision of work due to faults during construction phase	0.710	10	0.695	17	0.702	13
	Lack of management on site and its supervision	0.543	37	0.562	44	0.552	42
	Inappropriate method for construction applied by contractor	0.524	47	0.562	44	0.543	48
	Delay in mobilization of site related to secondary contractor	0.538	39	0.548	52	0.543	48
	Design documents having mistakes	0.695	12	0.719	12	0.707	11
	Inadequate collection of data & survey before execution	0.657	19	0.695	17	0.676	18
Consultant	Mistakes and discrepancies in design documents	0.543	37	0.576	38	0.560	36
	Delay in approval of main changes in the extent of work	0.567	33	0.595	35	0.581	34
	Delay in review and approval of documents	0.690	13	0.705	16	0.698	15
	Lack of sufficient experience of consultants	0.614	23	0.648	23	0.631	23
	Absence of consultant's site staff	0.605	27	0.605	31	0.605	29
	Poor inspection plan by consultants	0.552	35	0.557	48	0.555	39

	Project design complexity	0.500	57	0.529	55	0.514	59
	Inadequate quality assurance and quality control plans	0.690	13	0.724	11	0.707	11
	Delay in producing and completing the design documents	0.538	39	0.571	42	0.555	39
	Not enough information before design	0.500	57	0.548	52	0.524	54
Material and equipment	Lack of particular material accessibility in market	0.771	3	0.781	5	0.776	5
	Modification in type & specification of material during realistic time	0.538	39	0.562	44	0.550	44
	Delay in delivering materials on site	0.690	13	0.714	13	0.702	13
	Inconstancy of the price of construction Materials	0.805	2	0.833	1	0.819	1
	Least output & effectiveness of the equipment and materials	0.533	43	0.562	44	0.548	45
	Equipment failure	0.533	43	0.576	38	0.555	39
	Construction equipment shortage	0.600	29	0.629	26	0.614	27
	Poor procurement programming of material	0.714	9	0.743	8	0.729	9
	Inappropriate/misuse of material and equipment	0.505	55	0.552	50	0.529	53
Labor	Low level of qualification and technical staff	0.500	57	0.576	38	0.538	50
	Labor scarcity at site	0.571	32	0.614	28	0.593	31
	High cost of labor	0.614	23	0.638	25	0.626	25
	Weak motivation of labors	0.505	55	0.529	55	0.517	58
	The conflict between labors	0.519	49	0.543	54	0.531	52
	Overtime issues labor	0.519	49	0.519	59	0.519	56
External factors	Accident during construction	0.510	53	0.557	48	0.533	51
	Poor economic conditions(currency, inflation rate, etc)	0.671	16	0.714	13	0.693	16
	Unexpected geological and Weather condition	0.710	10	0.743	8	0.726	10
	Natural disaster	0.524	47	0.571	42	0.548	45
	Variations in government parameter & law	0.533	43	0.586	36	0.560	36
	Effect of social and cultural factors	0.514	52	0.524	58	0.519	57
	Security issue	0.529	46	0.600	33	0.564	35
	Utilities issues	0.510	53	0.586	36	0.548	45

Source: Own survey, (2024)

4.4. The Main Causes for the Delay of Water Supply Projects from the Different Parties' Point of View.

The main causes for the completion time delay of water supply projects in the study area was analyzed from the different parties' point of view, who were involved in those projects. With regard to this, the causes were analyzed from owner/client, contractor and consultant point of view and finally the finding was presented as follow.

4.4.1. The Major Causes for the Delay from Owner/Client Point of View.

Based on the finding of the study, the first top ten causes which were identified by the owners/clients from the list of causes with highest (RII) were regarded as major causes for the delay of water projects from the owner/client's point of view in the study area. With regard to this, the finding was presented as follow.

Table 5. The major causes for delay of water projects from the owners/client's point of view

No	Causes of delay	FI	Rank	SI	Rank	RII	Rank
1	Unrealistic contract duration	0.871	1	0.843	2	0.857	1
2	Ineffective planning and scheduling by contractor	0.829	3	0.857	1	0.843	2
3	Improper project feasibility study	0.843	2	0.829	3	0.836	3
4	Inconstancy of the price of materials	0.786	5	0.814	4	0.800	4
5	Delay in approving design documents and decision-making process	0.800	4	0.786	5	0.793	5
6	Lack of particular material accessibility in market	0.757	6	0.771	6	0.764	6
7	Unexpected geological and Weather condition	0.743	7	0.771	6	0.757	7
8	Poor contract management	0.714	9	0.743	8	0.729	8
9	Revision of work due to faults during construction phase	0.743	7	0.700	14	0.721	9
10	Poor procurement programming of material	0.714	9	0.729	9	0.721	9

Source: Own survey (2024).

As it was depicted on the above table, the major one causes for delay of water projects from owners/clients' point of view is unrealistic contract duration with (RII=0.857). The next one is ineffective planning and scheduling by contractor with (RII=0.843). As the third, fourth and fifth causes, improper project feasibility study, inconstancy of the price of materials and delay in approving design documents and decision-making process were identified with (RII= 0.836, 0.800 and 0.793) respectively. In addition, lack of particular material accessibility in market, unexpected geological and weather condition and poor contract management with (RII= 0.764, 0.757and 0.729) were identified as sixth, seventh and eighth causes respectively. From the top ten causes, revision

of work due to faults during construction phase and poor procurement programming of material were identified as the last with (RII= 0.721) from the owners or client's point of view in the study area.

4.4.2. The Major Causes for the Delay from Contractor Point of View

From the different parties who were involve in the delayed water supply projects, contractors are one group. So, in this study the top ten causes which were identified by the contractors with highest (RII) were regarded as the major causes for the delay of water projects from contractor point of view and these were presented in following table.

Table 6. The major causes for the delay from contractor point of view

No	Causes of delay	FI	Rank	SI	Rank	RII	Rank
1	Inconstancy of the price of Materials	0.830	1	0.860	1	0.845	1
2	Lack of particular material accessibility in market	0.820	2	0.820	2	0.820	2
3	Improper project feasibility study	0.790	4	0.820	2	0.805	3
4	Unrealistic contract duration	0.800	3	0.790	4	0.795	4
5	Unexpected geological and Weather condition	0.760	5	0.770	6	0.765	5
6	Delay in providing and delivering the location of work to the Contractor	0.740	6	0.780	5	0.760	6
7	Referral of bid to the lowest price	0.730	7	0.770	6	0.750	7
8	Delay in approving design documents and decision-making process	0.730	7	0.760	8	0.745	8
9	Poor procurement programming of material	0.720	9	0.750	9	0.735	9
10	Ineffective planning and scheduling by Contractor	0.720	9	0.730	11	0.725	10
11	Poor economic conditions (currency, inflation rate, etc.)	0.700	15	0.750	9	0.725	10

Source: own survey, (2024)

As it was presented on the above table, the major one causes for the delay of water supply projects from the contractors view of points is inconstancy of the price of materials with (RII=0.845). Next to it, lack of particular material accessibility in market and improper project feasibility study with (RII= 0.820 and 0.805) were identified by contractors as major causes for completion time delay of water supply projects in the study area. In addition to those, unrealistic contract duration, unexpected geological and weather condition, delay in providing and delivering the location of work to the contractor, referral of bid to the lowest price, delay in approving design documents and decision making process, poor procurement programming of material, ineffective planning and

scheduling by contractor and poor economic conditions (currency, inflation rate, etc.) were identified as a major causes by the contractors view of points respectively.

4.4.3. The major causes for the delay from consultants' point of view

Consultants are one group of participants who are involving in the water supply projects. In relation to the completion time delay of water supply projects, the consultants in those delayed projects of the study area were identified the main causes for the delay of those projects. Then, the top ten causes which were identified by consultants with highest (RII) were regarded as the major causes for the delay of water supply projects from consultant's point of view. So, these are presented as follow.

Table 7. The major causes for the delay from consultants' point of view

No	Causes of delay	FI	Rank	SI	Rank	RII	Rank
1	Poor contract management	0.850	1	0.825	2	0.838	1
2	Ineffective planning and scheduling by Contractor	0.800	3	0.850	1	0.825	2
3	Referral of bid to the lowest price	0.800	3	0.825	2	0.813	3
4	Unrealistic contract duration	0.825	2	0.775	5	0.800	4
5	Inconstancy of the price of materials	0.775	5	0.800	4	0.788	5
6	Delay in approving design documents and decision-making process	0.775	5	0.775	5	0.775	6
7	Poor procurement programming of material	0.700	8	0.750	7	0.725	7
8	Delay in progress payments by owner	0.700	8	0.725	8	0.713	8
9	Delay in review and approval of documents	0.725	7	0.700	11	0.713	8
10	Inadequate quality assurance and quality control plans	0.675	10	0.725	8	0.700	10

Source: Own survey, (2024).

As it was presented on the above table, the major causes for completion time delay of water supply projects from consultant view of point were, poor contract management with (RII=0.838). Next to it, ineffective planning and scheduling by contractor and referral of bid to the lowest price were the other major causes with (RII= 0.825 and 0.813). From top ten causes which were identified, by consultant as a cause, the other remaining were unrealistic contract duration, inconstancy of the price of materials, delay in approving design documents and decision-making process, poor procurement programming of material, delay in progress payments by owner, delay in review and approval of documents and inadequate quality assurance and quality control plans with (RII= 0.800, 0.788, 0.775, 0.725, 0.713 and 0.700) respectively.

4.4.4. The Top Causes/ Significant Factors for Completion Time Delay of Water Supply Projects

After analysis of general causes for completion time delay of water supply projects, the major or significant factors for the delay of those projects were identified. So, the top ten causes with highest RII from the point of view of overall respondents were considered as the major causes/significant factor. Based on the information obtained from respondents the most significant factors are shown on the following table.

Table 8. The most significant factors for completion time delay of water supply projects

No	Causes of delay	Category of delay sources	FI	Rank	SI	Rank	RII	Rank
1	Inconstancy of the price of construction materials	Material and equipment	0.805	2	0.833	1	0.819	1
2	Unrealistic contract duration	Project Team	0.829	1	0.805	2	0.817	2
3	Improper project feasibility study	Owner	0.771	3	0.800	3	0.786	3
4	Ineffective planning and scheduling by contractor	Contractor	0.771	3	0.795	4	0.783	4
5	Lack of particular material accessibility in market	Material and equipment	0.771	3	0.781	5	0.776	5
6	Delay in approving design documents and decision-making process	Owner	0.762	6	0.771	6	0.767	6
7	Referral of bid to the lowest price	Owner	0.729	7	0.757	7	0.743	7
8	Poor contract management	Project Team	0.729	7	0.733	10	0.731	8
9	Poor procurement programming of material	Material and equipment	0.714	9	0.743	8	0.729	9
10	Unexpected geological and Weather condition	External factors	0.710	10	0.743	8	0.726	10

Source: Own survey, (2024).

As it was presented on the above table, from the different types of causes for completion time delay of water supply projects, the most significant factor was inconstancy of the price of construction materials with (RII=0.819). The second significant factor was unrealistic contract duration with (RII= 0.817). The other significant factors were improper project feasibility study, ineffective planning and scheduling by contractor, and lack of particular material accessibility in market with (RII= 0.786, 0.783 and 0.776) respectively. In addition to these, delay in approving design documents and decision-making process, referral of bid to the lowest price and poor contract management were the other major causes for delay of water projects. From the top ten causes for

delay of those projects poor procurement programming of material and unexpected geological and weather condition were the remaining significant factors.

This implies that, the causes for the delay of water supply projects were originated from different sources, which means it is originated from project team members, material and equipment and external related factors. From those sources, inconstancy of the price of construction materials was the main factor which leads to delay of projects. In line with this, the finding of Nesru (2020) and Gebrehiwet and Luo (2017) show that, fluctuation in price of construction material was the major causes for the completion time delay of construction.

Unrealistic contract duration was the other main factor which is affecting to complete the projects with in estimated time. That may be due to underestimate the complexity and scale of water supply projects when initially setting contract durations by the project managers and contractors and final this causes for the delay of the projects.

Even, project feasibility study is a critical step in project management that assesses the practicality and viability of a proposed project plan or method, improper project feasibility study of water supply in the study area is one of the major causes for the completion time delay of water supply projects. In addition to this, ineffective planning and scheduling by contractor were affecting the projects to complete with in estimated time. However, effective project planning is the process of setting project goals and developing a plan for how to achieve them. It's an ongoing activity that helps teams stay on track and reach their goals.

In consistent to this, the finding of Lejalem (2019), ineffective project planning and scheduling, insufficient estimation of original contract duration and government tendering system of choosing the lowest bidder are the major causes for the delay of water projects.

Lack of particular construction material accessibility in local market, delay in approving design documents and decision-making process, and referral of bid to the lowest price were the other major factors which are affecting the completion time delay of water supply projects.

While, effective contract management helps organizations to manage their risks and achieve their financial goals and ensures both parties to fulfill their contractual obligations, that contracts are drafted with clarity and specificity, and that contracts are managed efficiently throughout their lifecycle, the poor project management in those delayed water supply projects was the major causes for the delay of those projects.

In contrast to this, the finding of Lielti (2023) most important causes for the delay of water supply projects were design errors and changes, lack of consistency between bill of quantities and drawings, and change order.

4.5. Consequences of completion time delay of water supply projects

Completing projects within planned time, cost and quality is the common goal of contracting parties including owners, contractors and consultants. However, most of water supply projects were not completed within estimated time. So, it is obvious that if the projects are not completed within estimated time it leads to the different consequences. With regard to this, due to the above-mentioned causes, the water supply projects in the study area were not completed within planned time and that may lead to the different types of consequences. For that reason, the consequences of completion time delay of water projects were assessed. In the process of analyzing the consequences of delay, the data were analyzed in both quantitative and qualitative method of data analysis and the finding was presented as follow.

4.5.1. Quantitative data analysis on the consequences of delay of water projects.

In the process of analyzing the consequences of delay, in quantitative data analysis technique, the same procedure was applied; that means relative important index (RII) was computed. Then, in this respect the respondents asked to rate their agreement on the consequences of delay using five points scale (strongly disagree, disagree, neutral, agree and strongly agree). After that, the effects of delay were analyzed and ranked, and assessed from the different parties point of views, which means from (owner, contractors and consultants view), and finally, the finding was presented as follow in table.

Table 9. Consequences of completion time delay of water supply projects.

No	Consequences of completion time delay	Owner		Contractor		Consultants		Average	
		RII	Rank	RII	Rank	RII	Rank	RII	Rank
1.	Time overrun	0.929	1	0.900	3	0.950	1	0.919	1
2.	Cost overrun	0.871	2	0.940	1	0.925	2	0.914	2
3.	Reduced profit or total loss and, extended site and general overhead expenses	0.814	4	0.920	2	0.850	5	0.871	3
4.	Dissatisfaction by project owners and consequently by end-users	0.843	3	0.830	4	0.875	4	0.843	4
5.	Public grievances were high due to delay of the project and late service delivery	0.771	7	0.820	5	0.900	3	0.819	5
6.	Arbitration	0.786	6	0.790	7	0.775	10	0.786	6
7.	Create stress on stakeholders	0.700	11	0.810	6	0.825	6	0.776	7
8.	Bad public relation and mistrust of the client (government) by the people	0.800	5	0.760	10	0.750	12	0.771	8
9.	Quality problems on the constructed project	0.729	10	0.780	8	0.800	8	0.767	9
10.	Disputes among the parties on the project	0.743	9	0.770	9	0.800	8	0.767	9
11.	High effect on the client's revenue collection plan due to delay	0.686	13	0.750	11	0.825	6	0.743	11
12.	Obstacle to the economic development	0.757	8	0.690	13	0.750	12	0.724	12
13.	Contract termination	0.700	11	0.710	12	0.775	10	0.719	13
14.	Positive Image of the project owner were faded	0.671	15	0.670	15	0.700	15	0.676	14
15.	Wastage and underutilization of resources	0.686	13	0.660	16	0.675	16	0.671	15
16.	Litigation	0.614	16	0.680	14	0.725	14	0.667	16
17.	It becomes causes for the delay of other projects	0.600	17	0.650	17	0.650	17	0.633	17

Source: Own survey, (2024)

As it was presented on the above table, there are about seventeen consequences of completion time delay of water supply projects. With regard to those consequences, the sample clients, contractors and consultants forwarded their opinion, and the consequences were analyzed and ranked from their points of view. So, the major top seven consequences with highest RII were considered as the major consequences from their point of views.

4.5.1.1. Consequences of delay from owners/clients point of views.

The major top seven consequences of completion time delay of water supply projects from owner/clients view of points were time overrun with (RII=0.929), cost overrun with (RII=0.871), dissatisfaction by project owners and consequently by end-users with (RII=0.843), reduced profit or total loss and, extended site and general overhead expenses with (RII=0.814),bad public relation and mistrust of the client (government) by the people with (RII=0.800),arbitration with (RII=0.786) and public grievances were high due to delay of the project and late service delivery with (RII=0.771) respectively.

4.5.1.2. Consequences of delay from contractors point of views

With regard to contractor's point of views the major top consequences of completion time delay of water projects were cost overrun with (RII=0.940), reduced profit or total loss and, extended site and general overhead expenses with (RII=0.920), time overrun with (RII=0.900), dissatisfaction by project owners and consequently by end-users with (RII=0.830), public grievances were high due to delay of the project and late service delivery with (RII=0.820), create stress on stakeholders with (RII=0.810), and arbitration with (RII=0.790) respectively.

4.5.1.3. Consequences of delay from consultant point of views

The other group participants who were involved in the construction of water supply projects were consultants. In relation to the consequences completion time delay of water supply projects they forwarded their opinion. With regard to the point view of them, the major consequences of delay were; time overrun with (RII=0.950), cost overrun with (RII=0.925) public grievances were high due to delay of the project and late service delivery with (RII=0.900) dissatisfaction by project owners and consequently by end-users with (RII=0.875), reduced profit or total loss and, extended site and general overhead expenses with (RII=0.850), create stress on stakeholders with (RII=0.825) and high effect on the client's revenue collection plan due to delay with (RII=0.825) respectively.

4.5.1.4. General Consequences of completion time delay of water projects

As it was presented on the above table 8, in addition to assessment of the consequences from owner/clients, contractors and consultants' point of views, the general consequences of delay of water supply projects, were assessed, analyzed and ranked based on their RII.

Based on the finding and as it was analyzed and ranked, the first top five consequences of delay of those projects were time overrun, cost overrun, reduced profit or total loss and/or extended site and general overhead expenses, dissatisfaction by project owners and consequently by end-users and, public grievances were high due to delay of the project and late service delivery with (RII= 0.919, 0.914, 0.871, 0.843, and 0.819) respectively. In consistent to this, the finding of Abdilkerim (2023),

time overrun, cost overrun and poor project quality are the major consequences of completion time delay of projects.

In addition to the above-mentioned consequences; arbitration, create stress on stakeholders, bad public relation and mistrust of the client (government) by the people, quality problems on the constructed projects, and disputes among the parties on the projects were identified as consequences of completion time delay of water supply projects and ranked from six to ten based on their (RII= 0.786, 0.776, 0.771, 0.667 and 0.677) respectively.

High effect on the client's revenue collection plan due to delay, obstacle to the economic development, contract termination, the positive image of the project owner was fade, and wastage and underutilization of resources were the other consequences of completion time delay of water supply projects and ranked from eleven to fifteen based on their (RII= 0.743, 0.724, 0.719, 0.676 and 0.671) respectively. From seventeen identified consequences of completion time delay of water supply projects, litigation and becoming causes for the delay of other projects were identified as the two last consequences based on their (RII= 0.667, 0.633) respectively.

4.5.2. Qualitative data analysis on the consequences of delay of water projects.

In addition to above quantitative data, qualitative data were collected from purposively selected key informants through interview in order to get detail data that were not covered in quantitative method about consequences of completion time delay of water supply projects. So, with regard to this, the participants in the interview from the owner/clients and contractors raised almost all the same issue and relevant to the quantitative one. Due to this, the qualitative data were analyzed through direct quotation of the words of participants in the form of statement and similar responses were grouped together and analyzed as follow.

With regard to this, three key informants from clients and two from contractor side, total five key informants were forwarded about the effects those projects delay at the time of interview. The consequences which were raised by all of them at the time of interview were almost all the same.

Accordingly, key informants from the clients and contractors explained in detail about the consequences of delay. Then, the main consequences which were raised by the key informants from the clients at the time of interview were; challenges in providing clean water access to the community, affects public - government relationship and raise issue of good governance and financial consequences. In addition to the key informants from the clients, the key informants from contractors were forwarded about the consequences of delay at the time of interview. According to them, the major consequences of delay were, loss of competitive advantage and market share,

negative impact on the contractor's reputation and financial impacts. These all are discussed and presented as follow.

4.5.2.1. Challenges in providing clean water access to the community

According to those key informants from clients the one of the major consequences of completion time delay of water projects was challenges in providing clean water access to the community.

According to the key informants;

> *"The delay of those projects was leads to significantly delay of the availability of clean, reliable water resources for communities and municipalities users, who are relying on those project's completion. So, this delayed access to water were undermine the ability to meet the growing water demands of the population, potentially leading to rationing, water shortages, and dissatisfaction among the end-users. Due to this, the intended beneficiaries, are deprived of the critical access to clean, reliable water sources for an extended period of time. In generally the delay of those projects is challenging in providing clean water access to the community."*

So, this implies that, the delay of those projects was challenging the communities in the access of clean and reliable water supply. Therefore, this can lead to water shortages or the need to rely on alternative, potentially more expensive or less sustainable water sources, which can have far-reaching consequences for the community. And, this has significant impacts on households, businesses, and essential public services, such as hospitals and schools, leading to economic losses and potential public health issues. In addition, it has also significant public health and social implications, as the lack of clean water can lead to increased risks of waterborne diseases, sanitation issues, and disruptions to daily life and economic activities. In generally, prolonged delays in accessing water supplies can stall economic growth, limit industrial expansion, and even impact public health and sanitation in the affected regions.

4.5.2.2. Affects public - government relationship and raise issue of good governance

The next consequences of delay which were raised by the key informants at the time of interview was it affects public - government relationship and raise issue of good governance.

According to the key informants

> *"Completion time delay of water supply projects is affecting public - government relationship and raise issue of good governance. The prolonged delays in water projects are leading to water shortages, disruptions in daily activities, and inconveniences for residents. This erodes public trust in the government's ability to fulfill its responsibilities.*

The consistent delay to deliver on promised water supply projects is severely affects the government's credibility and reputation, making it more difficult to implement other initiatives or secure public support for future projects. Due to this delay, public interpret the delays as a sign of corruption, mismanagement, or a lack of prioritization, further it is undermining their trust in the government."

So, this implies that, delays in water supply projects are often perceived as a sign of inefficiency, mismanagement, or lack of planning by the government. This can lead to increased public criticism, media coverage, and scrutiny of the government's decision-making processes and project management capabilities. The public may start questioning the government's competence and accountability, which can further strain the relationship.

In addition, persistent delays in water supply projects can contribute to a negative perception of the government's ability to deliver on its promises and fulfill its responsibilities. This can lead to a deterioration of the government's reputation and a loss of public trust, which can have long-lasting consequences for its legitimacy and effectiveness. These long-term consequences can be challenging to overcome and may require significant efforts to rebuild trust and restore the government's credibility in the eyes of the public.

4.5.2.3. Financial consequences.

The other consequences of delay which were raised by the key informants from the clients at the time of interview was financial consequences.

According to the key informants;

"The completion time delay of water supply projects leads to the financial consequences. The delayed water supply projects were result in cost overruns for us, as they need to allocate additional funds to cover the extended timelines, increased material and labor costs. These unanticipated financial burdens can strain our budget, diverting resources from other important infrastructure or social development projects, and potentially leading to a delay in the overall implementation of the broader water management strategy."

Therefore, this indicates that the delay of those projects has financial consequences to the clients. So, delays in water supply projects often result in cost overruns for the client, as they may need to extend contracts, pay for additional project management resources, or cover the increased expenses incurred by the contractor. These cost overruns can significantly impact the client's budgets, potentially diverting funds from other critical infrastructure projects or services. Additionally, clients may also face lost revenue or opportunity costs if they are unable to serve new customers or

expand their water supply network due to the project delays. And, also leads to the postponement of other infrastructure or development projects that are dependent on the availability of the new water supply, further compounding the financial impacts for the client.

4.5.2.4. Loss of competitive advantage and market share

According to the key informants from contractor;

> *"Prolonged delays in water supply projects are preventing us from participating in other projects, as our resources (e.g., personnel, equipment, and capital) is tied up in the delayed project. This result in lost opportunities to secure new contracts and maintain or grow our market share within the water infrastructure industry. In addition, Delays is eroding our competitive edge and leads for to be perceived as less reliable and less attractive and, limiting our ability to secure future work. And in generally the delay is affecting our competitive advantage and market share."*

So, this implies that, from the consequences of the delay of water supply projects Loss of Competitive Advantage and market share were one. It is obvious that, contractors who consistently fail to deliver projects on time may lose their competitive edge, as project owners increasingly favor more reliable and efficient competitors. This can limit the contractor's ability to secure new contracts, as they may be perceived as a risky or undesirable choice compared to their more successful competitors. The loss of competitive advantage can also make it more challenging for the contractor to maintain their market share, leading to a decline in revenue and profitability over the long term.

4.5.2.5. Negative impact on the contractor's reputation

The next consequences raised by the key informants from contractor at the time of interview was negative impact on the contractor's reputation.

According to the key informants;

> *"The completion time delay of water supply projects is negatively affecting our reputation. And, it leads to a loss of trust and credibility with project owners, making it more challenging for us to secure future contracts. This reputational damage has long-lasting consequences, as project owners hesitant to award future contracts to us, even if the delays were primarily due to factors outside our control. In addition, it also hinders our ability to attract and retain skilled workforce, as well as secure favorable terms from suppliers and subcontractors."*

So, this implies that, the delay of those projects has significant negative impacts on the contractor's reputation. This reputational damage can have far-reaching consequences, as project owners may be less willing to award contracts to the contractor, and the contractor may struggle to attract and retain talented personnel who value a strong reputation. In addition, damaged reputations can make it more challenging for contractors to form strategic partnerships with other industry players, such as subcontractors or suppliers, who may be reluctant to work with a contractor with a poor track record.

4.5.2.6. Financial impacts

The other consequences raised by the key informants from contractor at the time of interview was financial challenges.

According to the key informants; “the other main consequences of the delay of water projects was financial challenges. The delays are resulted in extended project timelines, leading to increased labor, equipment, and material costs for us. These additional expenses can erode our profit margins. In relation to this, delayed payments from project owners due to the delays, disrupt our cash flow, making it difficult to meet our own financial obligations to employees, subcontractors, and suppliers. This can lead to cash flow problems and potentially threaten our ability to secure financing for future projects.”

So, this indicates that from the consequences of delay of water supply projects financial challenge was one of the effects. Extended project timelines can lead to significant cost overruns for contractors, as they may need to pay for additional labor, equipment rental, and material expenses. In relation to this, delayed payments from project owners can disrupt the contractor's cash flow, making it difficult to pay their own subcontractors, suppliers, and employees on time. This can lead to strained relationships with these stakeholders and potentially result in legal disputes or the loss of future business opportunities.

Prolonged delays may also result in contractors being unable to bid on and secure new projects, as they may be financially constrained or unable to provide the necessary bid bonds or performance guarantees required by project owners. In addition, the financial strain caused by project delays can make it more difficult for contractors to secure favorable financing terms from banks and other lenders, further exacerbating their financial challenges.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Completing water supply projects with estimated time and cost is common problems and it raise from a number of causes and come up with a number of consequences. With regard to this, in the study area the issue of completion time delay of water supply projects was common. Due to this, the current study was conducted in order to identify the causes and consequences of delay of those projects. Accordingly, the finding of the study was concluded as follow.

With regard to the delay extent of water supply projects, from eight urban water supply projects which were launched since 2020, none of one is completed on the planned time. And, the average delay rate of those projects was 372%. Even, in some projects the delay rate reach to 600%.

In relation to the causes of completion time delay of water supply projects, the source of causes for delay were related to the different factors. Particularly, material and equipment related factors were the most significant factors for the delay those projects. In addition, owner and project team related factors were the significant sources of causes for the delay of water supply projects in the study area. In generally, the most significant causes for delay of those projects were; inconstancy of the price of construction materials, unrealistic contract duration, improper project feasibility study, ineffective planning and scheduling by contractor and lack of particular material accessibility in market. Additionally, delay in approving design documents and decision-making process, referral of bid to the lowest price, poor contract management, poor procurement programming of material and unexpected geological and weather conditions plays a great role in affecting completion time of water supply projects.

Delay of water supply projects due to above mentioned causes were led to the different consequences. So, the main consequences of delay of those projects were; time and cost overrun, reduced profit or total loss and, extended site and general overhead expenses, dissatisfaction by project owners and consequently by end-users, public grievances were high due to delay of the project and late service delivery, arbitration, create stress on stakeholders, bad public relation and mistrust of the client (government) by the people and quality problems on the constructed project. In addition, challenges in providing clean water access to the community, bad public - government relationship and raise issue of good governance, loss of competitive advantage and market share to contractors and negative impact on the contractor's reputation were the other consequences of delay of those projects.

In generally, this all causes and consequences of completion time delay of projects are more or less related to the project management system of those projects. Therefore, in order to complete the projects with in planned time and to avoid unnecessary delay, effective project management system should have to be implemented.

5.2. Recommendations

Based on the finding of the study, the following recommendation was forwarded in detail in order to avoid further delay of water supply projects.

From the causes for the completion time delay of water projects, the most significant factor was inconstancy of the price of construction materials. So, in order to solve this problem, the contracting bodies should have to implement effective material procurement strategies; through establishing long-term supply agreements with key material suppliers to secure more stable pricing. And, improve inventory planning and just-in-time delivery to minimize the impact of price changes.

In order to avoid delay of projects that is caused by unrealistic contract duration and improper project feasibility study; comprehensive feasibility studies should have to be done through employing experienced and qualified professionals to conduct in-depth feasibility assessments.

The project owners should have to implement comprehensive bidding evaluation: By developing a robust bid evaluation framework that considers not just the price but also factors such as technical capabilities, past performance, and project-specific experience, in order to avoid delay caused by referral of bids to the lowest price.

The owners should have to establish clear and efficient approval processes for design documents, with defined timelines and responsible authorities, to avoid unnecessary delay that is caused by delays in approving design documents and decision-making processes.

In order to avoid the delay of projects due to ineffective planning and scheduling by contractors, the contractors planning and scheduling should have to be enhanced and detailed project execution plans has to be required. In addition, the use of project management software tools has to be encouraged to help contractors develop, monitor, and update of their schedules effectively.

In generally the delay of those projects is in one or other way caused due to weak project management system. So, in order to avoid the delay of projects, effective project management systems should have to be implemented by the project team. That may include, by providing comprehensive contract management training, establishing clear dispute resolution mechanisms and by implement proactive contract monitoring.

Recommendation for the further study

As it was analyzed and presented in this study the completion time delay of water of supply projects were caused due to the different factors and leads to the different consequences. However, in relation to the consequences of delay, the effects of delay were assessed only from the owner, contractors and consultant point of view. But it is obvious that, the delay of those projects has its own impacts to the end users or to the community who were waiting the water supply services from those projects. And, that were not regarded in this study. Therefore, it is recommended to the further study to include the effects of delay from the beneficiary of those projects, by including the participants of the study from end user.

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APPENDICES

JIMMA UNIVERSITY

College of Business and Economics

Department of Accounting and Finance

Field of Specialization Project Management and Finance (MA)

Section One

Questionnaires filled by Respondents

Dear respondent,

My name is Kibralem Wodajo. I am Masters of Arts student in **Project Management and Finance** at Jimma University. I am writing my thesis work on the ***Causes and Consequences of Completion Time Delay of Water Supply Projects***. So, you have been selected purposively from the participants of the projects, by taking into consideration you're working experiences. The responses you are going to give are valuable and will be held in utmost confidentiality and will be used only for the analysis of this research. You will not be identified by name in any case. If you accept to participate in this research, you will be doing so voluntarily and there will not be any monetary returns. You are also free to refuse to respond to any questions if you do not feel comfortable answering or to withdraw from the research all together.

Direction

No need of writing name.

Return this questionnaire as soon as you complete responding questions.

Please try to answer every question in accordance to the instruction provided.

Thank you for your cooperation.

Part One: Personal Information

I) Encircle letters for multiple choice questions

1. Gender: a. male b. female
2. Educational level: a. graduated in diploma b. under graduate (BA/BSc) c. MA/MSc graduated. PhD
3. Working experience: a. 0-5 years b. 6-10 years c. 11-15 years d. 16-20 years e. above 21 years

II) **Part two: Questions to identify the major causes for delay of water projects**

Dear respondents, the questionnaire is designed in order to evaluate the frequency of occurrence and the degree of severity of the identified 59 causes of delay factors on water supply projects. So, you are expected to forward your opinion on each of identified causes and tick where are you agree with the following statements as it regards to the delay of water projects.

Therefore:

If you tick, for the chance of occurrence: 1= very rarely 2= rarely 3= Sometimes 4= often 5 = usually.

If you tick, for the degree of severity: 1= very low2= low 3= medium 4= high 5= very high

Source of delay causes	Causes of Delay	Rating scale based on											
		Chance of occurrence						Degree of severity					
		1	2	3	4	5		1	2	3	4	5	
Project team	Unrealistic contract duration												
	Parties having legal disputes												
	Ineffectiveness of Penalties on delay												
	Different categories of contract used in construction												
	Poor contract management												
	Poor communication and coordination with other parties												
Owner	Delay in providing and delivering the location of work to the Contractor by Proprietor												
	Referral of bid to the lowest price												
	Improper project feasibility study												
	Holdup of work by proprietor												
	Frequent change orders during construction												
	Delay in approving design documents and decision making process												
	Poor financial control mechanism												
	Bureaucracy in bidding method												
	Delay in progress payments by owner												
Contractor	Poor contractors experience												
	Stop work without valid reason												
	Cash flow problems faced by the contractor												

	Ineffective planning and scheduling by Contractor												
	Problems in subcontractors schedule for finishing the project												
	Frequent change of sub-contractors because of their inefficient work												
	Revision of work due to faults during construction phase												
	Lack of management on site and its supervision												
	Inappropriate method for construction applied by contractor												
	Delay in mobilization of site related to secondary contractor												
	Design documents having mistakes												
	Inadequate collection of data & survey before execution												
Consultant	Mistakes and discrepancies in design documents												
	Delay in approval of main changes in the extent of work												
	Delay in review, approval of documents												
	Lack of sufficient experience of consultants												
	Absence of consultant's site staff												
	Poor inspection plan by consultants												
	Project design complexity												
	Inadequate quality assurance and quality control plans												
	Delay in producing and completing the design documents												
Material and equipment	Lack of particular material accessibility in market												
	Modification in type & specification of material during realistic time												
	Delay in delivering materials on site												
	Inconstancy of the price of Materials												
	Least output & effectiveness of the equipment and materials												
	Equipment failure												
	Construction equipment shortage												
	Poor procurement programming of material												
	Inappropriate/misuse of material and equipment												
Labor	Low level of qualification and technical staff												
	Labor scarcity at site												
	High cost of labor												
	Weak motivation of labors												
	The conflict between labors												
	Overtime issues labor												
External	Accident during construction												
	Poor economic conditions(currency, inflation rate, etc)												
	Unexpected geological and Weather condition												
	Natural disaster												
	Variations in government parameter & law												
	Effect of social and cultural factors												
	Security issue												
	Utilities issues												

Thank you for your cooperation.

Part Three: Questions to identify the major consequences of delay of water supply projects

Dear respondents, here you are also expected to forward your opinion on each of identified effects of delay and tick where are you agree with the following statements as it regards to the delay of water projects.

Therefore:

If you tick, 1= strongly disagree 2= disagree 3= neutral 4= agree 5= strongly agree

No	**Consequences of delay**	**Rating scale based on effects**				
		1	2	3	4	5
1.	Cost overrun					
2.	Time overrun					
3.	Contract termination					
4.	Quality problems on the constructed project					
5.	High effect on the client's revenue collection plan due to delay					
6.	Dissatisfaction by project owners and consequently by end-users					
7.	Public grievances were high due to delay of the project and late service delivery					
8.	Bad public relation and mistrust of the client (government) by the people					
9.	Create stress on stakeholders					
10.	Reduced profit or total loss and, extended site and general overhead expenses					
11.	Positive Image of the project owner were faded					
12.	Disputes among the parties on the project					
13.	It becomes causes for the delay of other projects					
14.	Arbitration					
15.	Litigation					
16.	Wastage and underutilization of resources					
17.	Obstacle to the economic development					

Thank you for your cooperation.

SECTION TWO

Question Prepared For Interview to Take Information from Key Informants

Introduction

This study is being conducted to explore the ***Causes and Consequences of Completion Time Delay of Urban Water Supply Projects***. Your participation in this study is voluntary. Information provided during the study will be kept confidential and used for research purposes only. Signing the agreement below indicates that you understand the motivation behind this study and are willing to participate in it.

Approval

Respondent name (optional) …….…….

Respondent Position ……

Location …….. …….

Gender: …….

Education Level ……

Date ……

Interview Questions for Selected Key Informants.

1. What are major causes for the completion time delay of urban water supply projects in the study area?
2. In your opinion who are the responsible for the delay of those projects from the different participants in those projects?
3. What are the major consequences of completion time delay of water projects?
4. What are the effects of delay on the owner, contractors and as well as to the end users those projects?
5. In your opinion, what should have to be done in order to minimize the completion time delay of water supply projects?

Thank you very much for your time and cooperation