ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE
DEPARTMENT OF PROJECT MANAGEMENT

ASSESSMENT OF PRACTICES OF CLOSING OUT WATER SUPPLY PROJECTS: THE CASE OF OROMIA REGION WATER, MINES AND ENERGY BUREAU

BY: ABERA KUMSA YADESSA (ID: GSE/3622/11)

JULY, 2021
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ADVISOR: DR. ABDURAZAK

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JULY, 2021
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DECLARATION

I, Abera Kumsa, declare that this paper is a presentation of my original research work on the topic entitled "Assessment of practices of closing out water supply projects: the case of Oromia region water, mines and energy bureau" in partial fulfillment of the requirements for Masters of Arts at Addis Ababa University. This work has not been submitted for a degree to any other university. All the references are also duly acknowledged as listed in the references.

_____ _____

AberaKumsa Date

CERTIFICATE

This is to certify that the thesis is prepared by Mr**.** Abera Kumsa entitled "Assessment of practices of closing out water supply projects: the case of Oromia region water, mines and energy bureau" and submitted in fulfillment of the requirement for the Degree of Masters of Arts in Project Management complies with the regulation of the university and meet accepted with the respect to originality and quality.

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External Examiner Signature Date

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Internal Examiner Signature Date

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Thesis Advisor Signature Date

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ABSTRACT

This research conducted to identify from literature the general project closure practices, the steps and the standard practices of project closure implemented by Oromia Water, Mineral and Energy Bureau for its Water Supply projects as well as judging obedience and conformity of project closure practices and recognize challenges associated with project closure. It engage the qualitative method of research. Questionnaires were prepared and distributed among thirty nine (39) respondents comprising of fourteen (14) employees of Oromia Water, Mineral and Energy Bureau, twelve(12)employees of contractors and thirteen(13) employees of consultants to OWMEB's water supply projects. Data collected were scrutinized using the Relative Importance Index (RII)and the mean score. The research found that the common project closure methods included contractual and administrative closeout actions according to literatures.These characterize the fundamental steps of project closure practices, which are being focused by OWMEB in their water supply projects. OWMEB in their water supply projects obeys and conforms greatly with contractual closure practices but fulfill and stick reasonably to administrative closure practices. Further, it discovered that the challenges connected with OWMEB project closure are slow close out process and documentation of usual methods and building events which will serve the foundation for project evaluation and lessons learned for future projects. The research proposes that Oromia Water, Mineral and Energy should deal with the causes of slow close out as spell out by the current work and file typical practices and construction dealings for each project for future references. For the sake of future study, it is also suggested that potential research should center on the effects of slow close out from the perceptions of the client, consultant and the contractor.

Key Words: Project, Project management, Water supply project, Project lifecycle, project closeout, closeout challenges

1. INTRODUCTION

It is understandable that the majority community outside the project have little awareness of project closeout or why it's vital. Even project actors and stakeholders ignore project close out as an important part of the project management cycle procedure. The project close out phase can often make or break an otherwise successful project implementation. The final step of a project cycle is project close out, which is an important aspect of project management. As a result, this phase takes place after physical construction is finished but before the project is handed over to the beneficiaries. Because of this phase, the project material is archived, the scheduled task is done and organizational team resources are released to explore new activities (PMBoK). Thus, project closeout refers to the completion of a project contract, which includes a variety of administrative, contractual, and technical activities such as punch list completion, provision of "as built" documents and operations and maintenance training, final inspections, corrections, claim and change order resolution, submission of contractor's verification forms, and final acceptance of the project (Tim Mrozowski, etal, 2008).Administrative closure and contract closure are two components of project closure, as stated previously and as defined by Sanghera (2006) and Richman (2012).Administrative closure include operations such as project acceptance, project quality analysis, and knowledge management. Closeout occurs when all administrative activities have been finished, all issues have been resolved, and final payment has been made (Busansky 2003).

Contract closeout, on the other hand, is commonly characterized in the contracting community as the time between when the owner can accept the structure for its intended beneficial use, referred to as "substantial completion," and when the contractor receives final payment.

The mechanics of the closeout process, as well as the persons involved, differ based on the project's type and complexity. For example, in water supply projects, which are the subject of this study, a range of professionals are involved in the process, depending on the scope of the project. Water supply projects range from a very simple on- spot spring capping to big dam construction with longer pipe laying system. In many instances, however, the end of the contract cycle is plagued by slowdowns resulting from various sources leading to a lengthy, detailed and time-consuming phase.

1.1.PROBLEM STATEMENT

Project managers in a variety of industries and organizations are concerned with closeout. The project closing phase of project management of water delivery projects in Ethiopia's Oromia region is the subject of this thesis. While there is a lot of literature on project management, there is very little discussion on project closure in that literature (Havila & Salmi, 2009; Havila et al., 2013). As a result, there are few methods for dealing with the project closure stage (Havila etal, 2013). According to experts, contract closeout is a widespread issue with serious consequences. Owners may waste administrative time, project users may be dissatisfied, project partners may get tense, and smaller contractors and subcontractors may face cash flow problems as a result of closeout delays.

According to studies, inefficient closeout procedures are caused by a variety of variables and sources (such as a lack of closeout stage planning, punch lists, poor contractor response to requests, and the owner's inattention).The typical project closeout scenario, according to Pinto et al (1998) and Tim Mrozowski (2008), is anything but smooth because team members are focused on the next job rather than the one at hand, problems exist that need to be resolved, resources are running out, and finally, near the end of the job, the need to produce

documentation becomes critical. In this day of tight budgets and limited funds, a timely and successful project closeout is unquestionably in the best interests of all project stakeholders. Beyond time and economic considerations, the necessity of timely contract closeout cannot be overstated.

Sahle (2019) conducted a recent study on contract closeout on federally sponsored town water supply projects in Ethiopia. He discovered various closeout problem factors, including early termination and redesigning, an insufficient closeout plan, a lack of a closeout report, and, most importantly, a tendency to limit temporary acceptance paper signing to merely signing the temporary acceptance paper.

During preliminary review Sahle's work in early February 2020 to have research topic, it is found that four of the fifteen towns he mentioned in his study (Dambi Dolo, Fiche, Gabra Gurracha and Holeta) were towns of Oromia, the biggest region in the country with vast experience of implementation of water supply projects. Fortunately in the mentioned time, the researcher had a chance to visited Borena Water Network Project which commenced before 12 years back. The Federal Ministry of Water, Irrigation and Energy still supports with budget this project using its special sector support directorate though the main financer of the project is Oromia regional state. These and other related issues inspired the researcher to look deeply at water supply project closure of Oromia Water, Mineral and Energy Bureau.

Every Ethiopian physical year, Oromia Water, Mines and Energy Bureau enters contracts with water supply contractors and consultants. Unfortunately, this and other water supply construction projects that have been running smoothly and on time throughout the most of the project can become slowed down during the project closeout phase.. Furthermore, water supply construction projects that were supposed to be completed on schedule have not been

completed. This situation, combined with a lack of proper research on the country's water supply shortage, prompted the researcher to write this thesis.

1.2.RESEARCH OBJECTIVE

Despite the fact that a lot of organizations have identified challenges with this phase of a project, little study has been done.

This research defines the goals of the research project that will be completed as part of the Master of Art in Project Management thesis. The study will look into the construction closeout processes for water supply projects at Oromia Water, Mines, and Energy Bureau (OWMEB) level.

The study's overall goals are to evaluate project closeout methods and problems in the context of Oromia Water, Mines, and Energy's water delivery projects. The goal of this water supply construction project closeout study is to conduct a comprehensive review of the literature on closeout, assess factors that influence water supply project closeout processes, and develop effective strategies and recommendations for improving water supply construction project closeout procedures. Implementation of the advice, according to the researcher, can reduce delays, administrative time, issues, and expenditures associated with this phase of a construction project.

The specific objectives are:

- To review project closure standard practices and researches of water supply project closeout and compare the outputs with the practices at Oromia Water, Mines and Energy Bureau,
- To identify internal and external challenges/factors related to water supply projects closeout at the bureau.

- To provide a series of strategies to recapture control of the water supply project closeout process all within the context of the stakeholders involved.

1.3.RESEARCH QUESTIONS

The research has an intention to answer the following questions.

- How water supply projects are closed in Oromia Water, Mines and Energy Bureau level? Is the process follows the common steps concerning project closeout?
- Which problems/challenges the bureau faces in the course of closing out water supply projects?
- What are the strategies to recapture control of the water supply project closeout process the bureau ought to perform in closing out water supply projects?

1.4.SIGNIFICANCE/JUSTIFICATION OF THE STUDY

The study sheds light on the elements that influence project closure as well as the current trend in water supply closure procedures. The findings of this study will be useful to water supply industry practitioners as well as relevant bureaus in establishing better practice and look-ahead planning and scheduling closing out projects. The study also adds to what we already know about project closure and invites others to dig more into the subject.

1.5.SCOPE OF THE RESEARCH

The problem of water supply project closure affects people all around the world, yet the scope of this study is limited to Oromia's borders. It focused on current procedures, as well as internal and external problems that affect water supply project closeout. Those participating

in water supply projects in Oromia will be surveyed and interviewed. Project closeout methods in various industries and areas are not under this study.

2. LITERATURE REVIEW

The accompanying subsections deal with project management, stages in project lifecycle, project closure, the importance of project closure, the problems encountered during project closure, and water projects and sector organization development in Ethiopia.

2.1. PROJECT

Exact comprehension of the definition and key qualities of project is of critical significance. Any project isn't only an approach to make or accomplish something however it's a chance to accomplish so wanted outcome by executing a methodical administration approach. In case there is on single quality which separates a project from routine business of industrial tasks, it is its peculiarity. No two projects are ever precisely indistinguishable.

There are many written definitions of a project. Marriam-Webster for instance defines project as a planned undertaking: such as a definitely formulated piece of research, a large usually government-supported undertaking, or a task of problem engaged in usually by a group of student to supplement and apply classroom studies.

As per the Project Management Institute (PMI), the term project alludes to a transitory undertaking embraced to make a novel item, administration, or result (PMBOK,2017). The impermanent idea of project shows a clear start and end. The end is arrived at when the project's destinations have been accomplished or when the venture is ended in light of the fact that its targets will not or can't be met, or when the requirement for the project no longer exists. Another definition from Harold Karzner (2009), a project can be viewed as any series of activities and assignments that: have a particular goal to be finished inside specific details, have characterized start and end dates, have financing limits (if pertinent), burn-through human and nonhuman assets (i.e., cash, individuals, gear) and are multi-functional (for example cut across a few useful lines).

PRINCE2 (2009) defines a project as a temporary organization that is created for the purpose of delivering one or more business products according to an agreed business case.

Rodney Turner (2008) describes a project as a temporary organization to which resources are assigned to do work to deliver beneficial changes.

As clarified before, hardly any definitions were chosen since they are genuinely illustrative of most ordinarily acknowledged meanings of the term 'project.' More authoritative explicit definitions can likewise be found. While inspecting different definitions, a few shared traits start to arise; three qualities that are regularly acknowledged as the characterizing highlights of projects:

- Temporary
- Unique
- Creating Output

Temporary – The temporary idea of a project shows that a task has a positive start and a clear end. The start is set apart by the beginning of the project and the end is arrived at when the project's goals have been accomplished or when the task is ended for some other explanation. 'Temporary' is likewise one of the attributes recognizing a project from ordinary activities. Temporary doesn't really imply that the length of a project is short. It just alludes to the commitment of a project, and not to the item, administration, or coming about deliverable. The temporary aspect of the project can be conceptualized in consideration of the construction project. The construction of the building requires a certain time. However, after the construction project is completed, the building will remain in place for a longer period of time.

Unique – Every project is unique. This is another aspect that distinguishes the project from normal operations. There may be duplicate elements in project deliverables and activities, but

these elements or their combinations are always different. Similarly, building construction projects can be used as a conceptual example. A specific structure can be designed by the person who designs other buildings, or it can be built by the person who constructs other buildings, and made of the same materials as other buildings. However, a single architectural project combines these elements in a unique way. Combine specific buildings with specific designs using selected materials to create unique architectural projects.

Creating Output – Each project creates a certain type of product, service or end result. These products are called deliverables and are the reason for the existence and occurrence of the project.

2.1.1. WATER SUPPLY PROJECT

The planning and design of the water supply project aims to provide safe drinking water and good sanitary conditions, so it is essential to protect the health of the community by limiting the spread of infectious diseases and helping to maintain a hygienic home environment. At the same time, they free people (mainly women and children) from the monotony of carrying water and give them more time to devote to other activities, thus greatly promoting human dignity and economic opportunities.

2.1.2. COMPONENTS OF WATER SUPPLY PROJECT

There are four components of water supply project or water supply scheme.

• **Collection work**: Collection works collect water from sources. There are two main sources of water: surface water and groundwater. Dams and barrages are built to collect surface water, but Tube Well is used to collect groundwater.

• **Treatment work**: Treatment treats water obtained from the source. Most of the surface water needs treatment, since it is contaminated by suspended particles. Underground water may not require treatment. One of the problems with groundwater is a high salt concentration.

Treating this one is more expensive. In such cases, surface water is used if the groundwater contains a high salt concentration. The subway water can also include elements such as iron, magnesium. If the water collected is contaminated with a pathogen, it should be treated to kill the bacteria. Therefore, treatment work may not be part of a water supply project.

• **Transmission work**: If you are away from the water source, we need an energy transmission operation to transport the treatment plants and then transport the treated water from the treatment plant. In some cases, the transmission work can be eliminated.

• **Distribution work**: In distribution work , processing water is supplied to consumers when using air tank.

The following two requirements must be met while distributed to the community:

1. The amount of water should be sufficient depending on demand.

2. The pressure should be sufficient..

2.1.3. ORGANIZATION OF WATER DEVELOPMENT SECTOR

Universal access to an adequate and safe drinking water supply has been considered a human right and requires organized efforts by all parts of society to achieve it. The experience of successful water supply projects around the world clearly shows that the highest administrative level of the central government must act (Wagner, E. G. and Wanuoni, L., 2020). The term "central government" should be interpreted as federal government in countries where centralized management of water supply plans is highly developed and in countries with decentralized management such as state or provincial government. In any case, most of the technical and financial resources are usually used at this level for the development of public water supply. The initial planning concept is usually the result of the thinking and planning of this level of government management. Depending on the organizational model of a country, the central agency responsible for formulating and executing this work will vary.

As Dessalegn (1999) pointed out, the supply of drinking water began in Ethiopia in the late 1950s under imperial administration. In this case, until the establishment of the Water Resources Commission in 1971, there was no competent authority to deal with different issues of water use and development. Since then, although the apparent urban trend of the previous government has seriously affected investment in rural water supply, it has worked hard to provide potable water to urban and rural areas. This situation, combined with other factors, has resulted in a low level of drinking water supply in the country. Since the establishment of regional departments such as the Oromia Office of Water, Minerals and Energy in 1993, the situation has improved after years of continuous efforts.

2.2. PROJECT MANAGEMENT

According to “A Guide to the Project Management Body of Knowledge, PMI, sixth Edition”, “Project management is the application of knowledge, skills, tools and techniques to a wide range of activities to meet the requirements of a specific project”. On the other hand, the project management quality standard ISO 10006 defines it as: "A unique process that consists of a set of coordinated and controlled activities with start and end dates, designed to achieve goals that meet specific requirements, including time, cost, and resource limitations. " Another definition from the British PRINCE2 project management standard is: "a temporary organization that needs to use predetermined resources to produce unique and predetermined results or results at a predetermined time". The International Project Management Association (PMA) defines a project as "an operation with time and cost constraints to achieve a set of defined deliverables that meet quality standards and requirements." Although the PMBOK definition is one of the descriptions related to project management, it again fully represents the most commonly accepted definition of the term. This is because project management is accomplished through proper application and integration of the project management process

identified for the project. Project management enables organizations to execute projects effectively and efficiently. In other words, project management is the planning, implementation, and monitoring of project activities to achieve project goals, through effective control and balancing of time, cost, and scope constraints, to produce quality deliverables. that meet or exceed project expectations. Concerned parties.

2.3. PROJECT LIFE CYCLES

According to the concept of project management, projects go through different life cycles, which are characterized by different sets of activities or tasks, which move the project from concept to completion. There are large projects and small projects, but all have cost, time and resource constraints (Robert Wysocki and James Lewis, 2001). As projects become increasingly complex, it is important to structure and define project elements throughout the life cycle so as not to get lost in the hustle and bustle. One way to organize a project is to divide it into five phases of the project: initiation, planning, execution, follow-up and closure (PMI, 2017)

a. Project initiation phase: In the project initiation phase, the project is officially launched and named. The project manager defines it on a broad level. The project sponsor and other important stakeholders conduct due diligence and decide whether to commit to the project. According to the nature of the project, relevant parties conduct feasibility studies. In most sectors, such as the construction industry, this is the phase where the team finalize the project charter.

b. Project planning stage: In the planning stage, the project team organizes and combines individual cost, scope, duration, quality, communication, risk, and resource plans to create a comprehensive project plan. Some of the important activities that mark this stage are the creation of work breakdown structures, schedules, milestone charts, Gantt charts, and

resource estimation and allocation. The team also determines the stakeholder communication model based on milestones, deadlines, and important deliverables. The project team allocates time to develop a plan to manage identified and unidentified risks, as this can affect all future aspects of the project. The risk management plan includes risk identification and analysis, risk mitigation methods and risk response plans.

c. Project execution stage: In the project execution stage, the team develops and completes the project deliverables according to the project plan. At this point, project managers and other partners gain indicators through status meetings, project status progress, workload reports, and implementation reports. This critical phase provides a clearer indication of the success or failure of the project for the project team and everyone involved.

d. Project follow-up phase: The project follow-up phase and the execution phase occur simultaneously. The focus of this phase is to measure the performance and progress of the project according to the project plan. Scope verification and control are to verify and monitor the extent of scope, while change control is to track and manage changes to project requirements. The project manager calculates key performance indicators for cost and time to measure degree of change (if applicable). In this case, the team determines corrective measures and action plans to keep the project on track. To prevent the project from failing, consider why the project might fail and how to avoid it.

e. Project closing phase: In the closing phase, the project team and stakeholders formally end the project. This stage includes performing many important tasks, such as delivering products, releasing resources, rewarding team members, and officially terminating the contractor's employment or services. The project manager convenes an after-event meeting to evaluate which aspects of the project are progressing well and which aspects have not learned lessons. The project team can also view the to-do list to ensure that all deliverables, no matter how small, have been completed. At this point, the project manager prepares the final budget

report and project report. The entire project team will also complete, organize and store all project documents.

Figure 2-1the five project life cycles and their prominent activities (Robert Wysocki and James Lewis, 1992).

2.4. PROJECT CLOSE OUT

Project closure or termination is the final stage of the project life cycle. This phase begins after all project deliverables in the scope statement are completed. However, despite the success in the early planning and execution phases, there are still several project managers struggling in the closing phase. This is because the end of a project requires strong technical and personal skills (Amos Haniff and Mohamed Salama) The biggest challenge the project manager faces after completion is to show understanding of people's problems and compassion for the team, because the team may be involved in the project. Will feel unmotivated. end. Probably for this reason, some authors, proposed that "project completion" should be regarded as a project in itself. In fact, the task of closing the project meets the classic definition of the project as a single company with specific resource constraints. Spire and Hamburger made a very useful closing WBS. This identified many potential problems in the shutdown phase. When the project begins the completion process, these are broken down into intellectual and emotional factors that management must address.

2.5. CONDITIONS FOR PROJECT CLOSURE

The project is temporary, so it must be closed. When we plan a project, we will arrange the project completion and closure accordingly. However, the project may be closed for various reasons. Gray and Larson (2008) identified five scenarios for project closure:

1. **Normal closure**: The common condition for project closure is that the project is completed as planned. This is the realization of the project goal, the customer accepts the project, and the normal project closure begins.

2. **Closing prematurely**: Many projects have not achieved all their deliverables or have no chance to do so. Instead, they end early by deleting the project elements originally identified in the project scope. This may be due to cost, when the client reduces project funds or the project has already consumed the budget. Premature closure can also occur when a project is strategically important and needs to be delivered earlier than expected (such as a new product launch). Delaying the product to the original completion date can result in lost opportunities for customers.

3. **Permanent projects**: On the contrary, some projects seem to have no end. These projects have many delays, frustrations and problems. Permanent projects are also affected by endless changes, add-ons, and scope changes. The problem with these types of projects is that they can never achieve their goals or objectives due to changes and constant scope filtering. This makes the project manager and project team feel very frustrated. For customers, this can also be very frustrating because they do not see that the project goals are being achieved, despite the constant demands for changes. At some point, the project manager must set the scope and plan for closure. Redefining the scope of the project to force closure of the project, limiting budget or resources, or setting time limits can do this. Therefore, any addition requested by the customer can be considered as the second phase of the project, rather than a permanent project

4. **Failed projects:** Projects are often closed due to failure. There are many reasons for project failure. It is not uncommon for clients to run out of funds and permanently terminate projects. Other common

project management literature tends to focus on the early stages of the project and related general project management capabilities, such as planning, scheduling, budgeting, resources, and motivation. Only a small part of the discussion was about project closure (Virpi Havila et al., 2013).

There is no doubt that project closure is a challenging aspect of project management, especially in the construction industry. Nevertheless, due to its unpredictability, variability and dynamics, it has been retreated behind the scenes, and if it is not handled properly, it will bring serious consequences. As the last part of the project life cycle, even large organizations often underestimate its importance, especially when operating in multiple project environments. There is a trend in the construction industry.

Project professionals tend to change the focus of the project to participate in new projects that use scarce time and money resources. Due to this approach, projects continue to fail, and organizations avoid correcting the route because they do not have time to take corrective actions. (Kaul, 2014)

As Tyler A. and Johnson (2017) said, project closure refers to the period from the end of construction to the completion of the contract. During the closure period, resources are kept in the taxation funds used for the project and the contractor's guarantee capacity (Tyler A. Johnson, 2017).

Project closing includes the time and activities from the completion of construction to the completion of the contract (that is, the final payment of the contract, the planned submission and quantity verification of the built project). The

project closure combines two procedures: "The implementation of project deliverables and the documentation of all project experience" (Gardiner, 2005). Project closure is foreseeable, but how and when to manage it has a great impact on the success of the project (Hormozi, 2000). The end of the construction project means that the buildings, bridges, roads ... have been finished and are ready to be delivered to customers.

There is very little literature on the subject of construction project closure, and it is mostly descriptive. In fact, few people seriously tried to discover common ground and create a solid theoretical framework before to help guide professionals in successfully meeting the challenges of completing construction projects. Most of the literature on this topic is limited to suggestions for additional contract language to be included in the administrative procedures for administering the checklist. Alternative project execution systems, such as design and build and construction management and commissioning services, have been developed as possible solutions to problems in the project closure phase (Molenaar and Songer 1998). In addition, organizational forms such as cooperation (Chan et al., 2004), value engineering (Eldin and Hikle 2003) and support for information technology have been suggested, developed and pursued, and moderate results have been achieved (Ballard and Koskela, 1998).

2.5.1. WHY IT IS IMPORTANT TO CLOSE OUT A PROJECT?

The practice of project closure is to complete all completed project activities at all stages of the project to formally close the project and transfer completed or canceled projects as appropriate. The purpose of project closure is to evaluate the project, ensure its completion, and draw lessons and best practices that can be applied to future projects. Generally speaking, for the project contract parties, project closure has the several advantages for different parties involved.

It allows contractors and the government to officially consider a matter closed. For the government in particular get funds de-obligated or get repayment from contractor. It must be noted that appropriated funds are cancelled after 5 years. Delays in settling claims and completing closeout can easily result in the loss of necessary funding. In similar fashion, for contractors, project closure ensures that they are paid in full, including any holdbacks. Moreover, closure starts the clock of client occupancy of the facilities and it signals slacking may result in a crisis later on.

However, in a multi-phase projects, the closure practice can be applied to all phases of the project; when the deliverable is completed, when the phase is complete, when the iteration completes, at a specific time in the project life cycle, or when representing the completed portion of the project work. Applying closure practices in this way will only close a part of the project scope and related activities applicable to that part of the project..

2.5.2. ESSENTIAL COMPONENTS OF PROJECT CLOSEOUT

In the previous section, a broad overview of the project closure was provided and explained why it needs to be managed to achieve a smooth turnaround, but the breakdown of the components of the project closure reveals why a successful project can be accomplished or destroyed in the post-construction phase.

Punch-list

After the physical construction of the project is completed, the construction project manager and architect will walk through the project and record any changes that need to be made. This is called a punch-list and is an main part of the post-construction stage of a construction project. In some cases, the punch-list is considered to be a natural extension of physical construction, while in other cases it is considered to be an integral part of the project closing. Here, we treat the to-do list as part of the management shutdown. The completion of the

punch-list project requires coordination between the project manager, general contractor and subcontractor to ensure that the changes are completed in accordance with the contract requirements and within the project schedule and budget.

Inspection

After construction is completed, necessary inspections must be completed. The project manager will need to meet with the authority inspecting the facility to make certain that the inspection proceeds easily and any problems found can be resolved promptly.

Site cleaning: Ensure that the project site is ready for delivery to clean up any traces of the construction process. Cleaning up the site is a daunting task in itself. In many cases, you need to demolish and relocate temporary buildings, demolish temporary utilities, demolish waste, and rent equipment to return. Improper site cleaning will result in the property not being ready for renovation and may cause project delays at the last minute.

Document collection and delivery

Document collection and delivery is one of the most important parts of construction project closing management. During the project, your construction project administration team will produce several paperwork. This document is important for the record keeping of the owner's team members. This includes not only the paperwork of each entity involved in the project, including the design and engineering teams, general contractors and subcontractors, but also the financial documents of the project. If there is a dispute in a certain part of the project, it is essential to have this document.

Training

Most people forget that the new building is equipped with all the new equipment to operate it. Although you may have the documentation for all the machines and systems included in the documentation delivery, you need to ensure that your employees can operate the equipment. Training the equipment before it goes live is one of the best ways to ensure a

smooth transition. An important part of managing the project closure is ensuring such training. Typically, the construction project management team will organize with the client and their workers to arrange training time.

2.5.3. STEPS AND ACTIVITY GROUPS TO CLOSE OUT A PROJECT

The project closing practice includes two main activity groups (DALE CAIN 2018): **Administrative closing**: The administrative closing process defines the activities, interactions, and related roles and responsibilities of project team members and other stakeholders involved in the execution of the administrative closing procedure for the project.

Performing the closing process includes collecting project records, analyzing project success or failure, collecting experience and lessons, transferring project products or services to production and/or operations, and archiving project information for the organization's future use. Among other activities, the administrative closing includes: confirmation that the project has met all requirements of the sponsor, client and related parties; make sure that all deliverables have been delivered and accepted as well as verifying the exit criteria

Contract Closure – Contract closure includes activities and interactions needed to settle and close any contract agreements established for the project, as well as those related to supporting the formal administrative closure of the project.

Contract closure involves verification that all work has been completed correctly and satisfactorily, updating of contract records to reflect final results, and archiving information for future use. Among other activities contract closure includes: Confirming the project has addressed the terms and conditions of the contracts; proving completion of exit criteria for contract closure and formally closing out all contracts associated with the completed project.

Project close-out should be anticipated and planned as early as possible in the project lifecycle even though it is often the last major process of a project's life. At a high-level, the key elements of project close-out are verifying acceptance of final project deliverables, conduct post-project assessment and lessons learned, conduct post-project review and evaluation, recognize and celebrate outstanding project work, disburse project resources – staff, facilities and automated systems, complete and archive final product records and ensure transfer of knowledge

Verify Acceptance of Final Project Deliverables

The first step in the closing process is the acceptance by the client of the final deliverables of the project. This is a critical and important step because it means that the client accepts that the scope of the project and its deliverables are complete and have been delivered in the manner agreed upon by all parties. Acceptance is based on the success criteria defined during the initiation and planning of the project. This acceptance must be formal, which means that the client, the project sponsor, and the project steering committee must obtain a physical receipt as appropriate.

Conduct Post-Project Assessment and Lessons Learned

In addition to communicating the closure of the written project, it is also recommended to have a mechanism to review and evaluate project groups. Lessons learned learn how to improve project efficiency, save money and lessons learned only after the undesirable result has already occurred. Lessons learned are valuable closing mechanisms for team members, regardless of project results.

The lessons learned session is typically a meeting that includes: Project team, Representation of stakeholders that includes monitoring, auditor and/or quality assurance of the external

project agents, executive management, Maintenance and operation staff and Personal Project support staff

The sessions of the lesson participants usually discuss the different questions such as whether the product delivered comply with the designated requirements and objectives of the project, whether the preference customers comply with the final product or is there observed difference, the cost budget variance, whether there is a schedule creep, presence of identified risks and how these risks were handled, how the planned project management methodology worked, improvement necessary on the process and what bottlenecks and obstacles have been affected by the project. Likewise, the contributors are expected to outline steps needed to carry out in a future project, possible actions in a future project to promote success, and improvement needed for communication

The lessons, comments and comments on project assessments should be documented, submitted and discussed publicly by the intention of eliminating the occurrence of inevitable problems related to future projects.

Conduct Post-Project Review and Evaluation

A post-project review provides a record of the history of a project. It provides written documentation of the planned and actual budget, the baseline and actual schedule, and documents recommendations for other projects of similar size and scope.

The table of contents should include the items like project organization including staffing and skills, schedules, WBS, successful risk assessment and mitigation techniques, e.g. what risks occurred and what techniques were used to mitigate these risks, processes used for configuration management and quality assurance, general techniques used for project communication, general techniques for managing customer expectations, short-term success

factors and how they were met, financial data, culture or environment, lessons learned and recommendations to future project managers

Be certain to identify in the report the project successes, problems on the project, and new ideas that were successful on the project. Make recommendations on how these processes might be adapted for other projects.

Share the project's success with other organizations. In the same way that problem identifications can lead to improvements, successes must be shared so they can be repeated. Where possible, successes should be translated into procedures that will be followed by future projects.

Recognize and Celebrate Outstanding Project Work

Celebrating the success of completing a project with positive reinforcement can be extremely rewarding for project teams. When a project is completed successfully, be certain to provide some kind of recognition to the team. If individuals are singled out for significant achievements, do not forget to recognize the entire team as well.

Management may also want to express recognition of a successful team effort by praising the team at a key meeting or a large gathering of staff. People are proud to have senior management's appreciation openly expressed, and such recognition is a motivation to other projects to be successful.

Complete and Archiving Final Project Records

Historic project data is an important source of information to help improve future projects. All records, both electronic and hard copy should be stored according to record retention guidelines. The technical records will be turned over to the personnel responsible for

maintenance and operation of the system or program after it has been deployed. The project archive includes a description of the files being stored, the application used to create the archived materials, the location where they are stored, and a point of contact for further information. Typically, at a minimum, the following project data is archived: project charter, project plan, project management control documents, correspondence, meeting notes, status reports, contract files, technical documents, all checklists, information that had been placed under configuration control, lessons learned and post-project review/evaluation.

Ensure Transfer of Knowledge

Once all the project information has been accumulated plan for knowledge transfer where appropriate to those who will be responsible for continued operations. Involve the project participants in the hand-off of responsibility.

2.5.4. POTENTIAL ISSUES DURING PROJECT CLOSEOUT

There are some common pitfalls that crop up during project closeout. These project closeout problems can introduce cost delays to a project that is considered otherwise successful. The end result is an unsatisfactory conclusion to a project.

Punch-list Delays

Without comprehensive oversight of the project closeout process, you may run into problems getting items on your punch-list completed. Remember that a project punch-list is a list of things that need to be changed or completed before a project can be considered complete. The punch-list is created after physical construction is completed and is generated with the help of the architect that worked on the project. Any delays in completing these necessary changes can result in costly delays to the project completion timeline.

Incomplete Document Production

As the project owner, you'll want all of the documentation relevant to the project in your hands at the time that the keys are handed over. There are a variety of reasons for wanting a comprehensive collection of project documentation. Not only is it necessary for accurate record-keeping, but you may need documentation for equipment maintenance and warranty services. You may also need documentation in the future if a portion of the construction doesn't match up to the requirements outlined in the contract.

Not receiving all of the documentation for a project is a problem that may not be readily apparent at the time you take over a building. Too often, owners find out they don't have a required piece of documentation months or even years after the project has been completed. By then, it can be difficult to track down the individual or organization that does have the documents you require. The potential complications stemming from this make it a necessity to receive all required documentation as part of the project closeout process and prior to taking ownership of the premises.

Communication Breakdown

Communication is an essential component of any successful construction project. This is true throughout the project, including during project closeout. Communication becomes more challenging once each entity involved in a project begins to demobilize. Getting necessary documents from each entity becomes more difficult as time goes on and individuals and businesses involved in the project move on to other jobs. The slowing and eventual breakdown of communication between stakeholders in the project can introduce significant delays to each aspect of project closeout. Change orders on the punch-list may be delayed, and documents may not be produced.

2.5.5. Conceptual framework

The research is also captured in a conceptual framework that is organized between independent variables and dependent variables. The conceptual framework of the research was developed from several findings of the authors (Kual (2014), Meaga (2010), David (2016), Divya.r, S. Ramya (2015), etc.) Yes. This study was derived by the conceptual frame described below. A conceptual framework is constructed using the relationship between the framework of the project closing principle and customer satisfaction, as shown in Figure 4. It is adopted from theoretical concepts showing the relationship between the main practices of the project closure .

The closure stage has been expanded to show the details of this phase. The study and the focus is about the closure in water supply projects so it tries to explain the activities inside the closure stage that are importance for having a good transition to the maintenance. The planning of the project closure needs to address the resources that would be required during the closing phase. And then the project manager would have to keep a track of the progress of this closing phase. The activities related to the documentation, project review and releasing the resources can be done in the order suitable for the project

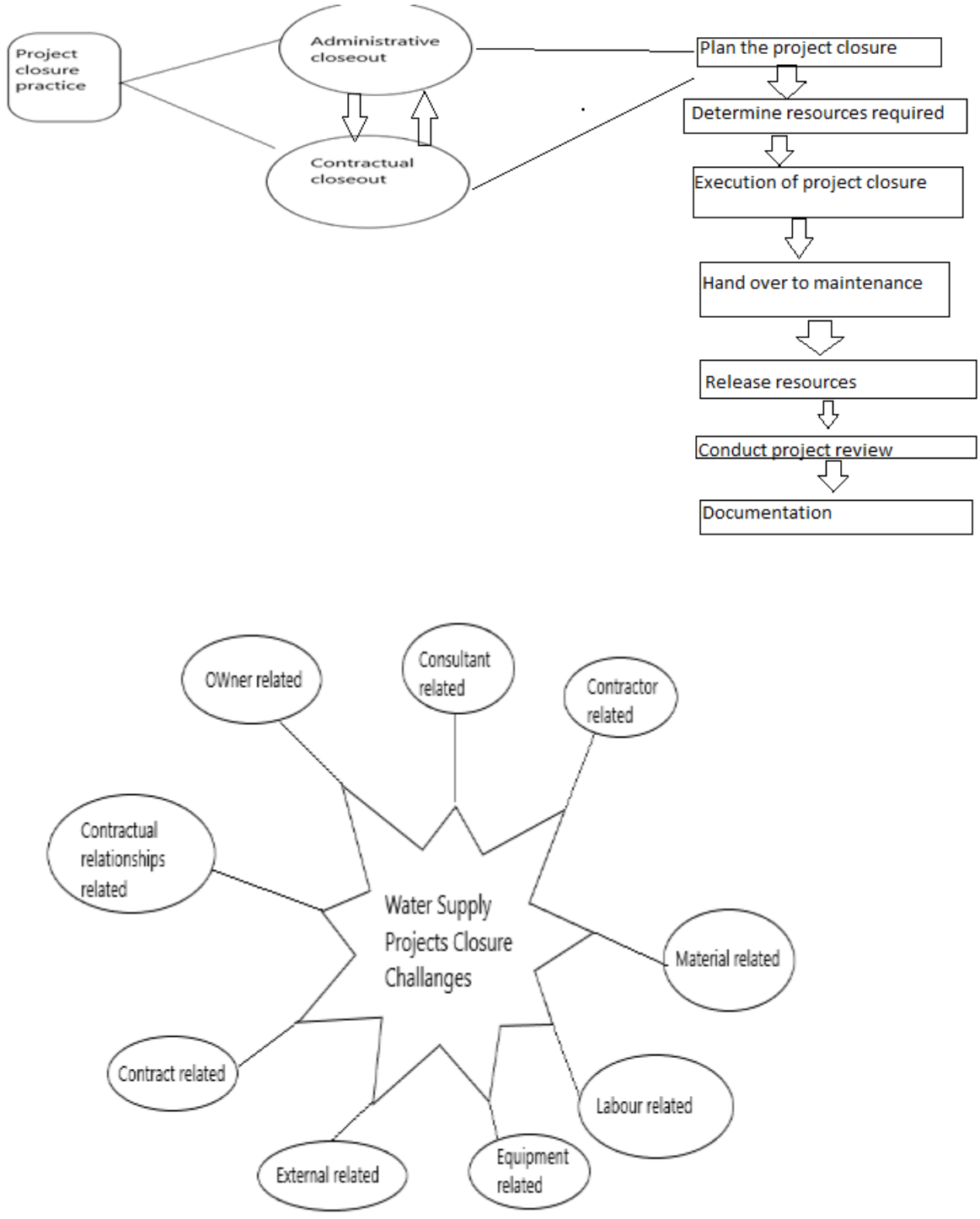


Figure 2-2 Conceptual framework of the flow of the research

3. RESEARCH METHODOLOGY

3.1.INTRODUCTION

This section outlines the methodology used to conduct the research. It looks at the study's research design, data collection and analysis methodologies, sampling methods, limitation and delimitation, and some ethical aspects.

3.2.RESEARCH DESIGN

The context in which data is collected, processed, and analyzed for research purposes is defined by the research design. The study approach, i.e. descriptive and conclusive, adds to this framework (causal). The tenets of qualitative methods to support or disprove a relationship are best accomplished utilizing qualitative methods for the objectives of this study.

As a result, the study used the Oromia Water, Mineral, and Energy Bureau as a case study to investigate the conventional methods of water project closure in Ethiopian construction projects. The answers to the research questions given in chapter one will be found through investigating this occurrence. The technique for conducting this research begins with identifying the problem, which was accomplished through an unstructured literature review, archival research, interviews, and discussions with colleagues and specialists in the field. The data and information sources will be determined after that.

The research tools selected based on the data and information sources, and the available documentary sources relevant to the study is assessed. Books, journals, and articles, as well as digital sources, are included in the review. The methodology used here is descriptive analysis, with data coming from both primary and secondary sources.

3.3.POPULATION

The term "population" refers to the total number of people who share the same characteristics as the topic being studied. The individuals are of interest to the research, according to Polit and Hungler (1999), and generalizations can be formed from them.

Employees of owners/clients, consultants, and contractors of Oromia Water, Mineral, and Energy Bureau's water supply construction projects make up the study's population.

3.4.SAMPLING

The subset of the population chosen to participate in the study is referred to as sampling, and it represents the entire population (LoBiondo-Wood & Haber, 1998). Respondents were chosen for this study using non-probability convenience and purposeful sampling approaches. Because it is difficult to identify all members of the population due to the study's time and location, convenience sampling was utilized. Those who were available to participate were used (Kumekpor, 2002). Purposeful sampling was also used because the respondents to the survey were selectively chosen based on their experience with water supply projects and their professional background (Kumekpor, 2002).

The following are the groups of respondents who were chosen for this study:

1. **Employees of the Oromia Water, Mineral, and Energy Bureau:** these are the employees of the water supply project's initiators and financiers. A total of fourteen (14) respondents were surveyed for this study.

2. **Employees of Consultants of Water Supply Project Designers and Construction Project Supervision:** These are Engineers who design the facility to be built and those who monitor its completion. Employees participating in the planning and supervision of the water

supply project are the target population. Consultants to the owners/clients of the water supply construction project for the purposes of this study. A total of thirteen (13) people were asked.

3. Employees of water supply project contractors: these are the employees of the construction firm that carries out the consultants' design. A total of twelve (12) people were surveyed for this study.

3.5.DATASOURCES

The study relied on primary data obtained from 39 respondents, who are primarily employees of the owners/clients, consultants, and contractors of Oromia Water, Mineral, and Energy Bureau construction projects.

In addition, a desktop data reflecting secondary data and process mapping of existing Oromia Water, Mines, and Energy closeout procedures were used for the literature review, which helped in generalizing the research findings.

3.6.DATA COLLECTION METHOD AND INSTRUMENT

A questionnaire was used to collect data for the study's aims. This method was utilized to allow respondents to react without interference from the researchers, ensuring the accuracy and dependability of the information gathered (Leedy&Ormrod, 2001).According to Kumekpor (2002), questionnaires are a low-cost method of acquiring information or data with minimal interviewer bias, especially when respondents self-administer them. As a result, a self-administered questionnaire based on the study questions was created using a Likert scale..

3.7.DATA ANALYSIS

The Relative Importance Index (RII) and the means score scale were used to analyze the data in an Excel sheet. The RII index assesses the importance of variables in causing slow project

closure and issues with on-time project completion in water supply projects. The purpose of this is to put the findings into context in Ethiopia. This will be measured using the formulas follows:

$$RI = \frac{\sum W}{A*N} (0 \leq \text{RII} \leq 1) \text{ where}$$

W – is the weight given to each factor by the respondents and ranges from 1 to 5,(where "1" is "strongly disagree" and "5" is "strongly agree"); A – is the highest weight(i.e. 5 in this case) and; N– is the total number of respondents.

4. RESULTS AND DISCUSSION

4.1.INTRODUCTION

The study's findings are summarized in this section. It includes information on the respondents' social demographics, project closure stages, including the basic actions performed during project closure, project closure challenges, causes of slow closeout, and solutions.

4.2.PROFILE OF RESPONDENTS

The summary data on the respondents' profile by gender, employment category, years with the company, and current position in the organization are presented in Table 4.2.1. According to the results, males made up 95% (37) of the respondents, while females made up 5% (2), making males the majority of the respondents. Whether a respondent was from the Oromia Water, Mineral, and Energy Bureau (OWMER), a consultant for a water supply project, or a contractor for a water supply project defined the category of respondents. OWMEB accounted for 36% (14%), contractors accounted for 31% (12), and consulting firms accounted for 33% (13%). This signifies that all three categories were almost represented in the same manner. Furthermore, 30% of respondents had worked for at least five years, 44% for six to ten years, and 26% for more than ten years. This indicates that the respondents have extensive job experience, which has aided them in providing objective responses to the survey. Furthermore, 64% of the respondents were senior managers, 35% were junior managers, and the remainder were from different positions within the firm. This indicates that the majority of the respondents were members of their organization's senior management team.

Table 4.2.1: Profile of respondents

	Variables	Frequency	Percent
i.	Gender of Respondent		
	Male	37	95%
	Female	2	5%
	Total	*39*	*100%*
ii.	Category of Respondents		
	Employee of Owner/Client of Water project	14	36%
	Employee of Contractors of Water project	13	33%
	Employee of Consultant of Water project	12	31%
	Total	*39*	*100%*
iii.	Years of Employment with your organization		
	0-5	12	30%
	6-10	17	44%
	10+	10	26%
	Total	*39*	*100%*
iv.	Current Position in organization		
	Senior Management Staff	26	64%
	Junior Management Staff	13	36%
	Total	*39*	*100%*

Source: Questionnaires" surveyed,2021

	Total	*39*	*100%*

Source: Questionnaires" surveyed,2021

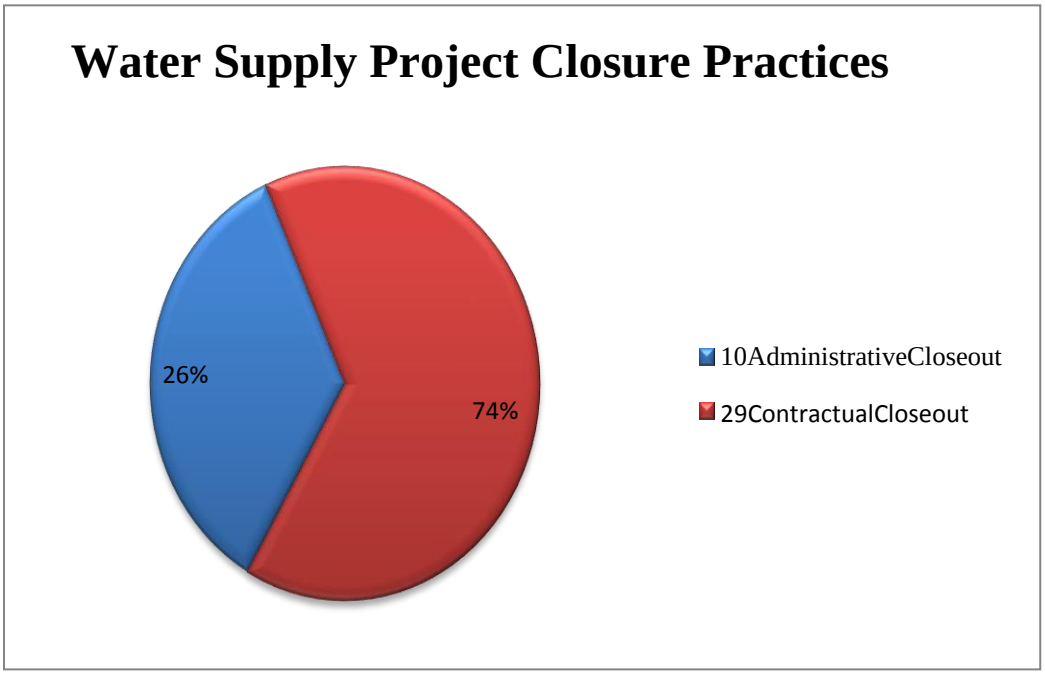
4.3.IDENTIFICATION OF WATER SUPPLY PROJECT CLOSURE PRACTICES

4.3.1. STAGES OF CLOSURE OF WATER SUPPLY PROJECTS

Respondents were asked to describe the basic stages of their organization's water supply project closure. Contractual closeouts were reported by 74% (29) of respondents, whereas administrative closeouts were reported by 26% (10) of respondents. Figure 4.3.1.1 shows

how this is done. According to section 2.2.1 of the FTA Construction Project Management Handbook (2006) and ITRM Guideline for Project Management (2006), the respondents recognized two (2) project closure practices: administrative and contractual project closure. According to the guideline administrative closure practices are significant in construction projects.

Figure 4.3.1-1:Water Supply project closure practices



Source:Questionnaires'surveyed,2021

4.3.2. EXTENT OF ADHERENCE TO PROJECT CLOSURE PRACTICES

Respondents were asked to rate the extent to which Oromia Water, Mineral and Energy (OWMEB) conforms to the following project disclosure policies on a scale of 1 to 5, with 1 representing strongly disagree and 5 representing strongly agree.

4.3.2.1. CONTRACTUAL CLOSEOUT

The relative importance index, as well as the mean score, are used to demonstrate respondents' level of agreement with contractual project procedures at OWMEB in Table 4.3.2.1.1. below.

Table 4.3.2.1.1: Ranking of contractual closeout practices

Contractual Closeout Practices	**Relative Importance Index (RII)**	**Rank**
Make final payment	0.826	1
Conduct a final inspection of the facility to test for quality	0.8	2
Obtain project acceptance from the principal stakeholders	0.8	3
We do prepare manuals on how to use the facility and its current status	0.783	4
We do prepare manuals on how to use the facility and conduct training	0.757	5
Resolve any claim disputes with the owner/clients	0.757	6
Provide certificate of beneficial occupancy to the owner to use the facility	0.739	7
Commission/launch the facility	0.713	8
Provide guaranty that the facility does work and warranty for after construction service	0.678	9
Prepare punch list after defects liability period	0.652	10
Mean Score:3.75		

Source: Questionnaires'' surveyed,2021

From the findings, "Make final payment" ranked first among OWMEB's contractual closeout practices, with a relative importance index of 0.826. This was followed by "Conduct a final inspection of the facility to test for quality," with "Preparing punch list after defects liability period" ranking last with a score of 0.652, indicating that it is less important to contractual closure. As part of its water supply project closure activities, OWMEB followed the final

payment practice to a tee. This suggests that the focus is on effecting the money owed rather than pursuing the entire project closure procedure and steps. It is feasible to draw from this that standard procedures should be followed. When the beneficiaries obtain services of fetching water from the contractor's built facilities, the water supply project is considered substantially completed, signifying that the contract is legally completed. Making final payment, on the other hand, had a good score of 0.826, indicating that OWMEB meets its financial responsibilities under its outsourced projects. It goes without saying that preparing a punch list after the defects liability period is a critical activity of contractual close out, despite the fact that it is ranked last on the OWMEB. Perhaps the last thing they assess as part of their contractual closing activities, but they do consider the infrastructure's quality, assuring value for money.

The average amount of marks to all practices was 3.75, suggesting that respondents were in agreement with all contractual closeout methods.

4.3.2.2. ADMINISTRATIVE CLOSEOUT

The relative importance index, as well as the mean score, are shown in Table 4.3.2.2.1 to illustrate respondents' level of agreement with OWMEB administrative project practices.

Table 4.3.2.2.1:Ranking of administrative close out practices

Administrative Closeout Practices	**Relative importance Index(RII)**	**Rank**
Close project accounts	0.809	1
Collection and Compilation project records such as procurement records, performance reports, changes in contracts, etc.	0.8	2
Conduct project demobilization to relocate project staff	0.773	3
Informing Stakeholders about project closure in the form of letter and other written documents indicating their acceptance of the project deliverable	0.773	4
Conduct project evaluation to document lessons learnt	0.745	5
Mean score:3.730		

Source: Questionnaires'' surveyed,2021

With a relative importance value of 0.809, "Close project accounts" placed first among OWMEB's administrative closeout practices. Because this practice is less important to OWMEB, they adhere to it fairly. Following that, project records such as procurement records, performance reports, contract revisions, and so on are collected and compiled. Undertake project demobilization to relocate project personnel, notify stakeholders of project closure through letter and other written documents showing their acceptance of the project delivery, and conduct project evaluation to capture lessons learned.

The mean amount of marks to all practices was 3.730, suggesting that respondents agreed with all of OWMEB's administrative closeout procedures.

4.3.3. CHALLANGES ASSOCIATED WITH PROJECT CLOSURE

Respondents were asked to rate how much they agreed with the problems mentioned in relation to water supply project closures. The delayed closeout procedure and documentation are the two key issues, with documentation containing two aspects. The amount of agreement on issues related to project closeouts is shown in Table 4.3.3.1 below.

Table 4.3.3.1:Ranking of Challenges associated with water supply project closeouts

Challenges Associated with Project Closeouts	RII	Rank	Mean Score
Presence of slow close out process	0.609	1	3.046
Documentation			
Documentation of the standard project closure practices	0.727	1	3.523
Documentation of construction events e.g. errors and mistakes to serve as reference point	0.682	2	

Source: Questionnaires' surveyed,2021

With a mean score of 3.523, the data show that documentation is the most common issue related with project closeouts, followed by the presence of a sluggish close out procedure

with a mean score of 3.046.Meanwhile, sluggish closeout processes are an issue linked with water supply project closeouts at OWMEB, with a RII of 0.609, while documentation is a problem related with project closeouts with a high RII of 0.705. (average).This suggests that while paperwork is a major issue with OWMEB's water supply projects, slow out is not, meaning that OWMEB will be able to complete its project on time.

4.4.CAUSES OF SLOW OUT

Respondents were asked to rate how much they agreed with the stated causes of the biggest issue with OWMEB project closeouts. Consultant-related, equipment-related, contractor-related, contract-related, and contractual relationships-related; owner/client-related, materials-related, externally-related, and labor-related were the categories of causes. Table 4.4.1 below shows respondents' level of agreement with cause of the problems.

Table 4.4.1: Causes of Slow out

Causes of slow out	RII	Rank
Owner/client related such as deferment of payments, postponing the site delivery to the contractor, insufficient of communication and co-ordination, delay in revising and approving design documents as well as change order during construction	0.782	1
Consultant related such as Inadequate experience of consultant, poor communication and co-ordination, errors and discrepancies in design documents, vague details in drawings	0.782	2
Contractor related such as rework due to mistakes during construction, poor co-ordination and communication, ineffective planning and scheduling of project, poor qualification of contractor's technical staff, delay in sub- contractors' work	0.773	3
Material related such as Shortage of construction materials, deferment of material delivery	0.755	4
Equipment related such as frequent equipment breakdown, shortage of equipment, low level of equipment operators and low productivity and efficiency of the equipment	0.745	5
Labour related such as shortage and unavailability of skilled labour, conflicts among labour, changes in material types during construction and late purchases and supply of materials	0.673	6
External related such as Late permission obtained from government organizations, weather effect on construction activities, accidents during construction, rises in prices of materials and delays in providing utility services	0.673	7
Contract related such as Unrealistic project time frame by stakeholders	0.645	8
Contractual relationships related such as clash of interest among stakeholders on the achievement of the project's deliverables and objectives	0.609	9

Source: Questionnaires' surveyed,2021

With a relative importance score of 0.782, “Owner/client-related and consultant-related practices” placed first among the reasons of slow out difficulties in OWMER's closeout processes. Contractor and material-related RII rank scores of 0.773 and 0.755, respectively, were next. According to the study, contractual relationships have a lower impact on producing delays in water delivery projects. Meanwhile, equipment-related issues are also important in understanding why OWMEB's water supply projects are taking so long to complete. The average score for the responses was 3.576. Because there is no standard ranking for the causes of delayed out in water supply projects, the findings are unique to this study. Furthermore, the research shows that multiple methods were utilized to rate the discovered causes. The relative importance index, mean score, frequency index, severity index, and rank correlation were all utilized in some studies. However, a critical examination of studies on the causes of slow out discovered the five (5) ranked categories that featured in most studies in descending order, i.e. 1, 2, 3, 4,5, with the owner/client cause listed first.

4.5.RESPONDANTS' SUGGESTIONS FOR SUCCESSFUL WATER SUPPLY PROJECTS CLOSURE

Respondents were asked to make mitigation suggestions for each of the issues listed in the previous section. Because this was an open-ended question, their responses/recommendations were classified and grouped according to similarities.

Table 4.5.1: Causes of slow close out and recommendations

Cause of slow close out	Recommendation(s)
Owner/Client Related	• Confirmation of source of water before start civil work construction • Releasing payment on time for the executed works • Allocation adequate budget • Taking measures in reasonable time regarding change works, design appraisal, approval and changes • Immediate site delivery to the contractors • Communication: regular meeting, contract based, sense of ownership • Revise supervision system that responsibility and accountability shared. • Create retaining system for experienced manpower
Contractor Related	• Early planning, scheduling and mobilizing is needed • Provide adequate resources and deploying competent and skilled professionals • Have good communication and frequent discussion with both client and consultant • Implement the given works as per agreed contract document • Early review of documents such as drawing adequacy and specifications • Avoid/reduce reworks and mistakes • Evaluate project performance timely • Recording is very important • Due attention to ethics and professionalism
Consultant Related	• Assign adequate number of staff and experienced engineers • Maintain consistent design quality assurance system • Enhancing and upgrading skills of the personnel frequently • Precaution should made to drawings and bill of quantity • Avoid/ reduce design errors and designs specific to the given site condition • Have clear drawings and original survey data in documentation • Make the client and other pertinent stakeholders to review and appraise designs • Closely supervise the project during implementation time
Equipment Related	• Quality should be ensured when buying equipment • Ensure availability of equipment with good performance • Own key equipment needed for the work rather than renting them • Equipment early testing care before mobilizing to sites • Establish efficient maintenance crew
Material Related	• Early approval of material quality on site • Materials should be delivered to sites on time and safely • Establish good handling and storage, if condition permits stocking materials is crucial • Ensure required quantity of materials are available • Facilitate construction materials particularly cement to be supplied from factories • Material market inflation should be considered on bid process

Labour Related	• Deployment and retaining of skilled labour • Avoid conflicts among labourers • Ensure workers productivity • In heavy work areas, it is better to use machines instead of labour • On- time payment of wage should be made
ExternalRelated	• Strong support and cooperation from local administration is required • Right of Way problem (like land permit) should be solved in the earliest time • During planning and scheduling, consider rainy season months that may lag execution
Contract Related	• Preparation of Contract document should be with due care and articles listed in contact document should be defined seriously • Set realistic time frames with consultation of stakeholders
Contractual Relationships related	• Minimize contract intrusion of political leaders • Encourage every party in the contract to apply/ abide to signed contract terms • Contractually written communication is better to mitigate miss information • Smooth relationship among contracting parties and resolve issues timely amicably • Avoid conflict of interest

Source: Questionnaires' surveyed,2021

The findings revealed that the vast majority of respondents (more than 98 percent) had similar responses/recommendations for all of the mentioned causes, or did not offer a recommendation at all.

4.6. DISCUSSION

The majority of the respondents were male senior management employees with more than 5 years of experience with their respective firms. Water project closures were mostly contractual closeouts, according to the majority of the respondents (74%). The scope of procedures under contractual and administrative closeouts are also supported by respondents' level of agreement. The average score for contract closeouts was 3.570, while the average score for administrative closeouts was 3.3.73. With a relative importance rating of 0.826, “Make final payment” was ranked first among the contractual closeout practices at OWMEB. The primary issue with project closures was documentation, which had a mean score agreement of 3.523 from respondents, contrasted to the delayed close out process, which received a mean score agreement of 3.046. Client and consultant concerns were ranked first among the causes of sluggish project closures in OWMEB's project closures, with a relative relevance index of 0.782.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. INTRODUCTION

This chapter summarizes the research, draws conclusions, and offers recommendations to assist OWMEB in completing its water supply construction project.

5.2. SUMMARY OF THE FINDINGS ALONG WITH RESEARCH OBJECTIVES

The goal of the research was to determine from the literature the general project closure practices, stages, and standard practices of project closure used by OWMEB for its water supply construction projects, as well as to determine adherence and compliance with project closure practices and to identify project closure challenges.

The qualitative research method was used in this study. The surveys, which mostly used the Likert Scale and were completed by 39 people, were analyzed to obtain numerical values that could be used to make comparisons and value assessments. The convenience sample technique was used to select the respondents. The study's findings are as follows:

Objective1

The goal of the study was to compare OWMEB's general project closure methods to those found in the literature. Contractual and administrative closeout actions were included in the overall project closure processes described in the literature. According to the findings, OWMEB engages in contractual closeout activities.

Objective2

The study also sought to uncover internal and external challenges/factors associated with the bureau's water supply project closeout.

Two issues with on-time completion of water supply construction projects were found in the study.

- The primary issues with project closing were identified as documentation and a lengthy closeout process. Documentation had a high rating of 3.523, while the delayed close out process received a rating of 3.046..

Objective3

Furthermore, it aims to provide a series of strategies to recapture control of the water supply project closeout process all within the context of the stakeholders involved so that the bureau must take into consideration in order to complete water supply projects.

- The OWMEB shall establish standard close out procedures to follow which are clearly documented for anyone interested including those of contracting parties.
- Furthermore, the bureau has no mechanism of capturing water supply of construction events e.g. errors and mistakes to serve as reference point. As mentioned in literature review part, lessons learned should draw on both positive experiences– good ideas that improve project efficiency or save money, and negative experiences– lessons learned only after an undesirable outcome has already occurred.
- Lessons learned sessions are a valuable closure mechanism for team members, regardless of the project's outcome.
- In addition, the study identified the causes of slow close out process of Water supply construction projects at the OWMEB is categorized into six (6) groups, namely,

consultant, equipment, contractor, contract, contractual relations and owner/client related causes.

- In addition the recommendations set by respondents explained earlier, the table below indicates key actions to be taken by OWMEB on how causes can be addressed.

Table 5.2.1: Suggestions to minimize those causes of slow project closeout

Causes of Slow close out	Ways to mitigate them
Owner/client related	• Facilitate payments as early as possible after checking its reliability. • Avoid frequent design revisions by carefully reviewing design documents ahead of project commencement • Enhance close monitoring and supervision and • strengthen communication with relevant stakeholders to timely address defects and bottlenecks.
Contractor related	• Assign qualified site engineer by contractor to minimize poor workmanship and reworking • Make the client/consultant closely monitor and supervise project work to rectify defects timely • Strengthen communication and coordination among relevant stakeholders for effective and efficient project implementation, • Monitor that technical staffs of the contractor's and consultants' competency and qualification. Is as per the contract agreement, • Well organized and effective planning and scheduling of project works, machineries, equipment usage and project personnel to enhance efficiency and effectiveness of the project implementation.
Consultant related	• Careful preparation of Terms of Reference for recruitment of consultants both staffs' and firms competency and experience on similar assignment. • Enhance close communication and coordination between consultant and the client through regular reporting and on desk discussions. • Exercise thorough design document review and appraisal ahead of project commencement.
Equipment related	• Careful setting of equipment specifications during procurement planning and careful inspection of equipments upon delivery and follow up proper installation of the supplied equipment.
Material related	• Procurement construction materials and early delivery at the stage of the contract signing to avoid price escalation and supply related shortages which may lead to project delay.
Labour related	• Careful preparation of ToR for key staff requirement during bid document preparation and closely follow up their availability on project work as per the agreement by the contractor.

External related	• Government's support to facilitate hard currency for equipment and materials going to be procured from abroad such as pumps, generators, DCI and GS pipes, • Facilitate import of vehicles and machineries on duty free base for the project, • Give priority for public projects on some materials in shortage in the market such cement, RFIB
Contract related	• Assign qualified contract management experts who should properly manage projects and exercise contract management principles and procedure in a consistent and reliable way • Collect, organize, document and manipulate all project related data for contractual management purpose • Take contractual actions as per the contract agreement document
Contractual relationships related	• Enhance coordination and smooth communication among different project stakeholders as much as possible

5.3. CONCLUSION

This study draws attention to the ways that the practices, experience, description and challenge in the process of project closure at Oromia Water, Mineral and Energy Bureau, and their strategies on opportunities to help better alignment between the existing practices and standard guidelines in literatures, and on overcoming challenges for doing so in these situations. It is clear that project closure can be a particularly difficult aspect of client/contractor action and a challenging experience for both the bureau and global level. Closing projects involves making multiple complex decisions with imperfect information. This situation may be compounded by features including stakeholders conflict, resource limitations, risks, competing interests, and urgency. It without doubt involves allocating extra budget, time and commitment. In this way, water supply project closure may leave employees of client and contractors with a lingering burden and extra cost.

As illustrated by the narratives in this study, there are a range of incomplete steps to fully achieve and to promote closing healthy, at least as well as possible in often highly constrained situations. While the efforts of the implementers are not overlooked to full

project closure, the findings shed light on a range of other aspects that are essential of closing and that also indicated careful attention. It is important to acknowledge that planning a project can still be justified, even in circumstances where it is difficult to imagine, at the beginning of the project, what a successful closure might look like. Careful attention to closure across the lifecycle of the project is needed to minimize potential incomplete water supply projects for the user communities.

The analysis presented in this article shown how processes of closing are look like at Oromia Water, Mineral and Energy for people involved in the closure of a water supply project in which the research identified challenges and strategies in the processes to orient project closure.

Thus, it understandable that the outputs of the research revolves around two important points. On one hand the study concludes that the Oromia Water, Mineral, and Energy Bureau's normal project closure processes are contractual and administrative closing actions. When opposed to the administrative closure practice, the contractual closure practice is more adhered to. Furthermore, the main issue with the OWMEB project closure is documentation.

5.4.RECOMMENDATIONS

The following are the suggestions offered by the researcher.

Policy: According to the study, the OWMEB should have a guideline that specifies project closure methods. It will serve as a guide for completing building water supply projects and ensuring that best practices are followed.

Practice: To ensure the successful completion of the project, the research suggests that

OWMEB should use standard project closure methods. Furthermore, the advice mentioned to address the causes of slow project closing are taken into account to aid in making informed decisions during project closure.

Research: As mentioned earlier in this study, water supply closure at OWMED take lengthy time. It is known fact that every water supply project has time essence. Contractors are liable to overhead costs like additional staff salaries, machinery rent and other equipment costs when the project is not properly closed and on process. Similarly, the client faced incurred cost of salaries, bank interest, etc. Thus, it is suggested that time and cost overrun of water supply project should be assessed as a result of inefficient and lengthy project close out.

6. REFERENCES / BIBLIOGRAPHY

AAUSC (2011).Project Management (module).

Arditi, D. &. (2005). Journal of Construction Engineering & Management.*doi*, 866-876.

Arjun, N. (2017). *Construction Project Life Cycle – Phases in Life Cycle of a Construction Project.*USA.

Assaf, S. A.-H. (2006). Causes of delay in large construction project,*Journal of project management*, 349-357.

Atkins. C. H. (1953). Some economic aspects of sanitation programmes in rural areas and small towns (Unpublished working document WHO/Env.San./56)

Ballard, G. &Koskela, L. (1998). 'On the Agenda of Design Management Research' In:, 6th Annual Conference of the International Group for Lean Construction. Guarujá, Brazil, 13-15 Aug 1998.

Barager, J. (2013). *Project closure: Applying the finishing touches.*

Bennet Gustafsson, B. Y. (2013).*Closing IT projects: A Swedish public sector.*Jönköping.

Bpayne and Adrienne Watt.(2012). *Project Management for Instructional Designers.*california.

Busansky, M. D. (2003). *Contract Closeout Pathologies and Recovery Strategies.* Monterey, California: Master's Thesis Report, Naval Postgraduate School.

Carson, C. W. (2009). Planning and Scheduling From Substantial to Final. *AACE International*

Transactions, PS.14.11-PS.14.17.

Carty, G. J. (2012). Selection Criteria Used for the Choice of Contract Type for Major Highway Construction Projects, 121.

Chan et al. 2004).Factors affecting the success of a construction project Journal of Construction Engineering Management, 130 (1) (2004), pp. 153-155

Crowley, L. G. (2008). Liquidated Damages, Review of Current State of the Practice, *Journal of Professional Issues in Engineering Education & Practice*, 134.

Dessalegn R., (1999). Water Resource Development in Ethiopia (online). Available at: http://www.ethiopians.com/Main_FSS_Paper1.htm#rfethio. [Accessed 28 July 2011].

De, P. (2001). Project termination practices in Indian industry: a statistical review,*International*

Journal of Project Management, 119-126.

Dale Cain (2018). Emr Project Manager Marcus Bailey, External Consultant, DvaEmr Project Closeout Report

Eldin and Hikle (2003). Pilot Study of Quality Function Deployment in Construction Projects, Journal of Construction Engineering and Management

El-Razek, M. &. (2008). *project management closeout problem.*

Field, M. &. (2007). *Project Management. London.* Landon.

Fisk, E. R. (2004). *Introduction to Engineering Construction Inspection.*Roterdam.

Gardiner (2005). Project Management: A Strategic Planning Approach, Macmillan International

Gray and Larson (2008).Project management: the managerial process, the McGraw-Hill/Irwin series operations and decision sciences, Higher Education, 2005 M01 26 - 336 pages

Havila, V., &Salmi, A. (2009).*Managing Project Ending*. Oxon, UK: Routledge.

Havila, V., Medlin, C. J., &Salmi, A. (2013).*Project ending competencies in premature project closures,*International Journal of Project Management, 31(1), 90-99.

Kaul, V. (2014).*Excessive delay in Closeout.*Purdue: Purdue University.

Kumekpor, K. B., (2002) *Research Methods & Techniques of Social Research*, Ghana, SonLife Printing Press and Services.

LoBiondo-Wood, G., & Haber, J. (1998). *Nursing research: Methods, critical appraisal, and utilization*. St. Louis: Mosby.

Leedy, P. and Ormrod, J. (2001) Practical Research: Planning and Design. 7th Edition, Merrill Prentice Hall and SAGE Publications, Upper Saddle River, NJ and Thousand Oaks, CA.

Mehdi KalantarHormozi (1998) Department of Engineering, Payame Noor University (PNU), P. O. Box, 18658-65399, Rey, Iran

Molenaar, Keith R., &Saller, Brian J. (2003).*Educational Needs Assessment for Design/Build Project Delivery*, Journal of Professional Issues in Engineering Education and Practice, 129(2), 106-114.

Molenaar, K, Washington, S and Diekmann, J (2000) Structural Equation Model of Construction Contract Dispute Potential. Journal of Construction Engineering and Management, 126(04), 268–77.

Pinto, J. K. (1998).*The Project Management Institute: Project Management Handbook*, 1st ed., San Francisco: Jossey-Bass Publishers

PMBOK.(2017), *A guide to the project management body of knowledge.*

Polit, D. and Hungler, B.: Nursing Research: Principle and Method, 6th ed.; Philadelphia: Lippincott Company, (1999), P.P. 416-417.

PRINCE2, 2017 Edition ,"Managing Successful Projects with ". *Axelos.*

Richman, L. (2012). *Improving Your Project Management Skills 2nd Edition.* New York, USA:

American Management Association

Robert Wysocki and James Lewis, (2001). The World Class Project Manager: A Professional Development Guide, Basic Books

Rodney Turner (2008). Gower handbook of project management, 4th edition, McGraw Hill Professional

Sahle (2019). *Assessing the practice of project closure: evidence from water supply and sanitation projects,* Addis Ababa University, Ethiopia.

Sanghera, P. (2006). *Project Management Professional Study Guide for PMP*. Boston, USA.

Tim Mrozowski, etal (2008). Construction management of steel construction: project management, scheduling and estimating ,USA.

Tyler A. Johnson. (2017). *Streamlined Project Closeout for Construction at KYTC.* Kentucky.

Wagner, E. G. & Wanuoni, L. (2020). 2030 Agenda For Drinking Water, Sanitation And Hygiene In Latin America And The Caribbean A look from the human rights perspective (Unpublished working document WHO/Env.San.l40)

WHO and UNICEF (2004). Meeting the MGD Drinking Water and Sanitation Target: A Mid-Term Assessment of Progress.

WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. Geneva: WHO and New York: UNICEF.

7. APPENDEX

QUESTIONNAIRE

Dear Sir/Madam,

First of all thank you for agreeing to be willing to receive and respond to this study questionnaire. I am currently pursuing my Master's Degree in Project Management with the school of Commerce, Addis Ababa University(AAU). Currently, I am writing my thesis titled **"Assessment of practices of Closing out Water Supply Projects: The case of Oromia Region Water, Mines and Energy Bureau".** The purpose of the study is to identify the practices and challenges associated with closure of Water supply project. This questionnaire is meant to solicit information regarding the topic. Information provided will be used for academic purposes only, thus your responses are strictly confidential and anonymous. It will take approximately 15 minutes to provide your responses to this questionnaire.

Thank you for your co-operation.

Abera Kumsa

Please TICK [√] where appropriate

Section A: Demographics

1. Sex: Male [ ] Female [ ]

2. Category of respondents
   a) Employee of Oromia Water, Mineral and Energy Bureau [ ]
   b) Employee of contractor of Water supply project [ ]
   c) Employee of consultant of Water supply project [ ]

3. How long have you been an employee in your organization?
   a) 0 – 5 years [ ] b) 6 -10 years [ ] c) 10 years and above [ ]

4. What is current position in your organization
   a) Junior Management Staff [ ] b) Senior Management Staff [ ]
   c) Other, please specify:

   …….

Section B: Stages of Closure of Construction Projects

1. In which stages of project management life cycle do you participated? Initiation, planning, execution, monitor and control and closeout. ----------

2. Is project closure/termination formally taken up? ----------

3. When do you start preparing for project closure? ----------

4. How do you determine that it is time to start the project closure task? ----------

5. With which activities do you start with the project closure? ----------

6. What are the challenges you face during project closure? ----------

7. Is any assessment or research conducted as to assist the Oromia Water, Mineral and Energy to improve practices and challenges related out to project close out? (If yes, please indicate the author and title of the research)----------

8. Indicate by ticking on scale 1-5 the extent to which Oromia Water, Mineral and Energy Bureau practices the following project closure practices. .

SD – Strongly Disagree, DA – Disagree, NS – Not sure, AG – Agree, SA-Strongly Agree

Activities	**SD 1**	**DA 2**	**NS 3**	**AG 4**	**SA 5**
Contractual closeout					
a. Prepare punch list after defects liability period					
b. We do prepare manuals on how to use the facility and conduct training					
c. Provide certificate of beneficial occupancy to the owner to use the facility					
d. Provide guaranty that the facility does work and warranty for after construction service					
e. Provide a record drawing indicating the location of the facility and its current status					
f. Conduct a final inspection of the facility to test for quality					
g. Resolve any claim disputes with the owner/clients					
h. Obtain project acceptance from the principal stakeholders					
i. Make final payment					
j. Commission/launch the facility					
Administrative closeout					
k. Conduct project demobilization to relocate project staff					
l. Close project accounts					
m. Collection and Compilation project records such as procurement records, performance reports, changes in contracts, etc.					
n. Conduct project evaluation to document lessons learnt					
o. Informing Stakeholders about project closure in the form of letter and other written documents indicating their acceptance of the project deliverable					

9. The following are the problems associated with construction project closure/closeout. Please indicate your level of acceptance.

Problems	**SD 1**	**DA 2**	**NS 3**	**AG 4**	**SA 5**
Presence of slow close-out process					
Documentation					
Documentation of construction events e.g. errors and mistakes to serve as reference point;					
Documentation of the standard project closure Practices					

10. Causes of slow close-out can be viewed from varying perspectives. These perspectivesare presented in the table below. Please indicate your level of acceptance.

Causes of delays	**SD 1**	**DA 2**	**NS 3**	**AG 4**	**SA 5**
a. **Owner/client related** such as deferment of payments, postponing the site delivery to the contractor, insufficient of communication and co-ordination, delay in revising and approving design documents as well as change order during construction					
b. **Contractor related** such as rework due to mistakes during construction, poor co-ordination and communication, ineffective planning and scheduling of project, poor qualification of contractor's technical staff, delay in sub-contractors' work					
c. **Consultant related** such as Inadequate experience of consultant, poor communication and co-ordination, errorsand discrepancies in design documents, vague details in drawings					
d. **Equipment related** such as frequent equipment breakdown, shortage of equipment, low level of equipmentoperators and low productivity and efficiency of the equipments					
e. **Material related** such as Shortage of construction materials, deferment of material delivery					

f. **Labour related** such as shortage and unavailability of skilled labour, conflicts among labour, changes in material types during construction and late purchases and supply of materials					
g. **External related** such as Late permission obtained from government organizations, weather effect on construction activities, accidents during construction, rises in prices of materials anddelays in providing utility services					
h. **Contract related** such as Unrealistic project time frame by stakeholders					
i. **Contractual relationships related** such as clash of interestamong stakeholders on the achievement of the project's deliverables and objectives					

11. For each of the challenges outlined above, recommend ways to mitigate them

Causes of delays	**Ways to mitigate them**
Owner/client related	
Contractor related	
Consultant related	
Equipment related	
Material related	
Labour related	
External related	
Contract related	
Contractual relationships related	

12. Recommend measures to solve the documentation problem

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