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An Assessment of Factors Affecting Public Sector Project Management in Oromia Regional State, Ethiopia (A Case Study of Oromia Drinking Water Construction Project)

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Abstract:

The aim of this paper is to examine and point out factors affecting public sectors project management of Oromia drinking water construction projects management. For this study descriptive research method was employed. Interview, FGD and questionnaires were used to collect primary and document review was used for secondary data. According to Research Advisors (2006) method at 95% level of confidence, from the total of 277, 160 respondents were selected for the study sample size with simple random sampling technique after stratifying the population. Finally the SPSS version 20 and descriptive statistical tools such as percentages, frequencies and mean, for data presentation, tables, graphs and diagrams were used by the study. After thorough analysis, the paper find out that incompetency of project personnel whose assignment was based on political merit competency, Absence of strong top management support, weak coordination on common goals, fraudulent practices, kickbacks and corruption; and lack of coordination between general contractors and subcontractors, lack of continuous follow up of the project progress, inappropriate input cost control and inadequate pre-contract study were the major factors of Oromia Drinking Water Construction Project Management. Finally, the researcher recommends that it is better if the Bureau should work strongly to set a system that can reduce or if possible avoid fraudulent practices, kickbacks and corruption by changing the mindset of its employees and contractors. Another issue is that the bureau should assign adequate and competent site managers in all projects and participate community water construction projects site selection. Improving its method of cost estimation, the bureau should monitor and evaluate the cost estimation made and considering the changing circumstances before it gets approved.

Keywords: *Water Construction Project, site selection, pre-contract study, contractors and designers*

1. Introduction

1.1. Background of the Study

One of the most important organizational developments in recent years has been the significant growth in project work across different sectors and industries (Maylor et. al 2006). Academic research in the United Kingdom and elsewhere confirm this trend, which looks set to continue with increasing numbers of developments and initiatives being pursued through projects and programs (Midler, 1995). Project whether in private or public sectors is believed to be the cornerstones for the development of a given country if they are managed effectively and efficiently. Project managers play a crucial role in all kinds of projects and influence projects' success (Crawford, 2005).

Chatfield, (2007) defines project management as the discipline of planning, organizing and managing resources to bring about the successful completion of specific project goals and objectives. It is also regarded as a system or process of planning, designing, scheduling, managing and controlling interconnected project activities in order to achieve specific objectives or goal within a specific time, budget and standards (Lewis, 2007). Project Management is an innovative management practice that tends to achieve stated or specified objectives within specific time and budget limits through optimum use of resources (Stuckenbruck & Zomorrodian, 1987). Project management is naturally carried out in different ways depending on the types sector for which the project to be managed (private/public sector). This aspect is very important to be aware of when work methods and structures between different sectors, in different contexts, are compared (Friedman, Dyke, & Murphy, 2009).

Project according to Project Management Institute, (2000) cited in Pinto (2007) "is a temporary activity or endeavor undertaken purposely to create a unique output (product or service) within budget, time and standards. Turner and Muller (2003) in their own words defined project as "an organization of human materials and financial resources in a novel way, to undertake a unique scope of work, of given specification, within constraints of cost and time, defined by quantitative and qualitative objectives so as to achieve a

beneficial change". It helps organization in investing their limited resources in the best way possible in order to achieve recurring success and meeting the expectations of stakeholders.

Project managers play a crucial role in all kinds of projects and influence projects' success (Crawford, 2005). Their role is unique in public sector projects, due to the fact that public projects always deal with multiple, different stakeholders whose opinions can strongly influence the project. Public sectors projects are continually engaging in acquisition of physical assets in various forms such as, residential, commercial buildings, hospital, schools/institutions, and development infrastructure like water, roads, electricity and telecommunication (Friedman, Dyke, & Murphy, 2009).

Government and organizations usually embark on different projects with the aim of creating new service or improving the functional efficiency of the existing ones. All these projects require appropriate skills and techniques that go beyond technical expertise only, but encompass good and sound skills to manage limited budgets, and monitor shrinking schedules and unpredicted outcomes, while at the same time dealing with people and organizational issues (Abbasi & Al-Mharmah, 2000). The application of project management practice in public sector has been identified as an efficient approach which would help in upgrading management capabilities and enable public sector to efficiently complete projects and attain developmental objectives (Arnaboldi *et al*, 2004).

In less developed and developing countries the implementation of project management tools and techniques is still in its early phases of development. It is a relatively modern practice that attempts to achieve planned objectives within specific time and cost limits, through optimum use of resources and using an integrated planning and control system (Abbasi and Al-Mharmah, 2000). According to Schlichter (1999) project management has led a number of organisations to be more effective and efficient in delivery of their products and services, to have more accurate budgeting and scheduling and improved productivity. The growth and acceptance of project management is continuing to increase as resources become scarce in less developed countries.

Project Management has gained popularity as a distinct management concept used to drive not only business objectives, but also the economic development agenda of developing countries including Ethiopia. Several programs in Ethiopia, such as real estate development, railway and road constructions, water construction development, infrastructure development, especially those tied to foreign aid from development partners and Ethiopian own development policy programs (African development Bank, 2011).

In Ethiopia like other countries, construction industry is one of major industry contributing significantly in the growth of socio-economic development. Project management is indispensable for achieving project completion on time and within budget at specified quality standards is major criterion of success of project. Aftab H. and et al. (2010), stressed in their research work that in many developing countries although a lot of money has been spent in construction, the industry is facing a lot of challenges such as the expenditure exceeding the budget, delay to complete the project in time, the building defects and over dependent of foreign workers.

David W. Wirick (2009) also showed that even though every public project impacts society in the same way, every public project has the capability to improve the lives of citizens or the effectiveness and efficiency of government. Managing projects is always a challenge, especially when those projects involve multiple stakeholders, new or unproven technology, shifting or unclear project requirements, and constrained resources. Those project challenges multiply in the public sector, which depends on successful projects to make the changes necessary to cope with a fast-changing world.

Pursuant to the 1994 constitution, Ethiopia has decentralized its administrative structure to nine regions and two city administrations to facilitate the political, socio-economic, and cultural development of the country. Different ministers at federal and respective bureaus at regional are established for effective planning, coordination, implementation and control socio-economic and political issues of the country. Accordingly, there are projects that are administered at federal level and at regional level. Water supply construction project is among those projects which are administered by Water and Energy Minister at federal level under Proclamation No. 691/2010(26) to enforce and promote all national efforts towards the efficient, equitable and optimum utilization of the available Water Resources of Ethiopia for significant socioeconomic development on sustainable basis.

In light of this, the Oromia Regional Government Water and Energy Bureau was established by Proclamation No.162/2003(10) to exercise its power and duties for the enforcement of the regulations thereof. The regional bureau in collaboration with other development partners like Water for Sanitation and Health (WaSH), Millennium Development Goal (MDG) and UNCIEF, who finance the water construction projects, is working to enforce the development of water construction project and to secure the optimum utilization of the available Water Resources of Oromia National Regional State for significant socioeconomic development on sustainable basis.

1.2. The Rationale of the Study

Government both at regional and federal level is devising strategies with the objectives to enforce and promote all national efforts towards the construction of portable drinking water to ensure the efficient, equitable and optimum utilization of the available Water Resources of Ethiopia for significant socioeconomic development on sustainable basis.

This objective can be attained only through proper integration and management of each stage of projects from its initiation to closure (handover it to beneficiaries). It needs to tie project planning into the execution of the project during which there should be constant Monitoring and Controlling of all aspects of the project. According to Oromia Water and Energy Bureau reports, water construction project is not completed as plan and expectations (within scope, time, cost and expected quality). Moreover, water construction projects are among development projects which are often costly and long-term, and hence, errors tend to be equally costly with long lasting effects, usually with some socio-economic implications. Thus, it is imperative to assess and identify most important factors affecting public sectors drinking water construction projects management and propose necessary improvements for the project performances.

1.3. Statement of the Problem

Project management is concerned with the application of knowledge, skills, tools and techniques to project activities to meet project requirements. This is accomplished through the application and integration of the project management processes of initiation, planning, executing, monitoring and controlling and closing (Project Management Institute, 2004).

David Wirick (2009) highlights that project managers in public sector face team management challenges such as: the inability to clearly link performance and reward, compensation systems that are biased towards longevity, and the inability to select project team members based on their expertise. In addition, public sector project managers' work in environment which very often is not familiar with results-oriented project management, and are constantly dealing with political interference in the management of projects and the challenges of working with political appointees.

The new economy is the driving force behind the need for better project management and government across the world is, in fact, facing a perfect storm of increasing demands for services with a decreasing ability to raise revenues. Today's public-sector managers will be required to compete in world markets that will demand much of them and provide them with fewer resources than they need. They will be forced to make their way in an economic environment that is much tougher than that of just a few years ago. The public-sector project is particularly a demanding undertaking, with the requirement to meet diverse demands. Despite huge investment, public sector projects tend to complete behind schedule, indicating shortfall in various project factors (Hendrickson and Au, 2005).

Managing projects is always a challenge, especially when those projects involve multiple stakeholders, new or unproven technology, shifting or unclear project requirements, and constrained resources. Those project challenges multiply in the public sector, which depends on successful projects to make the changes necessary to cope with a fast-changing world. Compounding the challenges of public-sector projects is the shortage of good project managers in the public sector. At the national, regional, state, and local levels, governments are seeking ways to increase the number of project managers at their disposal and build the skills of those they have, so they can manage the complex projects on the public agenda (David W. Wirick., 2009).

In fact, the growth challenges of Sub-Saharan Africa governments are directly related to lack of basic infrastructures, poor organizational capacity, state ineffectiveness and negligible community participation in the decision-making process (Ndulu et al., 2007). A study conducted by the World Bank (2007) on the Ethiopian urban sector highlighted the following challenges of urban development: infrastructure is not managed efficiently and the coverage is also low; top-down planning practices are leading to inefficient outcomes; inadequate management of municipal finances; and poor urban management and governance practices are few to be mentioned.

Another study conducted by the African Development Bank (AfDB) (2011) found that weak institutional capacity, particularly at lower levels of government, is the challenge in Ethiopia. Moreover, the quality and coverage of infrastructure is low even when compared to African peers. As part of development policy and strategy, currently government both at federal and regional level are working hard to enhance and promote Millennium Development Goal by 2015 and Growth and Transformation Plan (GTP) 2011-2015, which aims at increasing drinking water coverage, based on the government's definition, from 68.5% to 98.5% while donors have committed substantial funds to the sector, effectively spending the money and to ensure the proper operation and maintenance of infrastructure built with these funds remain a challenge (MoFED, 2010).

Although the regional government and its development partners continue to allocate huge financial resources to finance infrastructure development- especially, to water construction project, the intended benefits are partly not realized due to many unsuccessful project implementations. As per bureau's annual reports for the past four years, the water construction project performance was very low. On the other hand, the budget used for the projects in the given budget years is not proportional to the performance of the projects as indicated in the table below.

Description	Budget Years (G.C.)						2011-2015 Average
	2010	2011	2012	2013	2014	2015	
Project performance in %	Data not available	56.23	57.41	35.45	60.78	64.42	52.47
Project budget utilization %		99.20	60.78	71.93	107	98.23	84.73

Table 1 : Project Performance and Budget utilization of Oromia Water and Energy Bureau 2010-2015

Source: Compiled from annual reports of Oromia Water & Energy Bureau 2010-2015.

Furthermore, the reports of Oromia Water & Energy Bureau 2011-2015 G.C. shows extreme gap between project plan and actual performance such as planning to dig 29 water walls but only perform 06 (six) water wall in some year and planning for 7 water walls but constructing only 01(one); in the year 2014/15, 37 constructed walls fail to give water and etc., are indicators for problems in the projects. The bureau was ranked among low performers by the evaluation of Oromia Civil Service and Good Governance Bureau (OCSGGB) on overall performance on implementing reform at Oromia Regional Bureaus (OCSGGB report, 2015).

Though rare in Ethiopia, past research works in different country tried to investigate and provide an insight on different problems such as project time delay, cost overruns, quality of public sectors water construction projects. To highlight some; Aftab H. and et al, (2010) conducted a study on Factors Affecting Construction Cost Performance in Management of Projects: Case of Mara Large Projects. A similar study by Mussa, (1999) focussed on factors influencing delays in water projects in Kenya funded by the Government. Similar observations have been made in developing countries like Indonesia (Kaming et al. 1997) and (Kannan, 2001), Vietnam (Long et al. 2004), Nepal (Manavazhi and Adhikari, 2002), and Nigeria (Aibinu and Jagboro, 2002) and (Abdul-Azeez, Ibraheem A., 2011). Various factors for overruns in Saudi Arabia were identified by Assaf et al. (1995), in Ghana (Frimpong et al.

2003) and in Ethiopia Dadi W. et al, (2014) conducted a study on Development Project Management: Experiences of Urban Local Governments in Oromia-Ethiopia; and Yewondemagegn Chekol, (2012), Admasu, Kumie, and Fantahun (2002)- also conducted a research on "Rural water supply and community participation in North Ethiopia". All the above works focused on causes, factors and problems of cost over run and delay of projects completion.

None of them was discussed on factors affecting public sector project management. Moreover, there were no studies that have been conducted in Oromia-Ethiopia to try and document the factors affecting public sectors project management especially in water construction projects. Implementations of water construction projects require huge capital investment and poor management of the process lead to huge financial loss, disappoint public interest and obstacles government policies and crises to country's developmental goals.

Therefore, it is instructive to investigate and understand how and to what extent the perceived factors (management/organization related factors, contractor's related factors, designer related factors and other factors) affect water construction project to enhance project performance of the sector. Thus, this paper tries to assess factors affecting public sector project management with special emphasis to Drinking Water Construction Project Management of Oromia National Regional State Water and Energy Bureau and to recommend possible solutions.

1.4. Research Questions

The research objectives above are translated into the following research questions:

- i. How can the quality of drinking water construction project management be improved for project success in Oromia Regional State?
- ii. What are the project management approach adopted by Oromia Water and Energy Bureau?
- iii. Which perceived factors that affect management of Oromia drinking water construction projects are relatively more important?
- iv. What are the critical factors that affect management of Oromia drinking water construction projects?

1.5. Objectives of the Research

1.5.1. General Objective

The general objective of this research is to assess factors affecting drinking water construction projects management in Oromia National Regional State Water and Energy Bureau.

1.5.2. Specific Objectives of the Research

The specific objectives of the research are to:

- i. Assess the quality of drinking water construction project management approach of Oromia Water and Energy Bureau.
- ii. Identify the major factors that affect project management in public drinking water construction projects in Oromia Regional State.
- iii. To examine and rank the major factors that affect project management in public drinking water construction projects in Oromia Regional State.
- iv. Determine ways in which drinking water construction project management could be made more effective to ensure project success.

1.6. Significance of the Research

This research is aimed to assess factors that affect public sector project management. The finding of this study will have the following benefits;

- It will help policy makers to see the need to support water construction project management and to improve its performance in the accomplishment of the development agenda of the Oromia/Ethiopia.
- It will also help target groups (Oromia Water and Energy Bureau) to have solution to some of the problems facing in water construction projects.
- It may also, be used as starting point for further related researches.
- The research will come up with a set of recommendations for various stakeholders for implementations.

1.7. Scope and Limitation of the Study

This research would be complete had it covers all water construction projects at all zones and woreda in Oromia Regional State. But it specifically targeted at drinking water construction projects of Oromia Water and Energy Bureau of the region because of time and budget constraints. The research will also have confined to the past five years (2011-2015) data because of none availability of organized data in the targeted bureau. It focuses only on assessing the factors affecting drinking water project management financed by Oromia Regional Government, Millennium Development Goals (MDG), Water for Sanitation and Health (WaSH) and UNICEF which are considered as growth corridors.

1.8. Operational Definitions of Terms or Concepts

The Operational (technical) terms or words and phrases having special meanings are the following among the other:

- Water Construction Project- Drinking water construction such as: construction of water wells, pipeline etc.
- Project Management- Management of water construction projects.
- Public Sectors Projects – Projects whose ownership is the public and constructed for the benefits of all citizens.
- Project Partners- Organizations/donors who are participate in financing and supporting water construction projects.

2. Literature Review

2.1. Theoretical frame work

2.1.1. Definitions and Concepts of Construction Projects

A project is a temporary endeavor with the objective to create a unique product or service. It is temporary in the aspect that it has a definite beginning and a definite end. The uniqueness with a project means that the provided service or product is different from all other services and products (Briner, Hastings, & Geddes, 1996). Many organizations use projects to response to requests that cannot be handled within the normal organizational limits. The size and length of a project can vary from one person to thousands and from a few weeks to more than five years (Project Management Body of Knowledge (PMBOK), 2004). A project ends when the objective has been reached, or when it becomes clear that the objective cannot be met, or if the need of the project no longer exists. When a project is terminated, documentation of lessons learned is made to make sure that the experiences drawn from the project can be used in future projects (Antvik & Sjöholm, 2007). The fact that a project is temporary does not mean that the result of the project also will be temporary. Most projects are undertaken to create a long-lasting result (PMBOK, 2004).

A project generally consists of four chronological phases- Such as: initiation, planning, execution and closing (Tonnquist, 2007). To get efficient feedback from drawn experience, the work in each phase should be evaluated as the project goes into the next phase. In the closing, down phase it is important that the work and result of the project as a total, is thoroughly evaluated and documented in order to benefit future projects (Tonnquist, 2007).

2.1.2. Project Management

Project management is the work methods that are used to control and manage activities in a project. Project management involves the application of knowledge, skills, tools and techniques in project activities to meet the project objectives. All management work is based on processes as: initiating, planning, executing, controlling and closing (PMBOK, 2004). A project manager needs to have the right skills and personal attributes, and most importantly the skill to be an effective leader, to carry out the role (Antvik & Sjöholm, 2007). The main task for a project manager is to integrate all activities and personnel in the project. As the integrator, it is not necessary that the project manager have expertise within all areas, more important is the ability to bring out the other team members abilities and make them work together as a team (Briner, Hastings, & Geddes, 1996).

It is important to identify new stakeholders and address their needs continuously throughout the project. Continuous stakeholder analysis also facilitates the management of previous identified stakeholders as their needs and expectations may change over time (Antvik & Sjöholm, 2007). Many companies and organizations use a project management system to establish consistent methods in their work. An integrated project management system also facilitates the establishment of a certain level of professionalism in an organization (IPMA). These systems are developed as handbooks including management activities that should be conducted in a project, which can be used as a guide for the project management team in order to ensure that all required plans and activities in the project are handled (PMBOK, 2004).

2.1.3. Differences and Similarities between Public and Private Organizations and Managers

A central element of the concept of New Public Management is that public organizations should import managerial processes and behavior from the private sector (Vries & Nemeč, 2013). Nowadays, a majority of public sector scholars claim that the concept of New Public Management is passé. Macaulay and Lawton (2006) argue that it may be tempting to think that the advent of New Public Management has shifted the ethos of public managers entirely toward managerial, efficiency and competence; and the example of local government potentially reinforces this view. However, according to Wal, Graaf and Lasthuizen (2008) the most important public and private sector values differ to some extent. In public sector, the most important are 'accountability', 'lawfulness', 'incorruptibility', 'expertise', 'reliability', whereas the highest ranking private sector values are 'profitability', 'accountability', 'reliability', 'effectiveness', 'expertise', 'efficiency', 'honesty' and 'innovativeness'.

Differences and similarities between private and public organizations have been widely debated in the literature on public management. The similarities between the two sectors focus mainly on the functions of management, while the differences relate to the conditions or constraints under which management is required to operate (Schneider & Vaught, 1993). While there is a level of generality at which management is management, whether public or private, functions that bear identical labels take on rather different meanings in public and private settings (Allison, 1986, p. 219).

The main conventional distinction between organizations operating in public and private sectors is their ownership (Boyne, 2002). Unlike private companies, owned by entrepreneurs or shareholders, public organizations are owned collectively by members of political communities. Boyne (2002, p. 100) evokes some arguments, which support the statement that public organizations differ from business, ones, among which we can mention -complexity, permeability, instability and absence of competitive pressures. He argues that public sector is also characterized by lower managerial autonomy, but the main differences between public and private

sectors are in his opinion the publicness of public sector and different managerial values. The distinctive set of values of public sector managers is characterized as a 'public service ethos' (Boyne, 2002).

Reichard (1998), based on the work of Farnham and Horton (1996), identifies some important differences between public and private managers. He states that whereas private managers typically strive to increase demand for their products, managers working in public sector must often suppress it in order to stay within their budget. Also, he stresses that economic efficiency cannot be used by public managers as the primary decision criterion, due to the mission that public organizations have. It means that public managers are expected to follow public service ethic in their activities. Next key difference between public and private managers is that public managers must balance different needs and expectations of multiple stakeholders, among which we can mention politicians (Reichard, 1998).

2.1.4. Project Management Process Groups

There are five project management process groups required in any project. The process groups have internal dependencies and are often iterated several times before a project is completed. A process group involves project management processes, which are linked together as the outcome of one process becomes the input in another (PMBOK, 2004). The process groups are not to be considered as chronological project phases that end when a part or section of the project is completed. In large projects, with distinct phases or sub-projects, the process groups are repeated in every phase of the project and there are continuously interactions between the groups during the project (PMBOK, 2004). The five process groups identified by PMI are; initiating, planning, executing, monitoring and controlling and closing process groups.

2.1.4.1. Initiation Process Group

The initiation of a new project is often done external to the project scope. The decision to start initiation is based on basic descriptions of the scope, deliverables, duration and forecasts of resources required. This documentation is handled and further refined in the Initiation Process Group to facilitate the formal authorization to start a new project. When initiating a phase in a large, multi-phase project, the processes are carried out to validate assumptions and decisions made in the original project charter (Gupta, Aha, Nau, & Munoz-Avila, 2008). The project charter is developed by the project organization, but approval and funding are handled externally. By reviewing the initiation process at the start of each new phase or sub-project, the project remains focused and start criteria is verified for each phase. The sub-project initiation processes also perform further validation and development of the project scope (PMBOK, 2004).

2.1.4.2. Planning Process Group

The main concern in the Planning Process Group is to develop and manage the project management plan. The planning processes include identifying, defining and managing all parts of the project management plan. These processes are continuously iterated as new information is discovered in order to keep the project management plan updated (PMBOK, 2004). An updated project management plan provides greater precision in schedule, cost and resource requirements which increase the chances to meet the defined project scope. It is important that the project team involves stakeholders, who often have useful knowledge, in the project planning (Gupta, Aha, Nau, & Munoz-Avila, 2008). Demands and requests by stakeholders must also be addressed as early as possible in the planning processes. The importance of iterations in the Planning Process Group is based on that many risks often are easier to identify after most of the planning has been made. This means that the project team might have to reconsider the planning concerning schedule, cost or resources with aspects of new identified risks or opportunities (Gupta, Aha, Nau, & Munoz-Avila, 2008).

2.1.4.3. Executing Process Group

The Executing Process Group is the processes where the work defined in the project management plan is executed. The process group involves coordination of resources and integration of the activities according to the project management plan (Walker, 2007). There is always a need for some re-planning in a project, due to variances in activity duration, productivity etc. These changes in planning should be analyzed and when needed trigger an update request in the project management plan. Analysis of these types of changes is conducted by the Monitoring and Controlling Process Group (PMBOK, 2004).

2.1.4.4. Monitoring and Controlling Process Group

The processes used to observe and control the project execution in order to identify potential problems, and take corrective action, are included in the Monitoring and Controlling Process Group (PMBOK, 2004). When the project's performance is observed and measured regularly, differences against the project management plan is quickly identified. Identified problems or differences in the project are investigated and can result in an update of the project management plan. Through continuous monitoring the project team gain insight into the whole project's progress and areas that require additional attention is highlighted (Guo-li, 2010).

2.1.4.5. Closing Process Group

The Closing Process Group includes the processes to formally close down all activities of a project phase or an entire project. The processes also include handing over the completed product or, if the project is terminated before completion, close the project and handle the contract closure (Briner, Hastings, & Geddes, 1996). When the Process Group is completed it verifies that all processes are completed and establishes that the project or project phase is finished. The PMI, Project Management Institute, has defined nine

categories of project management knowledge areas. In PMBOK (2004) these categories are described in detail with inputs and outputs from each phase and process. Each of the nine categories and their purpose are described below.

2.1.5. Project management knowledge areas

2.1.5.1. Project Integration Management

The project integration management is the processes that are used to coordinate the various elements of the project. Prioritizing between competing objectives and alternatives are an important task in the integration management. It consists of develop project charter, develop preliminary project scope statement, develop project management plan, direct and manage project execution, monitor and control project work, integrated change control and close project (PMBOK, 2004). A new project should always start with the development of a project charter. If the project has an internal customer, the project charter is often developed as an informal process. In projects with external customers the project charter development is a much more formal process (Gupta, Aha, Nau, & Munoz-Avila, 2008). Before starting up a new project it is important to carry out a feasibility study. The cost for this study is considerably less than the cost for starting up a project that then has to be closed down because of problems identified at a later stage in the project (Antvik & Sjöholm, 2007).

The project plan is the main document developed in the planning process and it is therefore very important to allocate sufficient amount of time and resources for this process. A project with a poor developed project plan is most likely to be poorly executed with high costs and delays as a result (Antvik & Sjöholm, 2007). The integration between the different elements of the plan is a complex process and is therefore often required to be iterated several times in order to reach a complete and integrated project plan (Antvik & Sjöholm, 2007). In order to maintain control and monitor the project effectively, it is important that the project team has a continuous insight to the health of the project (Briner, Hastings, & Geddes, 1996). The monitor and control work can be carried out through data collection, to identify trends of the project performance and to make sure that special attention is given to required activities (Antvik & Sjöholm, 2007). This shows that the main focus in monitor and control should be on comparing actual project performance with the baseline defined in the project.

The complicity of a project, and the many factors that are involved, makes it necessary for the project team to have an effective integrated control of changes (Gupta, Aha, Nau, & Munoz-Avila, 2008). The integrated change control should focus on influencing the factors that creates changes, determine that a change has occurred and managing changes when and as they occur. When changes occur at an early phase of the project it is not likely to be as expensive as if it is implemented at a later stage. Late changes often lead to much additional work, which makes the change much more expensive. This also highlights the importance for the project team to influence the factors that creates changes in the project (Antvik & Sjöholm, 2007).

2.1.5.2. Project Scope Management

Project scope management is a process to ensure that the project includes all the work required, and excludes the work that is not required, to complete the project successfully. It consists of five major processes; scope planning, scope definition, create WBS, scope verification and scope control (PMBOK, 2004). The importance of a well formulated scope of work has been shown several times in many projects. It is not unusual that a project is rushed into start without the proper planning and preparation. This often leads to problems for both suppliers and customers as extra costs and delays are likely to occur (Antvik & Sjöholm, 2007).

Scope planning is the process of elaborating the work that is needed to deliver the product of the project. It should be based on the product description and product requirements from the customer (PMBOK, 2004). The scope planning includes viewing different approaches to the project, in order to find the most suitable method for the current situation. The outcome from the scope planning is the scope management plan that mainly describes how the project scope will be managed and how scope changes will be integrated into the project (Gupta, Aha, Nau, & Munoz-Avila, 2008). When more specified requirements are known, the deliverables are subdivided into smaller, more manageable groups, through the use of a Work Breakdown Structure. By dividing major tasks into smaller work packages, the accuracy of cost, time and resource estimates are improved. A WBS also makes it easier to assign clear responsibility to each group of tasks, which is necessary in order for the project organization to gain control of the project (Antvik & Sjöholm, 2007).

Scope verification is the work to obtain the stakeholders acceptance for the project scope (Briner, Hastings, & Geddes, 1996). Deliverables and work results must be reviewed to ensure that it is completed satisfactorily in order to keep a good relationship with the customer (Walker, 2007). Scope verification differs from quality control in that it is mainly concerned with the acceptance of the work results, while quality control mainly focuses on the correctness of the work results (PMBOK, 2004).

2.1.5.3. Project Time Management

Project time management includes all processes that are required to ensure a timely completion of the project. Major processes in time management are activity definition, activity sequencing, activity resource estimating, activity duration estimating, schedule development and schedule control (PMBOK, 2004). The time schedule is one of the most important plans in a project. The level of work in planning, monitoring and controlling schedules in a project is often directly reflected in the execution and outcome of the project (Antvik & Sjöholm, 2007). In order to develop realistic and achievable schedules, it is important that activities are sequenced accurately. The activity sequencing involves identifying logical relationships and dependencies between the project activities (Guo-li, 2010).

The activity duration estimation should be based on the project scope, required types of resources, estimated resource quantities and the availability of resources. The result of the process is later used to develop schedules. To get an accurate estimation of duration it should be carried out by a person or group who is familiar with the specific activity (Antvik & Sjöholm, 2007). The development of schedules is often carried out through the use of project management software. To develop an efficient schedule, it is important that the critical chain is identified and that the lags in the schedule is used to allocate the projects resources effectively (PMBOK, 2004). A time schedule without control is fairly useless to the project organization. The control must be carried out regularly and relatively often in order to detect deviations early. This makes it possible for the project team to take necessary actions to avoid longer delays (Antvik & Sjöholm, 2007). The schedule control and development must be an iterative process in order for the project team to have updated schedules throughout the project (Guo-li, 2010).

2.1.5.4. Project Cost Management

Project cost management includes the processes of cost estimating, cost budgeting and cost control. The project budget is very important and influences all areas in both planning and execution of a project. It is important to keep track of total costs as well as costs for different work packages in a project (Guo-li, 2010). A professional developed budget does not only control the project costs, but also creates good conditions for development of a well-functioning cash flow in the project. The consequence of insufficient cash flow in a project is often connected to large extra costs and delays as there is a high risk for a temporary stop of the whole project (Antvik & Sjöholm, 2007).

The cost estimation should be based on the project scope, the workable budget schedule and be connected to the project plan. To reach a correct estimation it is important that each activity is estimated based on the conditions of the execution of the specific activity. Since there often are several factors that are uncertain in a project, a reserve cost can be assigned to activities with a low level of detailed information or work packages with potential high financial risks (Adisa Olawale & Sun, 2010). Cost control should include comparison of planned value and actual cost of each work package, but also include analysis of the earned value for the costs spent in the project. A correct performed analysis of the current financial status is necessary in order to develop forecasts of future, and final, costs of the project (Guo-li, 2010).

2.1.5.5. Project Quality Management

Project quality management involves all processes and activities in the project organization to determine quality policies and control that the performed work is of a satisfying quality. The project team must identify which quality standards that is relevant in the project in order to perform quality control. The identified standards should be considered the baseline in the development of a quality plan. It is important that the quality plan not only consist of required levels of quality in different activities, but also methods to achieve the requested quality (Wei & Yang, 2010). The objective with quality control is to ensure that the quality plan is implemented in the execution of the project and that established standards are met. It is important that the implementation and control of the quality plan is carried out thoroughly, since the quality plan otherwise will be of no use to the project organization (PMBOK, 2004).

2.1.5.6. Project Human Resources Management

Project human resources management is the processes used to ensure that the project organization is established in a way that provides the project with good conditions to succeed. Major processes in human resources management are human resource planning, acquire project team, develop project team and manage project team (PMBOK, 2004). In the early phases of a project it is necessary for the project management to plan how the project team should be organized and determine what roles that are required (Al-Maghraby, 2008). It is important that a role with a defined area of responsibility also has the authority to make decisions within that area. Responsibility without authority makes it very hard for middle management to influence the work, which most likely will affect the project negatively (Walker, 2007). Staff changes, especially when key-roles are involved, often affect the project negatively in aspects of time, cost and team development. The project management should therefore strive to make as few changes as possible in key-roles of the project team (Al-Maghraby, 2008).

2.1.5.7. Project Communications Management

Project communications management is the processes used to ensure that required information is distributed to the right person at the right time. The major processes in communications management are communications planning, information distribution, performance reporting and manage stakeholders. How communication in a project is handled must be planned in order to perform effective work and minimize the risks. A communication plan is necessary to ensure that both internal and external project communication is carried out effectively. The plan should contain details regarding what type of information that need to be distributed, who needs to receive the information, the purpose of the information, the frequency of the distribution and the responsible person to issue the information (Ramsing, 2009).

It is important that the project management performs frequently progress reports, mainly to inform clients and other stakeholders of the status of the project but also for the management team to keep control of all areas of the project. A progress report should focus on deviations from the project plan and contain current status of the project, executed and planned actions, uncertainties and forecasts regarding cost and time (Antvik & Sjöholm, 2007). When deviations from the baseline are identified in the progress report, the management team should include recommended corrective actions in order to bring the project in line with the project plan (Ramsing, 2009).

2.1.5.8. Project Risk Management

The main objectives of project risk management are to increase the probability and impact of events that are positive to the project and decrease the probability and impact of events that are negative to the project. Risk management include risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning and risk monitoring and control (PMBOK, 2004).

All projects have uncertainties that can either turn out to be an opportunity or a risk. Uncertainties often occur in areas where the management has little information of the current conditions. By effective management many uncertainties can be evolved into an opportunity rather than a risk (Antvik & Sjöholm, 2007). Risk analysis is often carried out early in a project when the information is highly limited within several areas. To manage risks and opportunities effectively, the analysis must be iterated throughout the project as more and more information becomes clear to the management team (Kululunga & Kuotcha, 2010). When risks are identified it is therefore important that a strategy is developed in order to response to the risk (PMBOK, 2004). A response strategy can be to eliminate the probability or impact of a risk, or to accept the risk and calculate with a potential extra cost if the risk occurs (Kululunga & Kuotcha, 2010). A common, and effective, approach to analyze risks is to estimate the probability and impact of a risk. The risk response is then based on the combined value of each risk, which leads to a risk management where the response is in relation to the magnitude of the risk (Briner, Hastings, & Geddes, 1996).

2.1.5.9. Project Procurement Management

Project procurement management is the processes to control and administrate contracts and purchase orders from sources external to the project organization. The major processes in procurement management are plan purchases and acquisitions; plan contracting, request seller responses, select sellers, contract administration and contract closure. The planning of procurement management should be carried out early in the project and focus on analysis of which products or services that need to be purchased. After the initial planning, a procurement plan should be developed that includes all major procurements that are needed in the project (PMBOK, 2004). The procurement plan is an important tool for efficient procurements throughout the project. It should be developed based on the project's workable budget schedule and time schedule in order to include all procurements and to be timely integrated in the project (Eriksson & Westerberg, 2011).

2.1.6. Previous Studies Related Challenges of Project Management

Several studies have addressed many different problems that challenge management of different types of construction projects. Construction delay is considered to be one of the most recurring problems in the construction industry and it has an adverse effect on project success in terms of time, cost, quality, and safety. A new type of construction projects has not escaped the overwhelming ghost of overruns. Environmentally conscious construction has become a subject of research during the last decades. Suppliers of construction materials has yet suffered from the drag of delays and cost, and multiple efforts to create a statistical model to help adjust the floats and budgets of the planning schedule have been conducted in recent studies, only to emphasize the effect overruns has on every angle of the construction project process (Ozcan-Deniz et al., 2012; Chen et al., 2012; Mahamid, 2012; Abu Hammad et al., 2010).

The causes and effects of delay factors in construction industry vary from country to country due to environmental, topographical and technological constraints. In anticipation of the effect of globalization and the technological difference between developing and developed countries, it is necessary to identify the actual reasons of delay in order to reduce the impact of delay in any construction project (Shebob et al., 2012). Gündüz et al. (2013) stated that in the construction industry, contractors tend to maximize their profit to increase market share. To achieve this aim, it is crucial for contractors to carefully identify the factors that affect the success of a project and estimate their impacts before the bidding stage. Construction projects may differ in size, duration, objectives, uncertainty, complexity, deadlines, and some other dimensions. Managing such projects needs multi-project management skill, competence and knowledge. Al- Khalil and Al-Ghafly (1999) tackled the question of delay in water and sewage projects and on whom the responsibility falls.

Algharbi et al. (2007) examined the factors behind the delay in construction projects in Malaysia and the results showed that the financial issue is the dominating factor among other factors that cause the delay of construction project in Malaysia. Coordination problems came next after the financial factor followed by materials problems. More recently, Jaskowski and Biruk (2011) pointed out that project activities' durations are directly affected by different risk factors independently. Every activity within the project has its own time and cost estimates with different processes differentiating the type of work undertaken to accomplish these activities. All differ and affected by different risk factors that might have a major impact on one and slightly affect the other. Several studies have been conducted in deferent parts of the world that show somewhat similar results to the studies mentioned earlier (Kasimu, 2012; Tabish, 2011; Memon et al., 2012; Le-Hoai et al., 2008; Doloi et al., 2012)

In the Middle East, several similar studies were carried out. Major causes of delay in Saudi Arabia were slow preparation and approval of shop drawings (Assaf et al., 1995). In Lebanon, however, the owners concern with regard to financial issues ranked highest among the factors affecting project management (Mezher et al., 1998). Additionally, Al Moumani (2000) identified poor design and change orders as the leading causes of failure production in Jordan. While Koushki et al (2005) regarded changing orders and owner financial concerns as the top factors affecting project management in the Kuwaiti construction industry. Finally, Faridi and Al Sayegh (2006) recognized that slow preparation of drawing was a major factor affecting project management in the United Arab Emirates construction sector.

2.1.7. Factors Affecting Project Management

There are 45 factors that affect water construction project management, which will be used in this research, can be grouped by category as follows:

2.1.7.1. Managerial/Organizational Factors

Managerial or organizational factors refer to inadequate or ineffective management of the project by project sponsor or project management agency (Chua et al, 1999; Delout, 1998 and Walker and Vines, 2000). The events in managerial factors include among the other: (1)Unclear Project mission/common goals;(2) Inadequate communication / Information;(3)Unclear Project Management objectives;(4)Lack of Top Management Support;(5)Absence of Competent Project Team;(6)Inadequate Project Planning and Control;(7)Lack of Problem Solving Abilities;(8)Project Performance and Quality;(9)Too optimistic goals in relation to project cost and schedule;(10)Lack of project sponsorship;(11)Unclear lines of responsibility, authority, and accountability;(12)Slow and cumbersome decision-making process;(13)Lack of training of the local staff for sustainability, and (14)Lack of end-user participation(Pinto (1986:59); Pinto & Slevin (1987,1989); Kerzner,(1992,2001,2003); Yeo,(2002); Boyd,(2001); Andersen *et. al*, (2002); Hyvari, (2006); Turner& Muller, (2005); Khang & Moe (2008), (2007); and Frese & Sauter, (2003)).

2.1.7.2. Contractors Related Factors

According to Nguyen et al, (2004); contractors and designer were the ranked top factors affecting construction project. They identified the following among inadequate site investigation ,work suspensions owing to conflicts ,fraudulent practices, kickbacks and corruption ,high machineries maintenance costs ,numerous construction activities going on at the same time ,high cost of machineries , inadequate labor/skill availability ,stealing and waste on site ,poor project (site) management/poor cost control ,lack of coordination between general contractors and subcontractors ,inappropriate contractor's policies ,shortage of material and plant poor relationship between manager and labors, and etc. Chua et al, (1999) and Songer and Molerner, (1997) also almost the same thing as did by (Nguyen et al, (2004).

2.1.7.3. Designer Related Factors

The research conducted by Kerzner, (1992,2001,2003); Chan et al. (2001); Chua et al. (1999); and Khang & Moe,(2008) categorized that the following are included among those factors affecting project management have direct relation with project designers/ architects; wrong method of cost estimation ,inaccurate cost estimation ,scope changes occasioned by inadequate pre-contract study ,inappropriate preconstruction study, change in project design ,lack of coordination between design team and general contractor ,scope changes arising from redesign and extensive variation occasioned, absence of construction cost data ,inadequate quality/ambiguity of contract documents ,incessant variation order , conflict between design consultants and implementation consultants.

2.1.7.4. Corruption and another Miscellaneous Factor

The World Bank defines corruption as "the abuse of public office for private gain". Inevitable politics interference coupled with lack of transparency and lack of regulatory institutions, bribery and corruption are widespread in international development projects resulting in ineffective use of development resources. Corruption is based on using unlawful influence to extract additional costs to receive or give a preferential consideration in connection with awarding and agreement to a project developer. The project developer includes these costs into the project development cost. The higher these costs are, the lower the returns from the project investment will be (Wal, Graaf and Lasthuizen (2008).

In Thailand, Mahithirook, (2000) estimates that 10% of the project cost is lost to corruption due to the following six factors which enable corruption to take place. (1) State agencies and politicians that implement projects; (2) Lenders that may favor some contractors;(3) The delegation of architects, engineers, supervisors, and consultants responsible for each project;(4) Panels inspecting and accepting finished projects;(5) Contractors who are ready to buy projects with bribes; and (6) Laws and regulations that can be misinterpreted to favor any parties. Rajghatta (1997) states that during the 1980s in India, only about 14 percent of the money marked for development actually reached the end user. In order to retain the confidence of their shareholders and the public, the IDFI's have acted and are combating corruption in development projects by control of fraud and corruption and institutional strengthening. Other factors may include; unexpected ground conditions, fluctuation in prices of raw materials, inappropriate government policies, project complexity, inadequate production of raw material in the country, adverse effect of weather, Domination of construction industry by foreign firms and aids.

2.2. Conceptual Framework

Considering the various variables that could constitute factors affecting public sectors project management, assessing the quality of project management practices and critical factors affecting water construction in Oromia-Ethiopia can be best undertaken using a conceptual model that embraces time, cost, scope as well as management competency, and leadership among others. Having this as a guided a conceptual model for assessing overall factors related to Oromia water construction project, the following conceptual framework for has been generated by the researcher.

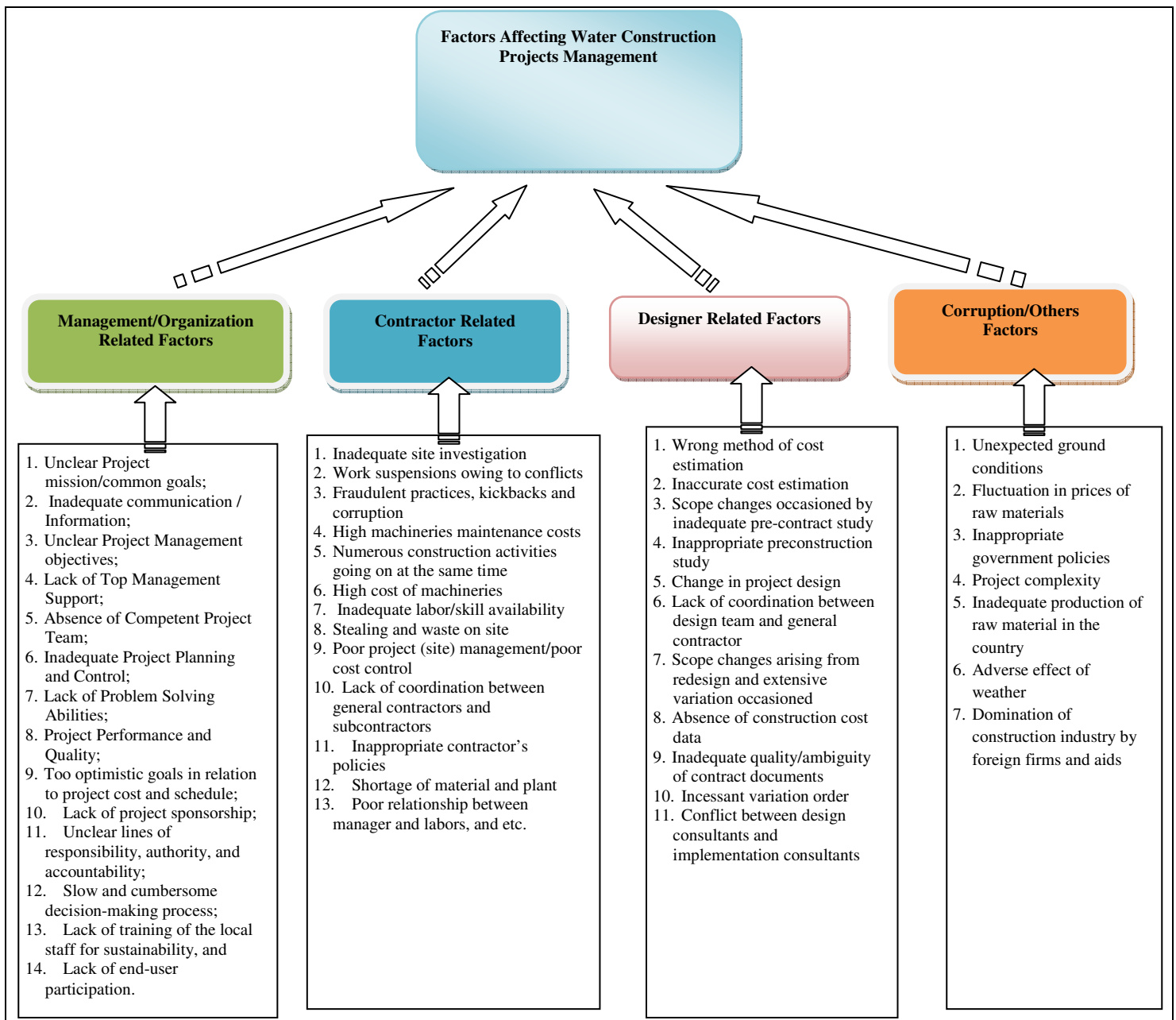


Figure 1: Conceptual Framework of the Study

Source: Self-generated by Researcher, 2016.

2.3. Empirical Studies

2.3.1. Factors Affecting Public Sectors Project Management

Ethiopia had a long experience of poor macroeconomic policies, economic mismanagement, protracted war, internal instability and recurrent drought are the main causes of the direct situation the country is now in today. The socialist regime which followed a centrally planned economic system since 1974, allocated huge (excessive) government budget for military purpose without any consideration to economic development and social welfare. As the socialist Derg-regime ignored socio-economic and developmental issues, investment public infrastructure like water project, health and other welfare issues almost came to a various ideological complexity.

After the change of government in Ethiopia in 1991, several policies were formulated and regulations promulgated relating to diverse social, economic and political issues. The most important policy and institutional reforms which include supplying all citizens in the country (both rural and urban) with clean potable water. To enhance the development of water supply, the government has formulated the National Water Resources Management Policy, published in 1999, defines guidelines concerning water supply and sanitation, resources management, irrigation and hydropower and the water and sanitation strategy of 2001 translates the policy into objectives with the following key aspects; more decentralized decision-making ,promoting the involvement of all stakeholders, including the private sector ,increasing levels of cost recovery ,more integrated approach to water, sanitation and hygiene promotion activities.

It promotes the sustainable development of water resources for equitable social and economic benefits through public participation and IWRM. In order to implement the requirements set forth in the policy, various legal and institutional capacity-building efforts are currently underway. For example, the Water Resources Development Fund (WRDF) and Water Sector Development Program (WSDP) were established in 2002 that define interventions in terms of projects and programs for 15 years (2002-2016). A WaSH Implementation Framework (WIF) has been finalized in March 2013 as guiding document for the implementation of the WaSH Program. It recognizes that safe water and improved sanitation & hygiene are not separate pursuits and that results will only be sustainable if responsibilities and resources are decentralized and communities are empowered to manage their own transformation (www.mowr.gov.et/attachmentfiles).

Moreover, Water Resources Management Proclamation was issued the same year to provide legal ground for the implementation of the Water Policy. The government has also devised other major national strategic plans include objectives of increasing water coverage and improving sanitation: The Plan for Accelerated Sustained Development and to End Poverty (PASDEP) that covered the 2005-2010 period, The Growth and Transformation Plan (GTP) for the 2011-2015 period, The Universal Access Plan (UAP) II that is the revision of the 1st UAP of 2006 and is aligned with the GTP. The GTP/UAP II target in rural water supply is coverage of 98% access at 15 liters per person per day within the radius of 1.5km in 2015, reduce non-functional rate of Water Sanitation schemes to 10%. Despite the efforts made by government in committing huge funds to accomplish these regional /national objectives by devising different water construction projects for constructing and digging of springs and wells and providing both biological and physical protection and development of natural resources around the water sources and pipes, there are discrepancies both at the operation and start up level in implementation.

According to the National Water Development Report for Ethiopia (2004), highlighted that the country's past performances, viewed in terms of the socio-economic requirements of the people are not satisfactory and there remains a lot to be done in the water and water related activities that could lead to inability to achieve the goal of the sector. Some of the problems of water construction project as indicated by different reports/ studies like National Water Development Report for Ethiopia ,(2004); and The Water Resources Management Program (WARM-P),(2011) include: high gap between planned water construction and its actual performances; delay in project completion, cost overrun, design changes, lack of project quality, high percentage failure to provide the intended service after construction, lack of management capacity to provide sustainable monitoring and evaluation and in particular deficient project management culture and excessive corruption.

3. Research Methodology

3.1. Introduction

Under this chapter, the researcher tries to outline the design of the research, approach of the study, the sampling design, sampling technique, data sources, tools to be used for data collection and method of data analysis.

3.2. Description of the Study Area

Owing to the federal system of government structure, the regional state of Oromia was established in 1992 as per the proclamation No.7/1992 which was issued to establish regional self-government in the country. The proclamation empowered the regional government to establish its own structure, fully exercise the right to self-determination, and build a political community founded on the rule of law, capable of ensuring a long-lasting peace, guaranteeing a democratic order, plan and implement growth strategy believed to foster resource utilization and economic maximization in the region.

The administrative structure of the region embraces the Regional Government, Zonal, Districts and Kebeles. Currently, the region consists of 18 zones and 304 woredas. Organs of the regional state comprise the 'Chaffee Parliament', which is vested with the legislative power and is the supreme organ; the administrative council, in which the executive power is vested and is accountable to 'Chaffee'; and the court, in which the judicial power is vested.

Oromia is the most populated and the largest among all Ethiopian administrative regions. It extends from 3040'N to 100 35'N and from 340 0S'E to 430 11'E. The land area of the region is estimated at 284,538km² (26.8% of the country's land mass). The elevation of the region varies from less than 500m to 4,000m above sea level. Its climate is affected significantly by variation in altitude, its latitudinal position, prevailing winds and air pressure and circulation and its proximity to the sea. According to the 2013 population and housing estimate, the estimated population of the region is 32,220,000, that is 37.2 % of total of the country (www.citypop.de/ethiopia).

3.3. Methodology of the Study

It is acknowledged that several options are available in social research but the choice of approach depends largely on the objectives of the study. Taking into account the research problem and objectives, this study employed descriptive research approach. The main reason for using this design was due to the fact that it can help to assess the major factors that affect public sector water construction projects management. Moreover, this design can help to describe, other than simply describing the existing performance of the sector. Being descriptive design, the research used a mixed type of research in which both qualitative and quantitative approaches were employed. This was done mainly to strengthen the finding of the study through triangulating the results to be obtained using both approaches.

3.4. Population of the Study

The population of the study comprises mainly employees of the Bureau, designers/ engineer's contractors of Oromia Water and Energy Bureau who coordinate and administer water and energy related issues and responsible to the development of the sector; and employees of WaSH program, Biogas Program and Co. WaSH Program who works in facilitating finance in this regard. This is depicted in the table below:

Population				
Water & Energy Bureau	WaSH Program	Biog Program	Co. WaSH Pogram	Total
248	14	11	4	277

Table 2: Total Population of the Study
Source: Oromia Water and Energy Bureau, December 2016

From the Table 2, above, the composition of the target population of this study was of four types.

3.4.1. Sample Design and Sampling Techniques

3.4.1.1. Sampling Size

As per the current data the total number of employees in Water and Energy Bureau, and other bilateral companies are about 277 from which a representative sample is selected. To keep the representativeness and enhance the reliability of the findings, 95% level of confidence and a 5% confidence interval was used in determine the size of the sample. As a result, based on Yemane, (1967), 160 respondents were selected as sample size of the study.

$n = N / 1 + N(e^2)$, where n - sample size, N - population size & e - margin of error

$$n = 277 / (1 + 277(0.05)^2)$$

$$n = 160$$

3.4.1.2. Sampling Techniques

To get the determined sample size, two – stage sampling design was used. First, the quota for the four categories - Water & Energy Bureau, WaSH Program, Biogas Program and Co. WaSH Program was proportionally allocated and then all respondents from each category was randomly selected for the sample.

S. No	Sample List	Employees in the sample list	Sample Proportion in %age	No. Selected respondents
1.	Water & Energy Bureau	248	89.53	144
2.	WaSH Program	14	5.05	8
3.	Biog. Program	11	3.97	6
4.	Co. WaSH Pogram	4	1.45	2
	Total	277	100.00	160

Table 3: Sampling Technique to Select Respondents
Source: Own Computation, 2016

3.4.2. Data Source, Type and Collection Procedure

3.4.2.1. Data Sources

Both primary and secondary data sources were used for the collection of data. Primary data were gathered through Semi – Structured Questionnaire, Semi – Structured Interview and Focus Group Discussion (FGD). Secondary data were collected different statistical reports, magazines, Oromia Water and Energy Bureau annual reports from 2011-2015 years and other publications related to the Water Construction Project of the sector.

3.4.2.2. Data Gathering Tools

The gathered data from primary and secondary sources were collected specifically through the following data gathering tools;

3.4.2.2.1. Structured Questionnaire

Semi structured questionnaire was dispatched to respondents from Oromia Water & Energy Bureau employees currently working in the sector were selected to fill anonymously. Moreover, this method was used to collect adequate data needed to address the problem being under the study.

3.4.2.2.2. Semi – Structured Interview

Semi structured interview was conducted to inculcate qualitative aspect data that cannot be addressed through questionnaire. For this purpose, the interview was conducted with Oromia Water & Energy Bureau head, project sight managers, project designers, and project contractors funding partners, budget and disbursement sections officers and other key informative employees working in the sector.

3.4.2.2.3. Focus Group Discussion

In order to strengthen the findings of the data gathered using above tools and for triangulation of data, FGD was made with different groups of the sample. Representatives from Managers, Designers, and contracts stakeholders (funding partners) totals ten (10) participants were being part of the discussion.

➤ Test of Content Validity

To test content validity the formula developed by C. H. Lawshe (1975), as it is one of the widely used methods of measuring content validity. It is essentially a method for gauging agreement among raters or judges regarding how essential a particular item is. The model used by C.H. Lawshe is presented us under.

Lawshe (1975) proposed that each of the subject matter expert raters (SMEs) on the judging panel respond to the following question for each item: "Is the skill or knowledge measured by this item 'essential,' 'useful, but not essential,' or 'not necessary' to the performance of the construct?" According to Lawshe, if more than half the panelists indicate that an item is essential, that item has at least some content validity. Greater levels of content validity exist as larger numbers of panelists agree that a particular item is essential. Using these assumptions, Lawshe developed a formula termed the content validity ratio: $CVR = (n_e - N/2) / (N/2)$ where CVR = content validity ratio, n_e = number of SME panelists indicating "essential", N = total number of SME panelists. This formula yields values, which range from +1 to -1; positive values indicate that at least half the SMEs rated the item as essential. The mean CVR across items may be used as an indicator of overall test content validity.

Source: Adopted from Wikipedia, the free encyclopedia, May, 2012

Accordingly the researcher developed content validity test on the basis of C. H. Lawshe formula by distributing the questionnaire prepared to gather data from respondents ,about how they perceive the Drinking Water Construction Project Management in Oromia Water and Energy Bureau, to fifteen (15) persons and twelve (12) of them indicated that an item is 'essential, to measure the efficient and effective budget and expenditure management in the municipality while three (3) of them rate it as 'useful, but not essential,'. Then the researcher analyzed their response and finally assured the content validity.

$$CVR = \frac{(ne - N/2)}{(N/2)}$$

Where:

CVR =Content validity ratio, ne = number of Subject Matter Expert panelists indicating "essential", N = total number of SME panelists.

$$CVR = \frac{(12-15/2)}{(15/2)} = + 0.60$$

According to C. H. Lawshe, if the formula yields CVR which range from +1 to -1; positive values indicate that at least half the SMEs rated the item as essential and so does this research CVR which is + 0.60. The mean CVR across items may be used as an indicator of overall test content validity.

➤ Test of Reliability

Joppe (2000: p. 1), defines reliability as the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable. To insure the reliability of this study research pilot test on questionnaire was carried out two times and the questionnaire is distributed after its consistence and accuracy rechecked by different intellectuals. To maintain the accuracy and consistency of data entry and to reduce the error rate, double data entry system (entering the same data using two sheets) were used.

3.5. Data Analysis

Analysis of data is a process of editing, cleaning, transforming, and modeling data with the goal of highlighting useful information, suggestion, conclusions, and supporting decision making (Adèr, 2008). Data from the field was edited and coded appropriately to make meaning out of them. Editing was made to correct errors, check for non-responses, accuracy and correct answers. Coding was made to facilitate data entering and a comprehensive analysis.

3.5.1. Qualitative Data Analysis

Data gathered through qualitative data tools such as Semi Structured Interview and Focus Group Discussion was analyzed under major thematic areas, after the necessary pre-analysis task such as recording, transcribing and coding were made.

3.5.2. Quantitative Data Analysis

Quantitative data gathered through semi – structured questionnaire was analyzed through the latest version of SPSS (Statistical Package for Social Science) Version 20. Descriptive was used for analyzing quantitative data. Specifically, Percentages, frequency, Mean, tables, diagrams, figures and Rank were used. The internal consistency of a measurement instrument such as a survey questionnaire was tested through testing its validity and reliability. Finally, Ranking was used to identify the relative importance (significance) of variables (factors).

4. Data Analysis and Discussion

4.1. Introduction

This part of the study deals with the analysis and discussion of the data gathered from the questionnaire survey and project literature review. It includes the identification of the factors affecting drinking water construction project management, severity of the factors on effective management of Oromia Drinking water construction Projects. The procedure used in analyzing the results was aimed at establishing the relative importance of the various factors responsible for management of Oromia Drinking Water Construction projects and their effects. The questionnaire gave each respondent an opportunity to identify the factor that was likely to cause problems in water construction projects by using five scale linker scale. For each variable, the mean value of respondents' response was ranked for analysis purpose. On the basis of the ranking of the variables that related to owners/management, contractors, designer and other categories of variables, the five most important factors that influenced of Oromia Drinking Water Construction Projects Management were selected from each category. Then ten most important factors from all factors categories that affect Oromia Water Construction projects selected based on their mean value rank.

During the study all the documents of water construction projects for the period of the study such project report, contract time during signing of the contract agreement and actual time taken to complete the completed project were thoroughly investigated.

4.2. Questionnaire Response Rate

Detailed questionnaires were designed and distributed for the assessment of factors affecting Oromia Water Construction Projects in the Oromia Water and Energy Bureau, Wash program, Biog. Program and Co.WaSh Program Workers; these are Contractors, designers and Managers (project owners). To make the analysis more comprehensive a total of 160 questionnaires were distributed and a total of 142 questionnaires were filled and returned.

No.	Respondents	Questionnaire Distributed		Questionnaire returned		Response rate
1.	Water & Energy Bureau	144	90%	130	92%	90%
2.	WaSH Program	8	5%	6	4%	75%
3.	Biog.Program	6	4%	4	3%	67%
4.	Co.WaSH Pogram	2	1%	2	1%	100%
Total		160	100%	142	100%	89%

Table 4: Number of questionnaires distributed and the number of questionnaires returned from the above stated works including their percentage response rate

Source: Survey 2016

The above Table 4, shows that the response rate was satisfactory. From total 160 questionnaires distributed to respondents 142 questionnaires (89%) were filled and returned on time. This means that the reliability of the data collected will be justifiable to make a general conclusion on the factors affecting Oromia Drinking Water Construction projects Management.

4.3. General Information of the Respondents

Table 5 below covered personal characteristics of the respondents' such as sex, work experience and educational qualification. The data from the table shows that males constitute 83.87% of the respondents while 16.13% are females. This means that majority of parties working on drinking water construction projects in Oromia Water and Energy Bureau, WaSH Program, Biog. Program and Co.WaSH Program works are male. Gender representation in the industry is biased towards male professionals.

The experience of the respondents in relation to drinking water construction project was also a major factor to be considered by the researcher. The researcher sort to know the experience of the respondents distributed in the age group presented in the questionnaire. The following table summarizes the findings.

Sex of the Respondents	Frequency	Percentage
Male	119	83.87%
Female	23	16.13%
Total	142	100%
Working Experience (years)		
1-5	27	19.35%
6-10	60	41.94%
>10	55	38.71%
Total	142	100%
Educational Level		
Less than grade 10	0	0%
Certificate	0	0%
Diploma	18	12.68 %
Degree	107	75.35 %
2 nd Degree	17	11.97 %
3 rd Degree & above	0	0%
Total	142	100%

Table 5: Personal Characteristics of the Respondents
Source: Own Survey 2016

From the Table 5, one can see that majority of the respondents have work experience of more than five years and above representing 80.65 % of the respondents. 19.35% has 1-5-year experience on drinking water construction projects. This translates to the fact that they are well grounded in the organization and can give accurate information as far as the subject matter is concerned.

Furthermore, observation of the table revealed that respondents with bachelor's degree rank highest with 75.35% followed by Diploma holders with 12.68% while the remaining 11.79% have second degree professional qualifications. As noticed, all the respondents are educated therefore this provides a solid base for understanding, better usage and implementation of project management techniques and tools.

4.4. Analysis Related to Project Management Practices Adopted by Oromia Water and Energy Bureau

4.4.1. The Type of Project Management Approach used by Oromia Water and Energy Bureau to manage Drinking Water Construction Projects

The data depicted in the Table 6 below, on project management practices adopted by Oromia Water and Energy Bureau, 61.3% of respondents shows that the project management practices adopted by Oromia Water and Energy bureau is both traditional and contemporary project management approach while the remaining 22.6% and 16.1% responded as the organization is using contemporary and traditional project management approach respectively. The interview and FGD results also confirm that the organization is using a mixture both traditional and contemporary project management approach.

Question	Alternatives	Frequency	Percentage
Project management practices adopted by Oromia Water and Energy Bureau	Traditional project management	23	16.1
	Cotemporary project management	32	22.6
	Both traditional and Contemporary project management	87	61.3
	Total	142	100.0

Table 6: Project management practices adopted by Oromia Water and Energy Bureau
Source: Own survey, 2016

4.4.2. Project Management Tool(s) is/are used by Oromia Water and Energy Bureau to Management Drinking Water Construction Projects

The analysis of the Table 7, shows that work breakdown structure is the most frequently used tools with 24.44%, Graphical Evaluation and Review Technique 15.56%, project sensitivity analysis and cost benefit analysis with 13.33% each was used. While statement of work and program evaluation and review technique were rated 11.11% each, critical path method and other decision-making techniques 6.67% and 4.44% were used respectively. Gantt chart and Project Management Software are some of the rarely used or not employed tools by the bureau. This reality shows that project management tools and techniques are still not well implemented in the drinking water construction project management being surveyed.

Question	Alternatives	Frequency	Percentage
Project Management Tool(s) is/are used by Oromia Water and Energy Bureau	Work Breakdown Structure	35	24.44
	Statement of Work	16	11.11
	Critical Path Method	9	6.67
	Project Sensitivity Analysis	19	13.33
	Gantt chart	0	0.00
	Cost Benefit Analysis	19	13.33
	Program Evaluation and Review Technique	16	11.11
	Graphical Evaluation and Review Technique	22	15.56
	Project Management Software	0	0.00
	Other decision-making techniques	6	4.44
	Total	142	100.00

Table 7: Project Management Tool(s) is/are used by Oromia Water and Energy Bureau
Source: Survey 2016

4.4.3. Water Construction Project Management Practices Adopted by Oromia Water and Energy Bureau

Here the researcher used William G. Zikmund (1997: p -540-451), method of transformation of data from its original form to a format that is more suitable to perform data analysis that will achieve the research objectives. William G. Zikmund argued that “Researchers often modify the value of scalar data or create new variables by collapsing or combining adjacent categories of variables in order to reduce the number of categories.” According to him, the “strongly agree” response category and the “agree” response category have to combine and form a new single category. The “strongly disagree” response category and the “disagree” response category have also to be combined into single category. This results in the “collapsing” of the -five category scale down to three. Using this transformed data Likert’s summative score for an attitude scale with three statements is calculated in the following manner.

NB:

$$\text{Summative Score} = \text{Variable 1} + \text{Variable 2} + \text{Variable 3}$$

Grand mean of the response is calculated as: $\mu = \frac{5*(f5) + 4*(f4) + 3*(f3) + 2*(f2) + 1*(f1)}{\text{Total number of respondents}}$

Where: μ = Grand mean

f = frequency of the value

5,4,3,2,1 = values assigned to strongly agree, agree, neutral, disagree and strongly disagree respectively,

If the grand mean (μ) is greater than three (> 3), that the value assigned to neutral response, it is assumed as the respondents are slightly agreeing. If the grand mean is less than three (<3), it is assumed as the respondents are slightly disagreeing. Finally, if the grand mean is exactly three (= 3), it is assumed as the respondents are not willing to give any response.

Onwards, in this study regarding the analysis of factors affecting Drinking Water Construction Management in Oromia Regional State, this concept was used.

Ser.No.	Factors	Five (5) Points Likert's Scale															3Points scale			Grand Total = (c) + (d) + (g)	Grand Mean = $\frac{((c)+(d)+(g))}{\text{Total Respondents}(142)}$
		Strongly agree			Agree			Neutral			Disagree			Strongly Disagree			(a) +(b) = (c)	(d)	(e) +(f) = (g)		
		Value(v)	Frequency (F)	V x F = (a)	Value(v)	Frequency (F)	V x F = (b)	Value(v)	Frequency (F)	V x F = (d)	Value(v)	Frequency (F)	V x F = (e)	Value(v)	Frequency (F)	V x F= (f)					
1	Clarity of overall project mission and goals	5	9	45	4	41	164	3	60	180	2	32	64	1	0	0	209	180	64	453	3.19
2	Top management support	5	27	135	4	23	92	3	46	138	2	37	74	1	9	9	227	138	83	448	3.16
3	Well-laid out specifications	5	14	60	4	50	200	3	60	180	2	18	36	1	0	0	260	180	18	458	3.23
4	Competency of project personnel	5	9	45	4	37	148	3	60	180	2	32	64	1	5	5	193	180	5	378	2.66
5	Effective consultations with stakeholders	5	14	60	4	37	148	3	50	150	2	32	64	1	9	9	208	150	73	431	3.04
6	Effective communications	5	5	25	4	41	164	3	46	138	2	32	64	1	18	18	189	138	18	345	2.43
7	Adequacy of contingency plan	5	37	185	4	37	148	3	55	165	2	9	18	1	5	5	333	165	23	521	3.67
8	Client' (Beneficiary) satisfaction	5	14	60	4	60	240	3	18	54	2	37	74	1	14	14	300	54	88	442	3.11

Table 8: Water Construction Project Management Practices Adopted by Oromia Water and Energy Bureau

Source: Survey 2016

The results obtained from the survey as shown in the Table 8, provide an option to identify management practices in Oromia Drinking Water Construction Project Management. According to the data in the table above the management practices currently is in use in Oromia Water Construction Project such as the existence of a well-laid out specifications and adequacy of contingency plan as their mean value indicate 3.67 and 3.23 respectively. But the result of interview and FGD shows that even if a well-laid specification exists on paper its applicability is not as strong as contingency plan.

The data in the Table 8 above shows the existence of clarity of overall project mission and goals, top management support, client' (beneficiary) satisfaction as their mean vale are 3.19, 3.16 and 3.11 respectively. The way they are drafted and documented is too attractive. However, their actual applicability is weak as justified by FGD information though there exist personnel who straggle for its implementation. The interview result also shows the satisfaction level of the beneficiaries is not much advisable which can be justified even the mean value of the respondents (which is 3.11).

With regard to the competency of project personnel in Oromia Drinking Water Construction Project management and effective communications about the performance of the project are relatively weak. The mean value form the Table 7 above, also shows below the mean average which is 2.66 and 2.43 for the competency of project personnel and effective communications respectively. As per the focal group discussion (FGD) the reason for being incompetency is the personal assigned for the purpose is because of political merit than competency in relation to the project management. The communication about the project performance is also very sluggish to the extent of delaying the report to Oromia Water and Energy Bureau complaining for different problems that enforce them to delay their report. As a result of untimely information about the progress on ongoing project the decision to be made to take corrective action also delay and consequently causes inefficient and ineffective project performance.

4.4.4. The Major Factors that Affects Public Sector Water Construction Projects in Oromia Regional State

Project management specifically drinking water construction project performance may be affected by the action of different actors even if the extent of influence differs from actor to actor. With regard to Oromia drinking water construction project the following data summarized the level of influences.

Questions	Alternatives	Frequency	Percentage
Factors significantly affects public sector drinking water construction projects in Oromia Regional State.	Management /organization related factors	32	22.5%
	Contractor related factors	43	30.3%
	Designer related factors	30	21.1%
	Factors related Others	37	26.1%
Total		142	100 %

Table 9: Major factors that affects public sector water construction projects in Oromia Regional State

Source: own Survey 2016

As can be seen from the Table 9 above, from the total respondents 30.3% responded as contractors’ related factors has major influence on the water construction projects in Oromia regional state followed by corruption related factors by 26.1%. 22.5% of the total respondent agreed as management /organization related factors has significance influence and finally, 21.1% of them responded that designer related factors has significant influence on the performance of Oromia water construction projects. From this analysis one can conclude that all the above stated factors have major influence as the respondents’ responses are nearly uniform. The information from FGD and interview results also confirm that they have major influences on the performance of Oromia drinking water construction projects.

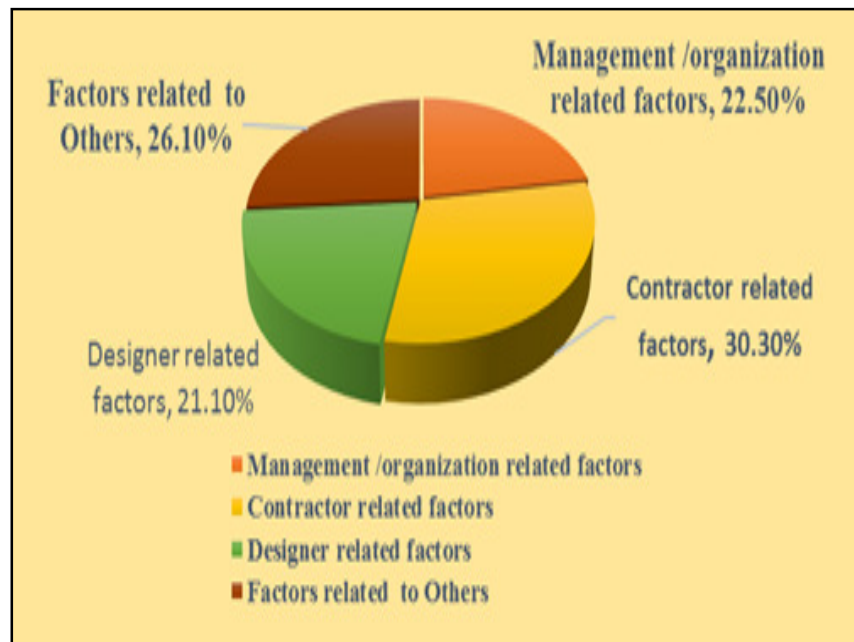


Figure 2: Factors Affecting Water Construction Projects in Oromia

Source: Own Survey 2016

The figure 2 above, also shows that all the factors have major impact on the performance of Oromia Drinking Water Construction Project works. This again justified that the collaboration and commitment of the above four factors will significantly increase the overall performances (in terms of time, quality and effectiveness) of Oromia water construction projects. If the above four factors overlooked and do not integrated the negative impact they pose on management of Oromia Drinking Water Construction Project will be unrecoverable.

4.5. Analysis Related to the Critical Factors Affecting of Oromia Drinking Water Construction Projects Management

4.5.1. Management /Organization Related Factors

Different factors may affect Oromia Drinking Water Construction Projects Management either positively or negatively. The table here under (Table 10.) summarized management related factors that affect Oromia Drinking Water Construction Projects Management.

Factors	Mean	Rank
Unclear project mission/common goals	3.35	3
Inadequate communication/information	2.02	12
Unclear project management objectives	3.13	9
Lack of top management support	3.42	2
Absence of competent project team	3.26	7
Inadequate project planning and control	3.30	4
Lack of problem solving abilities	3.64	1
Project performance and quality problems	3.30	4
Too optimistic goals in relation to project cost and schedule	3.19	9
Lack of project sponsorship	2.57	13
Unclear lines of responsibility, authority and accountability	2.82	12
Slow and cumbersome decision-making process	3.31	6
Lack of training of the local staff for sustainability	2.96	11
Lack of end user participation	3.2	8

Table 10: Management /Organization related factors affecting of Oromia Drinking Water Construction Projects Management
Source: Own Survey 2016

According to the current study and data presented in table 4.6 above, lack of problem solving abilities (incompetence of project managers) has been identified as the most critical factor that affects project management. The mean value of this factor is 3.64 and ranked first which indicates that this aspect was “extremely critical factor” that negatively influences the realization of Oromia Drinking Water construction project management. This factor is related to the skills and ability of project managers to identify and solve problems on timely bases for the successful completion of any project. Empirical evidence in support of previous research indicating that technical and administrative skills of the project manager, as well as his/her commitment and competence to identify and solve problems as occurred, becomes the most critical component during the project life cycle.

The second critical factor affecting of Oromia Drinking Water Construction Projects Management is the lack of top management support that executed the project. According to the analysis result the mean value for lack of top management support was 3.42. The information result from interview and FGD justified the lack of top management support and follow up on progress of projects. The integration of project work by top management and provision of support to the project manager and project team when accomplishing their duties on the particular projects was weak. The flexible and adequate access to organizational resources is considered as a core precondition for effectively executing the project activities. This can hardly be available without definite and timely reaction and support from the top management of the project-executing organization.

The third critical factor that affects Oromia Drinking Water Construction Projects Management was absence of clear project mission/common goals. The mean value of this factor is 3.35 that indicates the existence of unclear project mission/ goals and the result obtained from interview also confirms absence of clear mission/goals among different levels of project management (no coordination on common mission /goals among regional, zonal, and woreda level project management). This was one of the factors that endangering the water construction project performance in the region.

Inadequate project planning and control and project performance and quality problems were ranked as fourth critical factors that influence Oromia Drinking Water Construction Projects having a mean value of 3.3. The data obtained from interview and secondary data source such as annual report of the bureau clearly indicated that the plan and performance of water construction project have large variation (example; the reports of Oromia Water & Energy Bureau 2011-2015 disclosed extreme gap between project plan and actual performance such as planning to dig 29 water walls but only perform 06 (six) water wall in some year and planning for 7 water wall but constructing only 01(one); in the year 2014/15; 37 constructed wall fail to give water and etc., were indicators for problems in the performance and quality of the projects.)

Slow and cumbersome decision-making process was also rated among those that have significant influence on performance of Oromia Drinking Water Construction Projects. It has a mean value of 3.31 and the annual reports of Oromia Water & Energy Bureau for the years 2011-2015, show the dalliance of many decisions like bidding decisions which sometimes delay till the end of April. This indicates the existence of lenient management in making decisions which will be one of the reasons for unnecessary increases in time for project completion.

4.5.2. Contactors Related Factors

Factors	Mean	Rank
Inadequate site investigation	2.97	10
Work suspensions owing to conflicts	3.25	8
Fraudulent practices, kickbacks and corruption	3.92	1
High machineries maintenance costs	3.11	9
Numerous construction activities going on at the same time	2.84	12
High cost of machineries	2.76	13
Inadequate labor/skill availability	3.70	4
Stealing and waste on site	3.38	7
Poor project (site) management/poor cost control	3.76	3
Lack of coordination between general contractors and subcontractors	3.79	2
Inappropriate contractor's policies	3.45	5
Shortage of material and plant	2.96	11
Poor relationship between manager and labors	3.42	6

*Table 11: Contactors Related Factors Affecting of Oromia Drinking Water Construction Projects Management
Source: Survey 2016*

As can be seen from the Table 11 above, from the factors related contractors that significantly affect Oromia Drinking Water Construction Project; fraudulent practices, kickbacks and corruption was ranked as the first (1st) factor with a mean value of 3.92; and lack of coordination between general contractors and subcontractors ranked second (2nd) with a mean value of 3.79. According to the data obtained from interview and FGD results justified that these two factors are among the chronic problems in the Oromia Drinking Water Construction Projects. As corrupted acts deep rooted in project management, budget execution cannot bring about the desired outcomes and impacts as it “eats away” the allocated resources. It is even more so when these resources are wasted by public officials that are paid to ensure that such resources are utilized efficiently and effectively for the benefit of the majority of citizens.

According to Azeem (2009), when corruption is induced in the project management process and any actor involved at any stage (from the project formulation to closure of the project) it poses a serious development challenge, it undermines democracy and good governance by subverting formal processes. It also undermines economic development by generating considerable distortions and inefficiencies. Implicitly, there are opportunities for corruption in the project procurement (bid awarding) process and this is considered by interviewees of this study to be the most important challenge.

Poor project (site) management/poor cost control was ranked 3rd with mean value 3.76. This problem as revealed by FGD and interview results were common to own water construction project and those constructed by private contractors. This problem, according to Mansfield et al. (1994), is a function of hasty commencement of project and political expediency overriding the detailed preparation of designs. The phenomenon of producing a single design scheme and replicating it across the region also leads to change orders often resulting from change in site conditions. Lacking knowledge of site conditions and absence of community participation especially for underground water construction project can cause design changes prompting project delays. When site conditions tend to differ from what was anticipated, extension of time claims to cover loss and expense such as overheads and material and labor price fluctuations can significantly increase the initial budget and facilitate condition for corruption.

The result also confirmed that existence of lack of continuous follow up the project progress towards its completion and inappropriate input cost control, resulted with poor quality project output because some inputs were not used as per the project specification. Moreover, some input was redirected for personal use than for the project purpose by selling inputs illegally by for man or guardians of the projects but included and reported as consumed by the projects. There were also cases where high quality inputs sent to the project were sold and replaced by inputs low quality keeping the balance for corrupted individuals (personal) benefits.

Inadequate labor/skill availability was ranked fourth (4th) with a mean value of 3.70. Manpower shortages have remained the bane of effective project planning and implementation in the government sectors. Professional and trained planners are virtually nonexistent while administrative officers performing planning functions lack any form of training and experience. This is occasioned by the lack of the application of merit in employment as tribalism and nepotism takes the order of the day in employment. The double jeopardy here is that not only is plan formulation poor but also that continuity is not ensured.

4.5.3. Designers Related Factors

Factors	Mean	Rank
Wrong method of cost estimation	3.81	1
Inaccurate cost estimation	3.61	3
Scope changes occasioned by inadequate pre-contract study	3.68	2
Inappropriate preconstruction study	3.52	4
Change in project design	3.39	6
Lack of coordination between design team and general contractor	3.45	5
Scope changes arising from redesign and extensive variation occasioned	3.32	7
Absence of construction cost data	3.32	7
Inadequate quality/ambiguity of contract documents	3.13	11
Incessant variation order	3.19	10
Conflict between design consultants and implementation consultants	3.26	9

Table 12: Designer Related Factors Affecting Oromia Drinking Water Construction Projects Management

Source: Survey 2016

As can be seen from the Table 12 above, from the factors related designer that significantly affect Oromia Drinking Water Construction Project management; 'wrong method of cost estimation' was ranked 1st with mean value of 3.81. Peeters and Madauss (2008) stated that the biggest factor that contributes problems of construction projects is inaccurate estimation of original or initial cost of a project. It is because of technical problem on how to estimate project costs and also not enough project information in the early stage of project. In case of Oromia water Construction projects. According to the response of the respondents through interview and FGD, the designers took the past years cost data as a base and increases it by some percent to estimate the cost of construction for the following construction period without taking into consideration different changes that may occur such as input cost changes because of inflation and other circumstances. This finally causes the contractors to either quite their contract or to request contract cost modification (amendments in contract). This again makes management of the water construction project to not be efficient and effective that cause the project to delay many years to be finalized and given to the beneficiaries.

Scope changes occasioned by inadequate pre-contract study ranked 2nd most important factors that affect Oromia drinking water construction project management by respondents with mean value of 3.68. This factor reveals the effects of absence of site feasibility studies and accurate geological data. This problem according to Mansfield et al. (1994) is a function of hasty commencement of project and political expediency overriding the detailed preparation of designs. The response from interview result showed that there exists the phenomenon of producing a single design scheme and replicating it across all zones of Oromia also leads to change orders often resulting from change in site conditions. Lacking knowledge of site conditions can cause design changes prompting water construction project delays. Site investigation to assess conditions before design should be thorough and complete before project commencement. When site conditions tend to differ from what was anticipated, extension of time claims to cover loss and expense such as overheads and material and labour price fluctuations can significantly increase the initial budget. This again pose negative impact on management of water construction projects.

Inaccurate cost estimation was ranked as 3rd factor related to designer/engineer that affect Oromia Water Construction project management with mean value of 3.61. According to Kaliba et al. (2009), the initial cost estimates should be as accurate as possible. Accuracy of cost estimation allows clients to check and determine the required funds for executing the project are made available when required. But the data collected through FGD and interview; many water projects (both taped and underground water projects) costs were formulated with inadequate baseline estimates due to a lack of project scope definition. On the other hand, water construction projects are awarded to the lowest bidder. Some of the lowest bidder's lack management skills and less attention is paid to contractor's plan, cost control, overall site management, and resource allocation. When the actual costs of the construction incurred it became higher by far from initial estimate and contractors start to claim for contract amendment or withdraw from construction. This again negatively affect the management of drinking water construction and began to sue contractors to complete their contract. The litigation may last for more a year, the project will stack until the case will be settled or may require additional resource to be allocated to complete the construction project.

Inappropriate preconstruction study was ranked 4th factors related to designer that affect Oromia water construction project management with a mean value of 3.51. The result obtained through interview also show that there exists absence of preconstruction study in some drinking water contraction projects specially in underground water construction. If appropriate preconstruction study was made it will provide a rigorous risk assessment of alternative solutions under various scenarios provides a means of raising the confidence level that can be placed in early estimates. According to Project Management Institute (2008), before the project is planned, an appropriate level of detail preconstruction study should be conducted to ensure the time, cost and resources required for the project are adequately estimated and to effectively manage risk during project execution.

Lack of coordination between design team and general contractor was ranked 5th factor that affect the drinking water construction project management with mean value 3.45. The respondent's response disclosed that even not all some contractors rush into construction work simply relaying on the first draft of produced design documents rather than following the Design Engineer set a schedule to complete design documents. Mistakes and discrepancies in design documents then became common reasons for redoing and drawings and may take a long time to make necessary corrections. This form severs management problems in Oromia Water Project to delay projects and consume unnecessary resources.

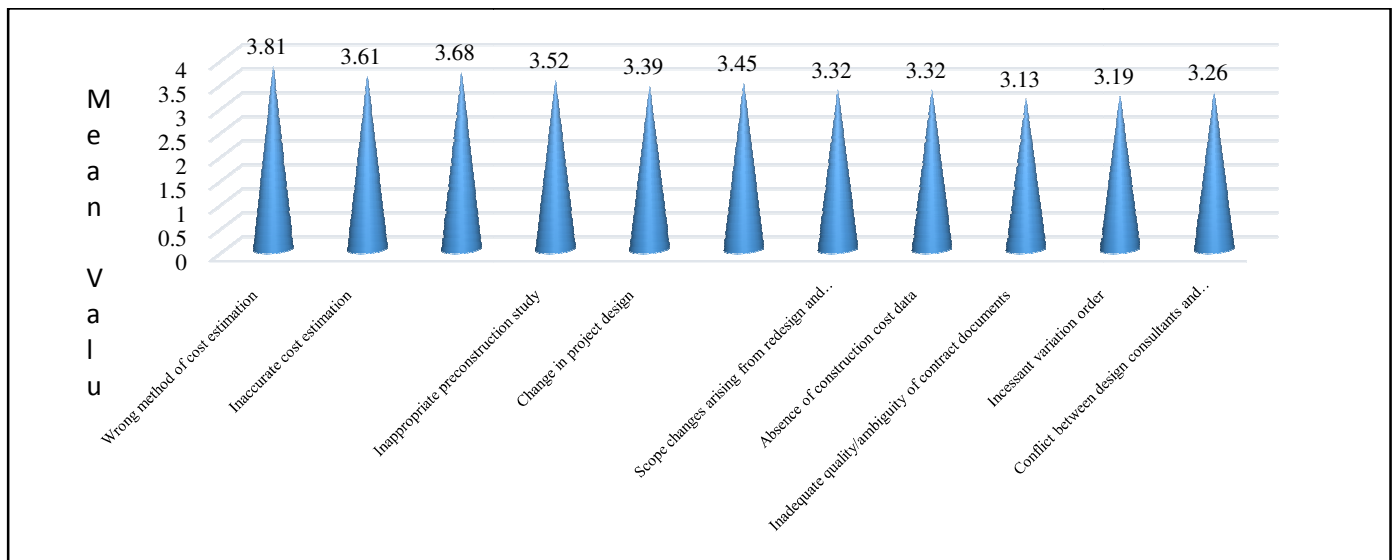


Figure 3: Designer related factors affecting Oromia Drinking Water Construction Projects Management

Source: Own Survey 2016

As summarized in the figure 3 all factors related to designer have significant impact on management of Oromia Drinking Water Construction projects. But the wrong method of cost estimation, inaccurate cost estimation, scope changes occasioned by inadequate pre-contract study, inappropriate preconstruction study and lack of coordination between design team and general contractor are ranked from one to five respectively. This shows that these for variables need special attention in the management of drinking water construction projects. Moreover, the result from annual reports of Oromia Water and Energy Bureau from the year 2011-2015 show that the existence of design problems and lack uniform Geophysics support especially on construction of digging wells for drilling underground water.

4.5.4. Other Factors Affecting Oromia Drinking Water Construction Projects

This part presents the analysis of factors affecting drinking water construction project that are either common to or not related to contractors, designer of owner/managers. the Table 13 below presents those perceived factors that pose problems to Oromia Drinking Water Construction projects.

Factors	Mean	Rank
Unexpected ground conditions	3.27	1
Fluctuation in prices of raw materials	3.19	2
Inappropriate government policies	2.97	7
Project complexity	3.08	4
Inadequate production of raw material in the country	3.15	3
Adverse effect of weather	3.06	5
Domination of construction industry by foreign firms and aids	3.03	6

Table 13: Other factors (not directly related to owner, contractors of designer) affecting Oromia Drinking Water Construction Projects Management

Source: Own Survey 2016

As per the Table 13 above, unexpected ground conditions were ranked 1st other factor that can influence management of Oromia water construction project with a mean value of 3.27. Nega (2008) found that actual site conditions of a project are not usually determined until excavation is completed. The unexpected conditions on sub surface sometimes require fundamental redesign of projects with high expense. According to the information gathered through interview and FGD this unexpected ground conditions is more common in drilling underground water than stretching taped water. This is because of poor design and lack of participating community in site selection for drilling underground water. Contractors used to drill the well by trial and error. They may encounter rocks or no water in the area they drill the well. As a result, the drilled well were filled and another were tried and keep on trying until they got the water which increase the cost of construction and pose problems on management.

Fluctuation in prices of raw materials were ranked the 2nd factors categorized under other factors that affect the management of Oromia Water Construction Project Management with mean value of 3.19. Price fluctuation causes cost overruns in most cases where it is hard to estimate the cost accurately because it is objective. This happen caused by high inflation of price in developing countries or the speculation of suppliers (Long et al., 2008). The information gathered through FGD disclosed that some contractors deliberated underestimating of costs for their project to get the project approval. But upon the commencement of the project, the material costs the contractors' estimate may by far lower than the actual material prices in the market and if inflation is added to this poor estimation of material cost it may aggravate the management of the project. As inflation goes up, interest rates will go up and the costs will increase

too. Then the contractors either start to negotiate for amendments of their contract or with draw from performing their agreement. This critically affects the management of drinking water construction projects.

Inadequate production of raw material in the country was ranked 3rd most important factor related to other factors that affect Oromia Drinking Water Construction Projects with mean value of 3.15. Some the water project will last long to complete because absence of mater pump and transformer used for the purpose. Chan and Park (2005) found that high cost of machineries is one of the market related problems. Construction industry is mainly market driven where it is influenced by current market style. When the production material is not adequately produced in the country and ordered from foreign market, the lead time between ordering and receiving the material will increase both the cost of construction and time required to complete the project. Such situations are common in Oromia water construction projects. Drinking water construction projects were started and left open for several years. When the concerned body is asked, they pretend as though the material for construction is in transited but never arrive for the purpose for more than three to four years. Example, the water construction project to from Tufa to Batu/Zeway town started before five years in the past and still as it was. Oromia Water and Energy Bureau 2011-2015 annual report also showed that many water constructions were not complete in the intended project completion time due shortage of supplies, design problems and incapability of contractors. This situation too severs in case of Oromia Water Construction Enterprise.

4.6. Analysis Related to Ranking the Relative Importance of the Identified Factors that Affect Oromia Drinking Water Construction Projects Management

The factors affecting Oromia Drinking Water Construction Projects be looked at from different perspectives. All the data provided by respondents were examined, ranked and then used as basis for selecting most important factors affecting drinking water construction project. The relative important was calculated based on mean value and ranked to yield the final outlined results. Table 14 lists the total results of responses per factor that affects Oromia Drinking Water Construction. The relative importance means value rank within the corresponding category, and the overall ranks of the factors investigated are presented and 15 most important was taken to further investigate where these factors more sever from the for general factors categories- Management, contractors, designers and other categories.

	Identified Factors	Frequency	Mean Value	Rank
17.	Fraudulent practices, kickbacks and corruption	139	3.92	1
28.	Wrong method of cost estimation	135	3.81	2
24.	Lack of coordination between general contractors and	135	3.79	3
23.	Poor project (site) management/poor cost control	133	3.76	4
21.	Inadequate labor/skill availability	131	3.7	5
30.	Scope changes occasioned by inadequate pre-contract study	131	3.68	6
7.	Lack of problem solving abilities	129	3.64	7
29.	Inaccurate cost estimation	128	3.61	8
31.	Inappropriate preconstruction study	125	3.52	9
33.	Lack of coordination between design team and general	122	3.45	10
25.	Inappropriate contractor's policies	123	3.46	11
4.	Lack of top management support	121	3.42	12
27.	Poor relationship between manager and labors	121	3.42	13
32.	Change in project design	120	3.39	14
22.	Stealing and waste on site	120	3.38	15
1.	Unclear project mission/common goals	119	3.35	16
34.	Scope changes arising from redesign and extensive variation	118	3.32	17
35.	Absence of construction cost data	118	3.32	17
12.	Slow and cumbersome decision-making process	118	3.31	19
6.	Inadequate project planning and control	117	3.3	20
8.	Project performance and quality	117	3.3	20
39.	Unexpected ground conditions	116	3.27	22
5.	Absence of competent project team	116	3.26	23
38.	Conflict between design consultants and implementation	116	3.26	23
16.	Work suspensions owing to conflicts	115	3.25	25
14.	Lack of end-user participation	114	3.2	26
9.	Too optimistic goals in relation to project cost and schedule	113	3.19	27
37.	Incessant variation order	113	3.19	28
40.	Fluctuation in prices of raw materials	113	3.19	28
43.	Inadequate production of raw material in the country	112	3.15	30
3.	Unclear project management objectives	111	3.13	31
36.	Inadequate quality/ambiguity of contract documents	111	3.13	31
18.	High machineries maintenance costs	110	3.11	33
42.	Project complexity	109	3.08	34
44.	Adverse effect of weather	109	3.06	35
45.	Domination of construction industry by foreign firms and aids	108	3.03	36
15.	Inadequate site investigation	105	2.97	37
41.	Inappropriate government policies	105	2.97	37
13.	Lack of training of the local staff for sustainability	105	2.96	39
26.	Shortage of material and plant	105	2.96	40
19.	Numerous construction activities going on at the same time	101	2.84	41
11.	Unclear lines of responsibility, authority, and accountability	100	2.82	42
20.	High cost of machineries	98	2.76	43
10.	Lack of project sponsorship	91	2.57	44
2.	Inadequate communication / information	72	2.02	45

Table 14: Relative importance (rank) of factors that affect Oromia drinking water construction projects management.

Source: Own Survey, 2016

Based on mean value and the relative rank given by respondents, the following 15 most important factors were selected from over all 45 factors selected for this study. In order to make it very clear the frequency of the response, mean value of the response rank of each selected factor and the category to which the factor belongs were presented in the Table 15 below.

No	Identified Factors	Frequency	Mean Value	Rank	Factor's Category
17.	Fraudulent practices, kickbacks and corruption	139	3.92	1	Contractor
28.	Wrong method of cost estimation	135	3.81	2	Designer/Engineer
24.	Lack of coordination between general contractors and subcontractors	135	3.79	3	Contractor
23.	Poor project (site) management/poor cost control	133	3.76	4	Contractor
21	Inadequate labor/skill availability	131	3.7	5	Contractor
30.	Scope changes occasioned by inadequate pre-contract study	131	3.68	6	Management
7.	Lack of problem solving abilities	129	3.64	7	Management
29.	Inaccurate cost estimation	128	3.61	8	Designer/Engineer
31.	Inappropriate preconstruction study	125	3.52	9	Designer/Engineer
33.	Lack of coordination between design team and general contractor	122	3.45	10	Designer/Engineer
25.	Inappropriate contractor's policies	123	3.46	11	Contractor
4.	Lack of top management support	121	3.42	12	Management
27.	Poor relationship between manager and labors	121	3.42	13	Contractor
32.	Change in project design	120	3.39	14	Designer/Engineer
22.	Stealing and waste on site	120	3.38	15	Contractor

Table 15: Over all ten most important factors that affect Management of Oromia Drinking Water Construction Project

Source: Own Survey 2016

From the above Table 15, the fifteen (15) most important factors selected from 45 total factors that affect management of Oromia Drinking Water Construction Projects used in this study can be summarized into four categories – contractors originated, designers originated, management originated factors and others. From fifteen selected factors seven (07) are contractors' originated factors (Fraudulent practices, kickbacks and corruption, lack of coordination between general contractors and subcontractors, poor project (site) management/poor cost control, inadequate labor/skill availability, inappropriate contractor's policies, poor relationship between manager and labors; and Stealing and waste on site). Five (05) of the factors are designers' originated factors (Wrong method of cost estimation, lack of problem solving abilities, inaccurate cost estimation, inappropriate preconstruction study; and change in project design). Only three (03) factors from fifteen selected are management originated factors (Scope changes occasioned by inadequate pre-contract study, lack of problem solving abilities and lack of top management support). The factors originated from others than those categorized under contractors, designers and management originated is non from the fifteen selected most important factors.

From contractors originated factors fraudulent practices, kickbacks and corruption forms the biggest factor that affect Oromia Drinking Water Construction Projects. 139 out of 142 respondents agreed that this factor is the main factor affecting drinking water construction projects and ranked 1st with the highest mean value (3.92) from all factors used in this study. Lack of coordination between general contractors and subcontractors stood 2nd in this category with mean value of 3.79 and followed by poor project (site) management whose mean value is 3.76 and so on. However, stealing and waste on site is rated the least factor that affect drinking water construction project from fifteen most important selected factors.

From designers' originated factors 'wrong method of cost estimation' was ranked the 1st from its category and 2nd from fifteen selected most important factors affecting Oromia Drinking Water Construction Projects with mean value of 3.81. The 2nd most important factor in this category is inaccurate cost estimation with mean value of 3.64 and the 3rd is inappropriate preconstruction study whose mean value 3.52 is and so on. Change in project design is ranked the least from this category with mean value of 3.39. From management originated factors category that affect drinking water construction management, scope changes occasioned by inadequate pre-contract study is ranked 1st with mean value 3.68 followed by lack of problem solving abilities and lack of top management support whose mean values are 3.64 and 3.42 respectively.

From these analysis, it is clear that most problems of Oromia Drinking Water Construction Projects Management are emanated from contractors' and designers' originated factors which may be estimated to be about 47% (7/15 * 100) and 33% (5/15 * 100). Whereas, Management (self) originated problems constitute about 20% (3/15 * 100).

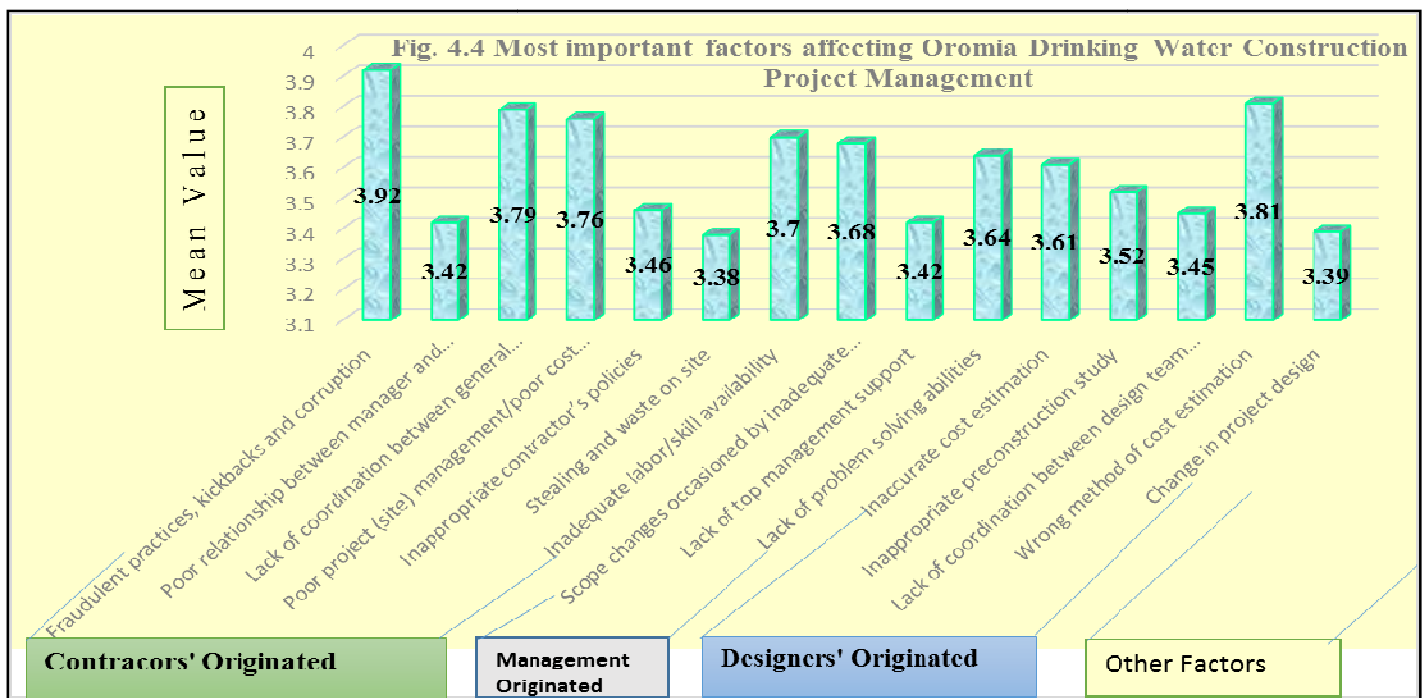


Figure 4
Source: Own Survey 2016

From this figure anyone, can realized (conclude) that much of the problems of Oromia Drinking Water Construction Project Management were emanated from both contractors’ and designers’ related factors.

5. Major Findings, Conclusions and Recommendations

5.1. Introduction

This chapter presents conclusion and recommendation made based on the analysis and findings of the study. The purpose this study to identify the project management practices adopted by Oromia Water and Energy Bureau and the critical factors affecting Oromia Drinking Water Construction Project Management in past five years (2011-2015) based on the secondary data available at the Oromia Water and Energy Bureau and data collected from respondents. Questionnaire survey was designed to identify the category of factors (management/organization contractors, designer and others) that affect management of Oromia Drinking Water Construction projects; and to identify which factor is more critical for water construction management within the given factor category.

5.2. Major Findings

From the survey results, almost all respondents agreed that the project management practices adopted by Oromia Water and Energy bureau is both traditional and contemporary project management approach. With regards to management tools used the work breakdown structure is the most frequently followed by Graphical Evaluation and Review Technique whereas, Gantt chart and Project Management Software are some of the rarely used or not employed tools by the bureau.

The management practices currently are in use in Oromia Water Construction Project shows the existence of a well-laid out specifications and adequacy of contingency plan, however, its applicability is not as strong as its contingency plan. The competency of project personnel and effective communications about the performance of the project are relatively weak. The reason for incompetency resulted from assignment of personal for the purpose of political merit than competency in relation to the project management. Because of ineffective (sluggish) communication about the progress on ongoing project performance decision were delayed and caused the project management to be inefficient and ineffective.

Lack of problem solving abilities (incompetence of project managers) has been identified as extremely most critical factor that affects drinking water project management. Top management support that executed the project in terms of integration of project works and provision of support to the project manager and project team was weak. The flexible and adequate access to organizational resources is hardly available with definite and timely reaction and support from the top management of the project-executing organization. Weak effort to project mission such as absence of strong coordination on common mission /goals among regional, zonal, and woreda level project management was another factor that endangering the water construction project performance in the region. Inadequate project planning and control and project performance and quality problems were identified as another critical factor. The annual report of the bureau (2011-2015) clearly indicated extreme gap between project plan and actual performance such as planning to dig 29 water walls but only perform 06 (six) water wall in some year and planning for 7 water walls but constructing only 01(one); in the year 2014/15; 37 constructed walls fail to give water and etc., were indicators for problems in the performance and quality of the projects.

Fraudulent practices, kickbacks and corruption; and lack of coordination between general contractors and subcontractors are among contractor's related chronic problems that negatively affect Oromia Drinking Water Construction Projects Management. As corrupted acts deep rooted in project management, budget execution cannot bring about the desired outcomes and impacts as it "eats away" the allocated resources. Consequently, it undermines democracy, good governance, and economic development. Poor project (site) management/poor cost control were common to own water construction project and those constructed by private contractors. Lacking knowledge of site conditions and absence of community participation especially for underground water construction projects were the causes for design changes. As a result, contractors request for extension of time claims to cover loss and amendments of contract agreement for additional prices and this again facilitate condition for corruption. Lack of continuous follow up the project progress towards its completion and inappropriate input cost control, resulted with poor quality project output and causes many drinking water projects to be out of function in few months. Inadequate labor/skill availability have remained the bane of effective project planning and implementation in Oromia Drinking Water Construction Offices. The administrative officers who were performing planning functions lack any form of training and experience though some employees at university studying their master degree. This is occasioned by the lack of the application of merit in employment as tribalism and nepotism takes the order of the day in employment. Wrong method of cost estimation' resulted because the designers took the past years cost data as a base and increases it by some percent to estimate the cost of construction for the following construction period without taking into consideration different changes which finally causes the contractors to either quite their contact or to request contract cost modification (amendments) in contract agreement and pose problems on management of the drinking water construction project and causes the project to delay many years to be finalized and given to the beneficiaries. Scope changes occasioned by inadequate pre-contract study was another design related factors that affect Oromia Drinking Water Construction Project Management. The research disclosed the absence of adequate site feasibility studies and accurate geological data; and the phenomenon of producing a single design scheme and replicating it across all zones of Oromia. Inaccurate cost estimation was still another factor that negatively influence Oromia Drinking Water Construction Project Management. Many water projects (both taped and underground water projects) costs were formulated with inadequate baseline estimates due to a lack of project scope definition. Constructors who win the bid at lowest bid quiet and withdraw from construction. Then management of drinking water contraction project began to sue contractors to complete their contact. The litigation may last for more a year, and the project will stack until the case will be settled or may require additional resource to be allocated to complete the construction project.

Unexpected ground conditions are more common in drilling underground water than stretching taped water. This is because of poor design and lack of participating community in site selection for drilling underground water. Contractors used to drill the well by trial and error and may encountered rocks or no water in the area they drill the well. Then another trial will start and the cost of construction goes up and pose problems on management of drinking water contraction project. On the other hand, some contractors deliberated underestimating of costs for their project to get the project approval leaving loopholes in the contract agreement. Upon the commencement of the project, they start to negotiate for higher prices by cohabiting with some key officials. Still inadequate production of raw material in the country is another problem that have negative influence on management of Oromia Drinking Water Construction Project. When materials were ordered from foreign market, the lead time between ordering and receiving the material will increase both the cost of construction and time required to complete the project. As a result, water construction projects were started and left open for several years before they hand over to their beneficiaries.

5.3. Conclusions

Generally, one can conclude that from 15 most important factors identified, contractors originated sever factors that affect Oromia Drinking Water Construction Management were fraudulent practices, kickbacks and corruption; lack of coordination between general contractors and subcontractors and poor project (site) management respectively were the three most sever factors. However, stealing and waste on site is rated the least factor that affect drinking water construction. From designers' originated factors 'wrong method of cost estimation, inaccurate cost estimation and inappropriate preconstruction study were the most important factors that affect drinking water construction projects and change in project design is ranked the least from this category. And from management originated factors category that affect drinking water construction management, scope changes occasioned by inadequate pre-contract study, lack of problem solving abilities and lack of top management support are the most important factors identified. The relative impact of these 15 factors that pose problems on Oromia Drinking Water Construction Projects Management were compared, about 47%(7/15 *100) factors were related to contactors' and 33%(5/15*100) were designers' originated factors and, about 20%(3/15*100) related to management (self) originated factors.

5.4. Recommendations

Based on the findings of the research, Oromia Drinking Water construction projects management are recommendations the following points to enhance the efficiency and the effectiveness of its projects management.

- In order to improve the project management practice Oromia Water and Energy Bureau:
 - Should adopt 'Project Management Software' to manage different drinking water projects in addition to other techniques and method already in use as the project management software will enhance delivery of information about project progress towards completion and facilitate monitoring and evaluation.
 - Should implement its well-laid out specifications and adequacy of contingency plan rather than simply having it for the sake planning and use competent project personnel who can effectively communicate about the performance of the project on timely basis.

- To improve overall Oromia Drinking Water Construction Project Management, the Water and Energy Bureau should work on the following identified critical factors that affect management of drinking water construction projects.

5.4.1. Management Specific Recommendations

- To improve the project management Oromia Water and Energy Bureau should assign project managers based on competencies and capabilities of project management (efficiency and effectiveness in managing projects as far as project management requires professional in relevant field of study) than for the purpose of political merit
- Provide short-term training and strengthen advanced studies (like second degree which was already started though few) for project manager to build capacity and extend uniform top management support to integrate project works and to strengthen project manager and project teams of the region.

5.4.2. Recommendations to Solve Contractors Originated Drinking Water Construction Project Management Problems

- Oromia Water and Energy Bureau should work strongly to set a system that can reduce or if possible avoid fraudulent practices, kickbacks and corruption by changing the mindset of its employees and contractors through deep scanning to bring about changes in project management and speeding project completion thereby reducing the project costs and enhance beneficiaries' satisfaction.
- The bureau should set a system in which can enforce both contractors and subcontractors to complete the project in agreed time and quality-the failure of which make them accountable.
- To improve competencies of project (site) management/or cost control of own water construction project and those constructed by private contractors, the bureau should assign adequate and competent site managers in all projects and participate community especially for underground water construction projects site selection.

5.4.3. Recommendations to Solve Designers Originated Drinking Water Construction Project Management Problems

- To improve its method of cost estimation, to reduce unnecessary contractors' request for amendments/changes in contract agreement, and to speed up the completion of projects, Oromia Water and Energy Bureau management should monitor and evaluate the cost estimation made by designers for own water construction projects/ Oromia Water Construction Enterprise projects and ensure that all necessary cost elements were well analyzed considering the changing circumstances before it gets approved.
- To correct/avoid scope changes occasioned by inadequate pre-contract study, Oromia Water and Energy Bureau should confirm whether the site feasibility studies were conducted adequately and the geological data were accurate; and assure the absence the phenomenon of producing a single design scheme and replicating it across all zones of Oromia
- To improve overall efficiency and effectiveness and to speed up water construction projects the bureau should design a strong system that break and eliminate the chance of cohabitation between contractors, designers and some key officials for unnecessary and preplanned financial benefit that causes delay project completion, change the contract agreement and award the contract for new contractors after unsolved litigation for many years.

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