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Assessment of Project Quality Management Practices: Case Study of Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.)

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A Research Project Submitted to Addis Ababa University School of Commerce in Partial Fulfillment of the requirements for the Award of Masters of Arts in Project Management

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Approved by Board of Examiners

Advisor	Signature	Date
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External Examiner	Signature	Date

Statement of Declaration

I hereby declare that the study entitled "Assessment of Project Quality Management Practices: Case study of Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.)" is original work of my own. I have carried out the present study independently with the guidance and support of the research Advisor Mesfin Workneh(PHD). Any sources used for the study have been accordingly acknowledged. The study has not been submitted for award of any Degree or Diploma program in this or any other institution.

_____ _____

Rahel Dinku Date

Statement of Certification

This is to certify that Rahel Dinku carried out her project on the topic entitled Assessment of Project Quality Management Practices: Case Study of Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.) under my supervision. It is conducted by Rahel Dinku for the partial fulfillment of the requirements for the award of masters degree in Project Management. To the best of my knowledge it is original work carried by her and it had not been presented for a partial fulfillment for any educational qualification at this university.

_____ _____

Advisor: Mesfin Workneh (PHD) Date

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ABBREVIATION AND ACRONYMS

PMBOK	Project Management Body of Knowledge
ECDSWCo.	Ethiopian Construction Design and Supervision Works Corporation
WEDSWS	Water and Energy Design & Supervision Works Sector
ISO	International Organization for Standardization
TQM	Total Quality Management
PQM	Project Quality Management

ABSTRACT

Quality must be recognized from the point of importance, at the same level as the scope, time and costs of project. Building projects that are delivered within estimated cost, specified quality and calculated time can greatly satisfy client, contractor and consultant and the project can be said it is delivered in successful manner. As researches indicate, many building projects in Ethiopia are not delivered successfully to the client. This research is intended to describe the project quality management practice of Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.). The study used descriptive type of design to meet its objective. Questionnaire was used as a tool for primary data collection and was prepared in a way to address three project quality management implementation factors. The factors tried to be addressed are communication of quality information, Employees training and participation and top management participation in project quality management. The researcher took a sample size of 60 from employees of ECDSWCo water sector who are believed to have project quality management responsibility. The data collected through questionnaire was analyzed using SPSS. The findings of the study indicate that the top management of ECDSWCo. is committed in the project quality planning process to higher degree than the project quality assurance and project quality control processes. The free flow of quality information with in project team is in higher level than between sections and with customers. Finally, it can be inferred from the findings that training is provided to employees to equip them with the necessary competencies. But employee's participation in project quality programs and awareness on their contribution to project quality is minimal.

Key Words: Quality, Project Quality Management, Quality planning, Quality Assurance, Quality Control

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CHAPTER ONE

1. INTRODUCTION

Project quality management is a distinct area of project management which applies to all projects, regardless of the nature of their product (Gvozdenovic, Miljanovic, Jegdic & Crnogorcic, 2008).

As described in Project Management Body of Knowledge Guide(PMBOK), quality management is all about identifying and following quality requirements, auditing the results of quality control measurements and using quality measurements to control quality and recommending project changes if necessary (PMBOK, 2013).

Currently where competition is very high, quality is not only the prerequisite but it also becomes a survival means for all organizations in the world.

Project Quality Management addresses the management of the project and the product of the project. In every case, failure to meet product or project quality requirements can have serious negative consequences for any or all the project stakeholders. It is more about preventing and avoiding than measuring and fixing poor quality outputs. It is part of every project management processes from the moment the project initiates to the final steps in the project closure phase. It is not about finding and fixing errors after the fact, quality management is the continuous monitoring and application of quality processes in all aspects of the project. Even projects that are delivered within budget and on time are not successful if the quality of the deliverable is poor (ibid).

1.1 Background of the study

PMBOK defines Project Quality Management as the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.

Implementation of quality management in project embraces the concepts of quality planning, quality assurance and quality control. Quality management processes were defined by Project Management Institute and several tools and techniques were identified as part of the implementation process which includes: - benefit/cost analysis, benchmarking, flow-charting, design of experiments, cost of quality, quality audits, inspection, control charts, pareto diagrams, statistical sampling, flow-charting and trend analysis (ibid).

Quality management is critically required for a construction company to sustain in current construction market which is highly challenging and competitive. Harris and McCaffer explained that quality management has to provide the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a company. The role of quality management for a construction company is not an isolated activity, but intertwined with all the operational and managerial processes of the company (Harris and McCaffer, 2001).

The construction industry is vital for the development of any nation. In many ways, the pace of the economic growth of any nation can be measured by the development of physical infrastructures, such as buildings, roads and bridges. Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion.

The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability (Takim, and Akintoye, 2002).

The Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.), is a fully integrated consultancy firm in water and energy, building and urban planning, transport sectors, geotechnics and underground works combined with advanced laboratory and research, surveying, geospatial and civil informatics services in search of excellence and quality. It's Water and Energy Design & Supervision Works Sector (WEDSWS) is one of the six business Units that make up the Ethiopian Construction Design and Supervision Works Corporation

(ECDSWCo.). This sector provides study, design and construction supervision services to wide range of civil engineering works such as dams and hydropower, water supply, environmental engineering, irrigation and drainage, flood protection, renewable energy, water resources development planning, integrated rural development planning, water conveyance systems, tunnels, integrated river basin master plan study, groundwater and other civil engineering and water resources development projects requiring full-fledged multidisciplinary specialist in-deep technical know-how.

It is stated in the company policy that the Enterprise strives for continual improvement in measures of performance such as time, quality and cost to enhance customer satisfaction through human resource development and project management capacity building. The Enterprise ensures that professional services comply with national guidelines, international standards and codes of practices by fulfilling the requirements of ISO 9001:2008 quality management system.

A Study made in area of project management practices of construction projects in Ethiopia indicates that there is weakness in the way projects are managed. The results of a study by Tadesse, Zakaria and Zoubeir has revealed the unsatisfactory construction project management practice in Ethiopia in terms of adapting general project management procedures and project management process tools & techniques. And it was also found that quality deviates from predetermined or specified requirements by 21-40 % (Tadesse, Zakaria and Zoubeir, 2016)

Other research by Solomon Desta on Ethiopian Road Authority shows that the Authority's both Internal Audit Service Directorate and Quality Assurance, Road Inspection and Safety Management Directorate is ill-staffed and not performing the detailed audits and quality assurances. And it also expressed Authority's current approach of project performance evaluation lacks a proper check-and-balance. Currently, the performance evaluation is conducted by the parties responsible for the execution of the various processes, projects and programs (Solomon, 2015).

1.2 Statement of the Problem

From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies (Tan & Abdul-Rahman, 2005). Quality management is critically required for a construction company to sustain in current construction market which is highly challenging and competitive (Harris and McCaffer, 2001). The use of project quality management enables realization or exceeding the needs and expectations of stakeholders.

As described in a research by Fetene Nega, building projects that are delivered within estimated cost, specified quality and calculated time can greatly satisfy client, contractor and consultant and the project can be said it is delivered in successful manner. But as indicated by the research most of building projects in the country are not delivered successfully to the client" (Fetene Nega, 2008).

Quality, therefore, must be recognized, from the point of importance, at the same level as the scope of the project, time and costs. If the stakeholders are not satisfied with the quality of project management or the results of the project, the project team should commit scope change, time extensions and additional costs to satisfy the stakeholders' needs and expectations.

1.3 Research Questions

1.3.1 Basic Research Question

- Does Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.) implement project quality management system?

1.3.2 Sub - Research Questions

- Does the top the management of ECDSWCo. participate in project quality management implementation?
- Is there proper communication of project quality management information in ECDSWCo?
- Are employees of ECDSWCo are trained in quality management?

1.4 Research Objective

1.4.1 General Objective

- To Describe the implementation of Project Quality Management in Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo).

1.4.2 Specific objective

- To describe the level of participation of the top management of **ECDSWCo.** towards project quality management implementation.
- To describe the existence of communication of project quality information in ECDSWCo.
- To describe training and participation of ECDSWCo. employees in project quality management implementation.

1.5 Scope of the Study

The study assessed only the quality management practice of projects undertaken by ECDSWCo – water sector. It doesn't assess any other project management issues. Projects undertaken by other sectors of the corporation are not included in the study. In addition, the study doesn't participate all the staff of the organization. Only information on project quality management is collected from randomly selected staffs of the ECDSWCo-water sector.

1.6 Limitations of the study

The research methodology of this study is descriptive. Thus, the study determines practices and not causes or reasons. In addition, the sampling technique used is judgmental sampling by which the technique is objective and may include uncontrolled variation.

1.7 Significance of the Study

Quality as one of the key factors of project success and taking in to consideration of previous studies indication of quality issues of projects undertaken in Ethiopia, this study will be of much significance to all who are concerned with project success and the satisfaction of project stakeholders.

The findings of the study will provide as lessons learned document for the company under study and a good base for further evaluation and improvement of any area of the quality management process.

1.8 Organization of the Study

The research paper contains five chapters. Chapter one contain background of the study, statement of the problem, research questions, objectives of the study, scope of the study, limitations of the study, and definition of key terms. Chapter two is dedicated to review related theoretical and empirical literatures and provide conceptual framework of the study. Chapter three deals with the research design and methodology, sources of data, target population, sampling technique, and tools of data collection and analysis. Chapter four presents results and discussions of results. Chapter five gives conclusion and recommendations based on the findings.

1.9 Definition of key terms

Quality

Quality is the features of a product that makes it useful and satisfies the need and expectation of the user (Juran, 1999).

Project

Project is a temporary endeavor undertaken to create a Unique Product, Service or Result. A project is temporary in that it has a defined beginning and end in time with defined scope and resources. And it is unique in that in that it is not routine operation but a specific set of operations designed to accomplish a singular goal (PMBOK, 2013).

Project quality management

Project quality management is the process for ensuring that all project activities accomplished in every stage of the project are effective and making sure the project met the requirements of the customers and will satisfy their need (ibid).

Quality planning

Quality planning (QP) is a systematic process that translates quality policy into measurable objectives and requirements, and lays down a sequence of steps for realizing them within a specified timeframe (Juran, 1999).

Quality assurance

Quality assurance (QA) is defined as a procedure or set of procedures intended to ensure that a product or service under development (before work is complete, as opposed to afterwards) meets specified requirements (PMBOK, 2013).

Quality Control

Quality control (QC) is a procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer (ibid).

CHAPTER TWO

REVIEW OF RELATED LITERATURE

INTRODUCTION

This chapter gives an insight in to various studies conducted by researchers as well as explained terminologies related to project quality management and presents status of the problem described by concise review of previous studies.

2.1 THEORETICAL REVIEW

2.1.1 Project

The project management body of knowledge guide (PMBOK Guide) defines ***project*** as a temporary endeavor undertaken to create a unique product, service, or result. A project has a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, the need for the project no longer exists or the client wishes to terminate the project. Temporary does not typically apply to the product, service, or result created by the project; most projects are undertaken to create a lasting outcome. Every project creates a product, service, or result unique with a different location, different design, different circumstances and situations, different stakeholders, and so on (PMBOK, 2013).

As Larson and Gray stated the major characteristics of a project which differentiate it from other endeavors of the organization is that projects:

- Have an established objective.
- A defined life span with a beginning and an end.
- Involve participation of several departments and professionals.
- Typically do something that has never been done before.
- Have specific time, cost, and performance requirements.

Projects are evaluated according to accomplishment, cost, and time spent. These triple constraints impose a higher degree of accountability than we typically find in most jobs. These

three also highlight one of the primary functions of project management, which is balancing the trade-offs between time, cost, and performance while ultimately satisfying the customer. (Larson and Gray, 2011)

2.1.2 Project Management

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. This application of knowledge requires the effective management of the project management processes; Initiating, Planning, Executing, Monitoring and Controlling, and Closing.

Managing of projects involves identifying and addressing of requirements, communicating with active stakeholders and balancing of project constraints majorly scope, quality, schedule and budget. The relationship among these factors is such that if any one factor changes, at least one other factor is likely to be affected. Project stakeholders may have differing ideas as to which factors are the most important, creating an even greater challenge. The project team needs to be able to assess the situation, balance the demands, and maintain proactive communication with stakeholders to deliver a successful project (PMBOK 2013).

Oberlender defines ***project management*** as the art and science of coordinating people, equipment, materials, money and schedules to complete a specified project on time and within approved cost. Much of the work of a project manager is organizing and working with people to identify problems and determine solutions to problems. It is people who have the ability to create ideas, identify and solve problems, communicate, and get the work done. Because of this, people are the most important resource of the project manager. Thus, the project manager must develop a good working relationship with people in order to benefit from the best of their abilities (Oberlender, 2000).

Meredith & Mantel stated the emergency of project management for the development of new methods of management is due to forces of: the exponential expansion of human knowledge; the growing demand for a broad range of complex, sophisticated, customized goods and services; and the evolution of worldwide competitive markets for the production and consumption of goods and services. All these forces combine to mandate the use of teams to solve problems that used to be solvable by individuals (Meredith & Mantel, 2009).

2.1.3 Project Stakeholders

A ***project stakeholde***r is an individual, group, or organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project. Stakeholders may be actively involved in the project or have interests that may be positively or negatively affected by the performance or completion of the project.

Stakeholders include all members of the project team as well as all interested entities that are internal or external to the organization. The project team identifies internal and external, positive and negative, and performing and advising stakeholders in order to determine the project requirements and the expectations of all parties involved. The project manager should manage the influences of these various stakeholders in relation to the project requirements to ensure a successful outcome (PMBOK, 2013).

2.1.4 Quality

Juran defines ***Quality*** in two ways. First ***quality*** as the features of products which meet customer needs and thereby provide customer satisfaction. In this sense, the meaning of quality is oriented to income and higher quality in this sense usually costs more. And second ***quality*** as freedom from deficiencies, errors that require rework, customer dissatisfaction and customer claims. In this sense, the meaning of quality is oriented to costs, and higher quality usually costs less.

According to Juran, managing for quality makes extensive use of three such managerial processes which are *quality planning*, *quality control* and *quality improvement*. These processes are known as the "Juran trilogy."

The ISO 9000 definition of ***quality*** is the totality of feature and characteristics of a product or service that bears on its ability to satisfy stated or implied needs.

The push for higher levels of quality appears to be customer driven. Customers are now demanding: higher performance requirements; faster product development; higher technology levels; materials and processes pushed to the limit; lower contractor profit margins; and fewer defects/rejects.

Customer demands are now being handled using total quality management (TQM). Total quality management is an ever-improving system for integrating various organizational elements into the design, development, and manufacturing efforts, providing cost-effective products or services that are fully acceptable to the ultimate customer. Externally, TQM is customer oriented and provides for more meaningful customer satisfaction. Internally, TQM reduces production line bottlenecks and operating costs, thus enhancing product quality while improving organizational morale (Kerzner, 2009)

2.1.5 Quality and the Triple Constraint

The project "***triple constraint***" includes *time*, *cost*, and *scope*. All three elements are of equal importance to project success and to the project manager. Project managers typically try to balance the three when meeting project objectives, but they may make trade-offs among the three during project implementation in order to meet objectives and satisfy customers. *Quality* is a fourth among equals. It may be most closely associated with scope because scope is based on customer requirements and quality is closely associated with customer requirements. This linkage addresses quality of the product of the project. There is another important quality consideration: quality of the project itself. Quality processes, attuned to the scope specifications, will ensure a quality product. Quality processes that maintain cost and schedule constraints will ensure a quality project. A project manager should never trade off quality during project implementation (Kenneth, 2005).

2.1.6 Benefits of Quality

The *benefits of quality* in project performance are many. First, a quality project and product will yield customer satisfaction. A satisfied customer may perceive greater value than originally anticipated, which goes beyond customer satisfaction to customer delight. Reduced costs are another benefit. Quality processes can reduce waste, improve efficiency, and improve supplies, all things that mean the project may cost less than planned. Finally, better products, better project performance, and lower costs translate directly into increased competitiveness in an ever-more-global market place (ibid).

2.1.7 Project Quality Management

Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. Project Quality Management uses policies and procedures to implement, within the project's context, the organization's quality management system and, as appropriate, it supports continuous process improvement activities as undertaken on behalf of the performing organization. Project Quality Management works to ensure that the project requirements, including product requirements, are met and validated.

Project Quality Management addresses the management of the project and the deliverables of the project. It applies to all projects, regardless of the nature of their deliverables. Quality measures and techniques are specific to the type of deliverables being produced by the project.

In the context of achieving ISO compatibility, modern quality management approaches seek to minimize variation and to deliver results that meet defined requirements. These approaches recognize the importance of:

- ***Customer satisfaction***. Understanding, evaluating, defining, and managing requirements so that customer expectations are met. This requires a combination of conformance to requirements and fitness for use.
- ***Prevention over inspection***. Quality should be planned, designed, and built into—not inspected into the project's management or the project's deliverables. The cost of preventing mistakes is generally much less than the cost of correcting mistakes when they are found by inspection or during usage.
- ***Continuous improvement***. as defined by Shewhart and modified by Deming, the PDCA (plan-do-check-act) cycle is the basis for quality improvement. In addition, quality improvement initiatives such as Total Quality Management (TQM), Six Sigma, and Lean Six Sigma could improve the quality of the project's management as well as the quality of the project's product.
- ***Management responsibility***. Success requires the participation of all members of the project team. Nevertheless, management retains, within its responsibility for quality, a related responsibility to provide suitable resources at adequate capacities.

- ***Cost of quality (COQ).*** Cost of quality refers to the total cost of the conformance work and the nonconformance work that should be done as a compensatory effort because, on the first attempt to perform that work, the potential exists that some portion of the required work effort may be done or has been done incorrectly.

2.1.8 Quality Management Processes

2.1.8.1 Quality Planning

Quality planning as defined by Juran is a structured process for developing products that ensures customer needs are met by the final result. The tools and methods of quality planning are incorporated along with the technological tools for the particular product being developed and delivered.

Juran identified four quality gaps. These are understanding gap, (that is, lack of understanding of what the customer needs), design gap, process gap and operational gap. Quality planning provides the process, methods, tools, and techniques for closing each of these component gaps and thereby ensuring that the final quality gap is at a minimum.

According to Juran, quality planning has six steps.

- Establish the project
- Identify the customers
- Discover the customer needs
- Develop the product
- Develop the process
- Develop the controls and transfer to operations

The first step, establish the project, provides the clear goals, direction, and infrastructure required if the constituent quality gaps are to be closed. The next step provides for systematic identification of all the customers. It is impossible to close the understanding gap if there is the least bit of uncertainty, fuzziness, or ignorance about who all the customers are.

The discovery of customer needs in the third step provides the full and complete understanding required for a successful product design to meet those needs. It also evaluates customer perceptions explicitly so that the final perception gap can be avoided.

The develop product step uses both quality planning tools and the technology of the particular industry to create a design that is effective in meeting the customer needs, thereby closing the design gap. The process gap is closed in the next step, develop process. Quality planning techniques ensure that the process can deliver the product as it was designed, consistently, time after time.

Finally, the operations gap is closed by developing process controls that keep the process operating at its full capability. Successful elimination of the operations gap also depends on an effective transfer of the plans to the operating forces. A strong transfer plan, executed well, will provide operations with all the processes, techniques, materials, equipment, skills, and so on to delight customers on a continuing basis.

2.1.8.2 Quality Control

Quality control as defined by Juran is a universal managerial process for conducting operations to provide stability—to prevent adverse change and to "maintain the status quo." To maintain stability, the quality control process evaluates actual performance, compares actual performance to goals, and acts on the difference. Quality control is one of the three basic managerial processes stated by Juran through which quality can be managed (Juran, 1999).

2.1.8.3 Quality Control Vs Quality Assurance (Juran's view)

Quality control and quality assurance have much in common. Each evaluates performance. Each compares performance to goals. Each act on the difference. However, they also differ from each other. Quality control has as its primary purpose to maintain control. Performance is evaluated during operations, and performance is compared to goals during operations. The resulting information is received and used by the operating forces. Quality assurance's main purpose is to verify that control is being maintained. Performance is evaluated after operations, and the resulting information is provided to both the operating forces and others who have a need to

know. Others may include plant, functional, or senior management, corporate staffs, regulatory bodies, customers, and the public.

Planning for quality control

Planning for control is the activity which provides the system—the concepts, methodology, and tools—through which company personnel can keep the operating processes stable and thereby produce the product features required to meet customer needs.

2.1.8.4 Quality Improvement

As per Juran definition improvement means the organized creation of beneficial change and the attainment of unprecedented levels of performance.

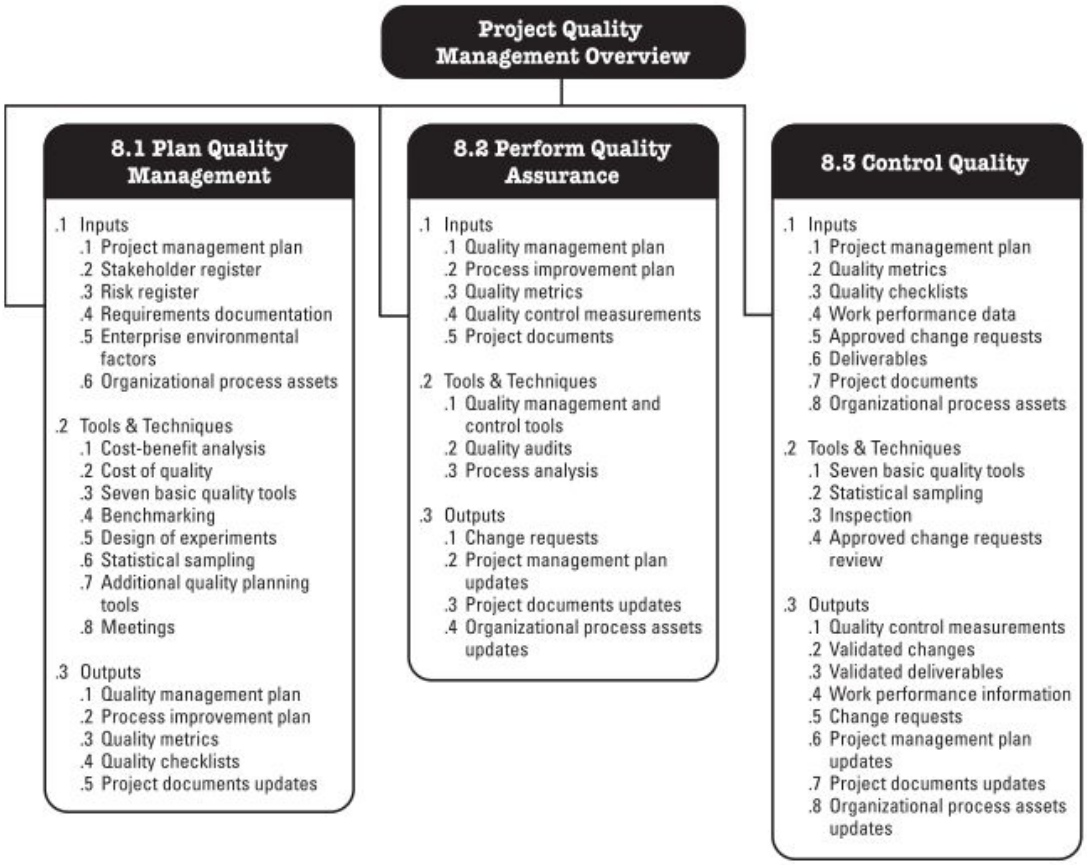
2.1.8.5 The role of upper managers

As Juran said it is difficult to attain quality leadership without the upper managers carrying out the following non-delegable roles.

- Serve on the quality council: Acquire training in managing for quality
- Approve the quality vision and policies.
- Approve the major quality goals.
- Establish the infrastructure:
- Provide resources:
- Review progress: A major shortcoming in personal participation by upper managers has been the failure to maintain a regular review of progress in making quality improvements.
- Give recognition: Recognition usually involves ceremonial events that offer highly visible opportunities for upper managers to show their support for quality improvement.
- Revise the reward system
- Serve on project teams
- Face up to employee apprehensions

2.1.9 Project Quality Management Processes as described by Project Management Body of Knowledge (PMBOK, 2013)

Project Quality Management processes (PMBOK)



2.1.9.1 Plan Project Quality Management

Plan Project Quality Management is the process of identifying quality requirements and/or standards for the project and its deliverables, and documenting how the project will demonstrate compliance with relevant quality requirements. It provides guidance and direction on how quality will be managed and validated throughout the project. Quality planning should be performed in parallel with the other planning processes. Plan Project quality management process gives different outputs by using different inputs, tools and techniques.

2.1.9.1.1 Plan Project Quality Management Process Inputs

The project management documents used to perform the project quality management process are project management plan, stakeholder register, risk register, requirements documentation, enterprise environmental factors and organizational process assets. The organizational process assets that influence the plan quality management process include organizational quality policies, procedures, and guidelines, quality policy, historical databases; and lessons learned from previous phases or projects.

2.1.9.1.2 Tools and Techniques used in Project Quality Management process

The tools and techniques used in the quality planning process are Cost-Benefit Analysis, Cost of Quality (COQ), Seven Basic Quality Tools (i.e. Cause-and-effect diagrams, flowcharts, check sheets, pareto diagrams, histograms, control charts and scatter diagrams), benchmarking, design of experiments, statistical sampling, meeting and other quality planning tools like brainstorming, force field analysis, nominal group technique, quality management and control tools. These tools are used to link and sequence the activities.

2.1.9.1.3 Plan Quality Management Process Outputs.

The following outputs are derived as a result of the project quality planning process.

- Quality Management Plan
- Process Improvement Plan
- Quality Metrics
- Quality Checklists
- Project Documents Update: - project documents that may be updated include stakeholder

register; responsibility assignment matrix; and WBS and WBS dictionary.

2.1.9.2 Perform Quality Assurance

Perform Quality Assurance is the process of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used. The key benefit of this process is that it facilitates the improvement of quality processes. Perform quality assurance is an execution process that uses data created during plan quality management and control quality processes.

Like the project quality planning process, the project quality assurance uses different tools and techniques to utilize different inputs and gives different outputs.

2.1.9.2.1 Inputs to project Quality Assurance

Most of the inputs used in the project quality assurance process are outputs of the project quality planning process. These include quality management plan, process improvement plan, quality metrics, and quality control measurements. In addition to the listed documents project documents may influence quality assurance work and should be monitored within the context of a system for configuration management.

2.1.9.2.2 Tools and Techniques used in the project quality assurance process

The project quality assurance process uses the tools and techniques of the plan quality management and control quality processes, quality audit and process analysis. Other tools that are available be used include: - affinity diagrams, process decision program charts (PDPC), interrelationship digraphs, tree diagrams, prioritization matrices, activity network diagrams, matrix diagrams.

2.1.9.2.3 Quality Audits

A quality audit is a structured, independent process to determine if project activities comply with organizational and project policies, processes, and procedures. Quality audit is used to: -

- Identify all good and best practices being implemented;
- Identify all nonconformity, gaps, and shortcomings;
- Share good practices introduced or implemented in similar projects in the organization and/or industry;
- Proactively aid in a positive manner to improve implementation of

processes to help the team raise productivity; and

- Highlight contributions of each audit in the lessons learned repository of the organization.

Quality audits may be scheduled or random, and may be conducted by internal or external auditors. Quality audits can confirm the implementation of approved change requests including updates, corrective actions, defect repairs, and preventive actions.

Process Analysis

Process analysis follows the steps outlined in the process improvement plan to identify needed improvements and examines problems experienced, constraints experienced, and non-value-added activities identified during process operation.

2.1.9.2.4 Outputs of Project Quality Assurance process

The outputs derived from the project quality assurance process are: -

- Change Requests: - Change requests are used to take corrective action, preventive action, or to perform defect repair.
- Project Management Plan Updates
- Project Documents Updates: - these are quality audit reports, training plans, and process documentation.
- Organizational Process Assets Updates: these include the organization's quality standards and the quality management system.

2.1.9.3 Project Quality Control

Project quality control is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes. Quality control identifies the causes of poor quality and acts to eliminate them and ensures key stakeholders requirements are met.

Quality assurance should be used during the project's planning and executing phases

to provide confidence that the stakeholder's requirements will be met and quality control should be used during the project executing and closing phases to formally demonstrate, with reliable data, that the sponsor and/or customer's acceptance criteria have been met. The

project management team should know the differences between the following pairs of terms:

- Prevention and inspection
- Attribute sampling and variables sampling
- Tolerances and control limits

2.1.9.3.1 Inputs used in Project Quality Control

Documents used as inputs for the project quality control are project management plan, quality metrics, quality checklists, work performance data, approved change requests, deliverables, project documents and organizational process assets. The organizational process assets that influence the control quality process include; the organization's quality standards and policies, work guidelines, and issue and defect reporting procedures and communication policies.

2.1.9.3.2 Tools and Techniques used in Quality Control

The tools and techniques used in quality control processes include the seven basic quality tools, statistical sampling techniques, inspection and approved change requests review.

2.1.9.3.3 Outputs of project Quality Control Process

Using the inputs and tools and techniques stated above, the project quality control process gives quality Control Measurements, validated Changes, verified deliverable, work performance information, change requests, updates to project management plan, project documents & organizational process assets. Project documents which may be updated as a result of the control process includes: - quality standards, agreements, quality audit reports and change logs, training plans and assessments of effectiveness; and process documentation, such as information obtained using quality management and control.

2.2 EMPIRICAL REVIEW

Massoud and Seyd on their study investigate Critical success factor for TQM implementation in Libyan Iron and steel company, to improve the performance and identify the main impediments of implementing TQM successfully. They used questionnaire Survey and semi-structured interviews. The finding of this research revealed that critical success factors for implementing total quality management in Libyan Iron and steel company are: Education and Training, Supplier quality management, Employee Empowerment, Vision and Plan statement, Recognition

and Reward and Customer Focus. This research identified government influence Poor vision statement, Lack of a detailed plan towards implementation of TQM, lack of top management commitment prevent Libyan Iron and steel company from implementing TQM successfully (Massoud and Seyd,2013).

The study undertaken by Ofori to identify and assess the quality of project management practices as well as the critical success factors for projects in Ghana, indicated that the critical factors that contribute to the success of a project include top management support, effective communication, clarity of project purpose and goals, and stakeholder involvement. The study adopted an exploratory approach and utilized a survey method to collect data on project management practices of Ghanaian organizations. It is also mentioned that documentation and dissemination of critical success factors and best practices in project management will improve the quality of project management in Ghana (Ofori, 2013).

A study by Teena was made with the intension of providing clients, project managers, designers, and contractors with necessary information needed to better manage the quality of a construction building projects by identifying the factors that affect process quality of construction projects and to rank them by degree of importance. A questionnaire based survey was used to find out the attitude of contractors and consultants towards factors affecting quality of construction project. The results of the study show that the factors which affect quality are Design, Lack of communication, Conformance to codes and standards, selection of designer, co-operation of parties, management factors, selection of contractor, top management support, labor, execution, material, equipment, financial issues, quality and safety systems, contract documents. (Tenna, 2014)

Based on the findings of the preliminary study by Keng and Hamzah on the implementation of quality management in construction projects in the context of construction industry in Malaysia, several points are preliminarily concluded: Total quality management is not a common practice; ISO registration is mainly for marketing purpose; Implementation of quality management is greatly perceived as a mean to fulfill contractual obligations instead of satisfying the needs of clients; In terms of quality management tools and techniques, construction companies are commonly using the traditional methods such as experiments and inspections. Other methods might be used depend on the individual practices of a company or requirements from

client/consultants; Leadership and participation of top management of construction companies in quality management need to be strengthened; Allocation of financial and human resources for the purpose of problems of the implementation of quality management should be further increased; Finally the study stated that most of the quality management implementation problems encountered elsewhere are relevant in the context. (Keng & Hamzah, 2011)

A research made by Birhanu Beshah on Quality Management and Engineering Practice and Challenges in Ethiopia, quality management practices in Ethiopia was found to be low in all the views including leadership, policy and strategy, resources management, process management, customer satisfaction, business performance and impact on society. Among these factors, policy and strategy is the most critical problem area despite the least weight given by the major quality awards and EQA. Comparatively, the service industries quality management practice is weaker than that of the manufacturing industries as measured by all the quality parameters. As stated by the researcher, the reasons for poor quality practice are basically two: The first one is lack of awareness about the basic concepts of quality. The second reason is that the customers' knowledge about quality is not adequate. Customers do not impose quality as a requirement on the part of the industries. As far as the finding of this research is concerned, so far, there is no planned intervention to develop the knowledge of customers that most probably would lead to quality improvement in the industries (Birhanu Beshah, 2011).

Reza, Allahvirdi, Mohammad had researched on the Relationship between Total Quality Management Critical Success Factors and Knowledge Sharing in a Service Industry. According to the statistical results of their study, the explicit and tacit knowledge sharing improvements led to promoting CSFs of TQM. Considering the results of the case study, the most related TQM CSFs with knowledge sharing were leadership and commitment, supplier management, competitive benchmarking, teamwork, training, customer focus, communication, get thing right first time and process improvement (Reza, Allahvirdi, Mohammad, 2014).

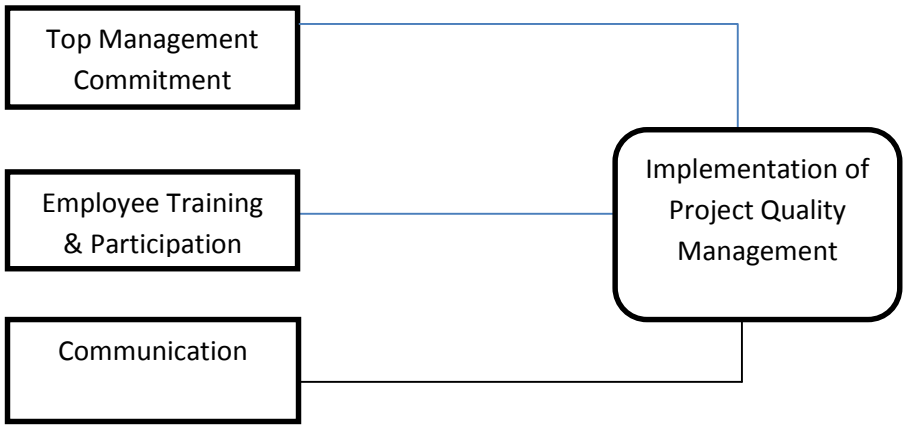
A study was made by Ephantus, Hellen & Joseph with the aim of determining the factors influencing implementation of TQM and their influence in implementation of TQM. The study was based on four objectives: The first objective was to establish how Top Management Commitment influences implementation of TQM in Construction Companies in Rwanda. The study concluded that top management commitment is a critical factor in implementation of

TQM. It was further concluded that top management commitment has a positive influence on implementation of TQM. This means that with increased top management commitment, the implementation of TQM is likely to be more successful. The second objective of the study was to investigate the extent to which Employee's Training influence implementation of TQM in Construction Companies in Rwanda. The study concluded that an employee training is a critical factor in implementation of TQM. The study further concluded that employee training has positive influence on implementation of TQM. This means that employee training can be used to enhance implementation process of TQM (Ephantus, Hellen & Joseph, 2015)

Secondary data analysis was made by Heena & Darshana to identify the critical success factors for TQM in manufacturing sectors. A total of 46 research papers (published between years 1994 to 2013) were selected and used to identify CSFs using Pareto analysis. The paper reviewed both studies on CSFs of TQM as well as TQM performance studies. After Pareto analysis of 21 CSFs, Pareto chart shows that first 13 "vital few" CSFs accounted for 80 percent frequency of occurrence and remaining 8 "useful many" CSFs accounted for only 20 percent frequency of occurrences. Regarding consistencies, the present study showed that 6 out of this 13 "vital few" factors stand out in several studies as being more central for manufacturing sector. As per the analysis, these six factors are: top management commitment, Customer focus, Employee Involvement, Education & Training, Supplier quality management, and Human resource management (Heena & Darshana, 2015).

2.3 CONCEPTUAL FRAMEWORK

Literatures discussed above revealed the factors that affect implementation of project quality management to be top management commitment, employee training, communication, customer focus, stakeholder involvement. The study will see the first three factors on the target company. Top management commitment, communication and employee training.



2.4 SUMMERY

The chapter tried to discuss theories around the topics project, quality, project quality management and the processes of project quality management. Much of the studies undertaken by different researchers in the area of project quality management have found commonly that the main factors that affect implementation of quality management are top management commitment, and employee training. Other factors the studies indicated include employee involvement and effective communication. Unlike other studies, study by Birhanu Beshah has found the reason for poor quality management practice to be low knowledge level of customers about quality. Much of the studies emphasized the implementation challenges at organizational level.

CHAPTER THREE

RESEARCH METHODOLOGY

INTRODUCTION

In this chapter the research methodology applied in carrying out the study will be explained. Accordingly, the kind of research design, type of data used, sources of data, sampling technique, data collection and analysis procedure will be explained with the corresponding justifications.

3.1 Research Design

The study used descriptive type of design to meet the objective of the research. Descriptive research design is undertaken to understand the characteristics of organization that follow certain common practices. It's goal is to describe relevant aspects of the phenomena of interest (Sekaran, 2003).

The researcher used quantitative research method. Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures (Creswell, 2009). The study uses project quality management processes to extract variables to measure consistency of systems and practices applied in the execution of project activities against acceptable standards used in the delivering of project requirements. A survey is used as part of the case study as the research strategy.

3.2 Data Type and Data Sources

Primary as well as secondary data sources are used for the study. The source of the primary data is the data collected through questionnaires. Using a questionnaire enables to organize the questions and receive replies without having to talk to every respondent. As a method of data collection, the questionnaire is a very flexible tool, that has the advantages of having a structured format, is easy and convenient for respondents, and is cheap and quick to administer to a large number of cases covering large geographical areas. There is also no personal influence of the researcher, and embarrassing questions can be asked with a fair chance of getting a true reply.

However, they do require a lot of time and skill to design and develop and not everyone is able to complete questionnaires (Nicholas, 2011).

Documents like company policy, procedures and manuals related to quality will be secondary data sources.

3.2.1 Population of the study

Population in research, it does not necessarily mean a number of people, it is a collective term used to describe the total quantity of things (or cases) of the type which are the subject of the study. Within this population, there will probably be only certain groups that will be of interest to the study. This selected category is sampling frame (Nicholas, 2011). The target population of the study comprises of employees of ECDSWCo. at different functional levels and the sampling frame is ECDSWCo. water sector.

3.2.2 Sampling procedure

Sampling provides a valid alternative when it would be impracticable to survey the entire population or there is budget or time constraint.

Respondents sample is determined using purposive or judgmental sampling. Purposive or judgmental sampling enables to use our judgement to select cases that will best enable us to answer our research question(s) and to meet our objectives. This form of sample is often used when we wish to select cases that are particularly informative (Neuman, 2005).

Purposive sampling technique was used due to the involvement of only the technical staff in project quality management and the availability of those staffs to fill the questionnaire.

The sample for this study contains randomly selected employees from project staffs of the target organization. The sample size is determined by the judgement of the researcher by considering the accessibility of the staffs and their responsibility in project quality management. The researcher took a sample size of 60 from employees of water sector who are believed to have project quality management responsibility.

3.3 Data Collection Procedure

Primary data will be collected regarding implementation of PQM. The respondents for this study will be selected employees from technical stuffs and support functional areas in the company. Data will be collected using structured questionnaires which will be self-administered.

3.4 Data analysis procedure

The data collected will be coded, and analyzed through SPSS (statistical package for social sciences) version 20. Descriptive statistics such as percentages, means and standard deviation will be used to describe the factors influencing implementation of PQM.

3.5 Reliability and Ethical Consideration

3.5.1 Validity and Reliability

Validity determines whether the research tools truly measure what they are intended to measure (Golafshani, 2003). Validity of the questionnaire will be done through consultations with the advisor. This is to remove any built-in errors in the measurement of the questionnaire.

Reliability is the extent to which results of a study are consistent over time and there is an accurate representation of the total population under study. Reliability analysis aims at finding out the extent to which a measurement procedure will produce the same result if the process is repeated over and over again under the same conditions.

The researcher also did Cronbach's alpha test using SPSS to check reliability of the questionnaire. The alpha coefficient for the items is 0.936 and it is generally considered acceptable, suggesting that the items have relatively high internal consistency.

3.5.2 Ethical Consideration

The researcher will seek authorization from the management of the target company (ECDSWCo) before carrying out the research. A letter from school of commerce will also be given to the company before data collection. All information obtained in this research will be strictly used for academic purposes and respondents will be assured of the confidentially of information given where necessary.

CHAPTER FOUR

DATA FINDINGS AND ANALYSIS

This chapter describes the analysis and interpretation of the collected data. Out of the 60 questionnaires distributed to employees of ECDSWCo water sector 54 questionnaires were able to be returned. The data was analyzed using SPSS version 20.

4.1 Primary data analysis

In this study, information on project quality management practice of ECDSWCo. water sector is gathered through questionnaires. Descriptive statistical analysis method was used to see the practice of project quality management and see the factors that affect implementation of Project Quality Management at ECDSWCo. water sector. The factors tried to be checked in this study are top management participation (on processes of quality planning, quality assurance and quality control), communication of project quality information and employees training and participation in project quality management. The questionnaire contained six questions on communication, five questions on employee training and participation and a total of sixteen questions on top management participation.

4.1.1 Demographic Information

The demographic information included in the questionnaire are gender, position held and department. As per the summery of the data, 68.5 % of the respondents were male and 31.5 % were females. Most the respondents (92.6 %) are technical staffs and from project departments. Only 7.4 % were support staff from quality assurance department. This big difference may be a result of distribution of the questionnaire to those assumed to have project quality management responsibility.

4.1.2 Communication of Project Quality Information

In this part the researcher will find information on the extent of agreement of the respondents to communication of quality information among employees each other, between sections and with customers.

Specific targets and actions for quality improvement are documented and communicated to the project team.

The findings of the survey show that most of the respondents of the above question agree to the communication of information on specific targets and quality improvement with in the project team. Their extent of agreement is 61 % of the respondents agree & 26 % strongly agree. Only 13% of the respondents are neural about the above issue and none disagree. The average of the response from all the respondents is 4.13 (4 being rated as Agree) with standard deviation of 0.616 and shows that the average rating of the question is Agree. This indicates that specific targets and actions for quality improvement are documented and communicated to the project team.

Project's quality standards are communicated to the project team and stakeholders.

The response of the employees on the above question gives that 46.3 % of the respondents agree and 33.3 % strongly agree to the communication of quality standards to the project implementers as well as stakeholders. The percentage of respondents who disagree is 11.1 % and 9.3 % are not sure of the above issue. The average of the response of from all the respondents is 4.02 (4 being rated as Agree) with standard deviation of 0.942 and shows that the average rating of the question is Agree. This implies that project's quality standards are communicated to the project team and stakeholders.

There is a well-developed feedback mechanism in your organization.

The percentage of respondents who agree to the existence of well-developed feedback mechanism in the organization is 50 % out of which 16.7 % strongly agree. 24.1 % disagree and 25.9 percent of the respondents are not sure of the existence of well-developed feedback mechanism. The average of the response from all the respondents is 3.43 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 1.039. This shows that the average

rating of the question is Neutral with little inclination to Agree. This indicates that there is feedback mechanism in the organization but is not that developed.

Your organization gets timely information about customer quality needs.

64.8 % of the respondents agree that the organization gets timely information about the customer quality needs out of which 22.2 % of the respondents are in strong agreement. 24.1 % of the respondents disagree and 11.1 % are not sure of timely availability of information on customer quality needs. The average of the response from all the respondents is 3.63 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 1.087. This shows that the average rating of the question is Agree with inclination to Neutral. This may have two implications. The availability of information about customer quality needs to the organization may sometimes be late or some customers' quality information may not be available.

Your organization gets customer complaints on time.

The percentage of respondents who agree to the on-time availability of customer complaints is 68.5 % out of which 14.8 % of the respondents are in strong agreement. 13 % of the respondents disagree and 18.5 % are not sure of availability of customer complaints on time. The average of the response from all the respondents is 3.7 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of .882. This shows that the average rating of the question is Agree with little inclination to Neutral. This implies that, occasionally the organization does not get customer complaints timely.

There is free flow of quality management information between different sections of your organization.

53.7 % of the respondents agree (out of which 25.9 % of the respondents strongly agree) that there is free flow of quality management information between different sections.35.2 % of the respondents are not sure and 11.1 % disagree to the free flow of information among different section of the organization. The average of the response from all the respondents is 3.69 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.987. This shows that the average rating of the question is Agree with inclination to Neutral. This implies that there are

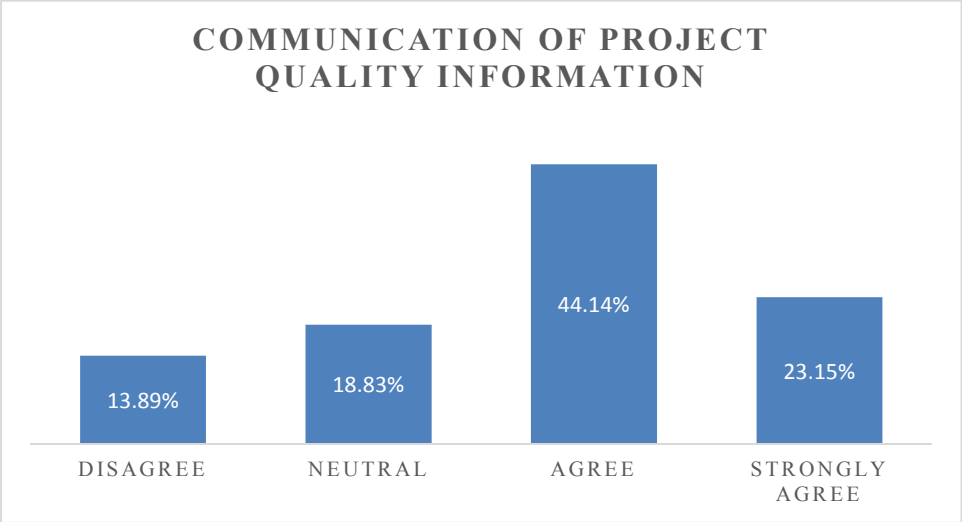
times where quality management information is not communicated between different sections of the organization.

The aggregation and analysis of the above six questions give the results summarized in the table below.

Table 4.1 Communication of Project Quality Information

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	0	0.00%	0.00%	0.00%
Disagree	45	13.89%	13.89%	13.89%
Neutral	61	18.83%	18.83%	32.72%
Agree	143	44.14%	44.14%	76.85%
Strongly Agree	75	23.15%	23.15%	100.00%
Total	324	100.00%	100.00%	
Mean	3.77			
Standard Deviation	0.961			

The overall communication of project quality information with in the project teams and with other relevant stakeholders is rated by the respondents as 13.89 % disagree, 18.83 % Neutral, 44.14 % agree and 23.15 % strongly agree. The average of the all the responses of questions regarding overall communication from all the respondents is 3.77 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.961. This shows that the average rating of the overall communication is Agree with little inclination to Neutral. This implies that communication of project quality information exists but there are areas which need attention. The rating is further summarized by the below Graph.



4.1.3 Employees Training and Participation

In this part the responses on the extent of agreement to Employees training and participation in implementation of project quality management will be analyzed.

Employee's ideas on ways to improve quality in the organization are welcomed by the top management.

The data from the respondents on the acceptability of employee's ideas on quality improvement revealed that 76 % of the respondents agree out of which 20.4 % with agree strongly. 14.8 % of the respondents are not sure and 9.3 disagree with the acceptability of employee's idea on quality improvement. The average of the response of the above question from all the respondents is 3.87 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.848. This shows that the average rating of the question is Agree with little inclination to Neutral. This implies that Employee's ideas on ways to improve quality in the organization may sometimes be ignored.

All employees in your organization are involved in quality management programs.

The percentage of employees who agree to the involvement of all employees in the quality management programs is 40.7% out of which 13% of the total respondents strongly agree.46.3 % of the respondents are neutral and 13.5 % disagree to the involvement of all employees in quality management programs. The average of the response on the above issue from all the respondents is 3.41 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.88. This

shows that the average rating of the question is Neutral with little inclination to Agree. This may imply that either the quality management program of the organization may not always involve employees or only selected employees are involved.

Training is provided to meet required competencies

The data from the respondents for the provision of training gives a result of 61.1 % agree out of which 11.1 % agrees strongly. 20.4 % of the respondents are neutral, 13 % disagree and 5.6 strongly disagree to the provision of training. The average of the response on the above issue from all the respondents is 3.48 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 1.041. This shows that the average rating of the question is Neutral with little inclination to Agree. This implies that training is sometimes provided to meet required competencies.

Training received by employees equips them with understanding on quality management and their role in it.

The analysis of the data collected on the role of the training received by employees, 59.3 % agree (11.1 % strongly) that the training help to understand quality management and their role in it. 33.3 % of the respondents are neutral and 7.4 % disagree to the role of the training received by the employees. The average of the response of ETP04 from all the respondents is 3.63 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.784. This shows that the average rating of the question ETP04 is Agree with little inclination to Neutral. This implies that training received by employees equips them with understanding on quality management and their role in it but not always.

All employees are aware of the relevance and importance of their activities and contribution to the quality objectives.

The extent of agreement of the respondents on the awareness of the importance of their activities to the quality objectives is 37 % agree and 13 % strongly agree. 40.7 % of the respondents are neutral and 9.3 % disagree. The average of the response on the above issue from all the respondents is 3.54 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.84. This shows that the average rating of the question is Agree with inclination to Neutral.

This may indicate that majority of employees are aware of the relevance and importance of their activities and contribution to the quality objectives.

The aggregation and analysis of the above five questions about employee training and participation in quality management gives the results summarized in the table below.

Table 4.2 Employees' Training and participation

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	3	1.11%	1%	0.0
Disagree	28	10.37%	10%	11%
Neutral	84	31.11%	31%	43%
Agree	118	43.70%	44%	86%
Strongly Agree	37	13.70%	14%	100%
Total	270	100.00%	100.0	
Mean	3.59			
Standard Deviation	0.891			

Overall employee training and participation in project quality management is rated by the respondents as 1.11 % strongly disagree, 10.37 % disagree, 31.11 % Neutral and 43.70 % Agree and 13.70 % strongly agree. The average of all the responses of the respondents regarding employee training and participation is 3.59 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.891. This shows that the average rating of the overall employee training and participation in project quality management is Agree with inclination to Neutral. This might be an indication of either not all employees participate and are trained in project quality management or they participate and trained but not always. The rating is further shown by the below Graph.

4.1.4 Top Management Participation in project quality management

In this section the participation of top management in project quality management will be analyzed with each project quality management process as described by PMBOK 2013.

4.1.4.1 Top Management Participation in Project Quality Assurance

The organization management ensures quality standards are being utilized.

The percentage of respondents who agree to management's assurance of utilization of quality standards is 72.2 % out of which 14.8% strongly agree. 9.3 % of the respondents disagree to management's assurance of utilization of quality standards and 18.5 % are neutral. The average of the response on the above issue from all the respondents is 3.78 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.816. This shows that the average rating of the question is Agree. This implies that most of the time the organization management ensures quality standards are being utilized.

The project's current level of quality is assessed regularly.

The extent of agreement on the regular assessment of project quality level is 57.4 % out of which 18.5 % is with strong agree. 18.5 % of the respondents disagree with the regular assessment of project quality level and 24.1 % are neutral. The average of the response from all the respondents is 3.57 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 1.002. This shows that the average rating of the question is Agree with little inclination to Neutral. This may be an indication of regular assessment of level of quality of projects may not be done always or may not be done to some projects.

The process for documenting quality standards and metrics are defined and communicated to the project team.

The percentage of respondents who agree to the communication and defining of process of documentation of quality standards and metrics is 74.1 % out of which 13 % strongly agree. 7.4 % of the respondents disagree and 18.5 % are Neutral. The average of the response from all the respondents is 3.8 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.762. This shows that the average rating of the question is Agree.

The company has put a procedure to manage nonconformities.

The extent of agreement to the existence of a procedure to manage nonconformities is 63 % out of which 14.8 % strongly agree. Only 3.7 % of the respondents disagree and 33.3 % are neutral. The average of the response from all the respondents is 3.74 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.757. This shows that the average rating of the question is Agree with little inclination to Neutral. This may indicate that the company has put a procedure to manage nonconformities but might not cover all types of projects.

The Quality Management Plan aligns with regulatory quality standards.

The alignment of quality management plan to regulatory quality standards is rated by the respondents as 22.2 % strongly agree, 40.7 % agree, 31.5 % neutral and 5.6 disagree. The average of the response from all the respondents is 3.8 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.855. This shows that the average rating of the question is Agree.

The company has put quality audit procedure in place.

The extent of agreement to the existence of quality audit procedure is 64.8 % out of which 16.7 % is strong agreement. The average of the response from all the respondents is 3.67(3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.932. This shows that the average rating of the question is Agree with little inclination to Neutral. This may indicate that the company has put quality audit procedure in place but the audit is not taking place regularly.

Critical resources required in implementing quality initiatives are made available.

The availability of critical resources required to fulfill quality initiatives is rated as 7.4% strongly agree, 53.7% agree, 29.6 % neutral and 9.3 disagree. The average of the response from all the respondents is 3.59(3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.932. This shows that the average rating of the question is Agree with little inclination to Neutral. This may imply that critical resources required in implementing quality initiatives are made available but not always.

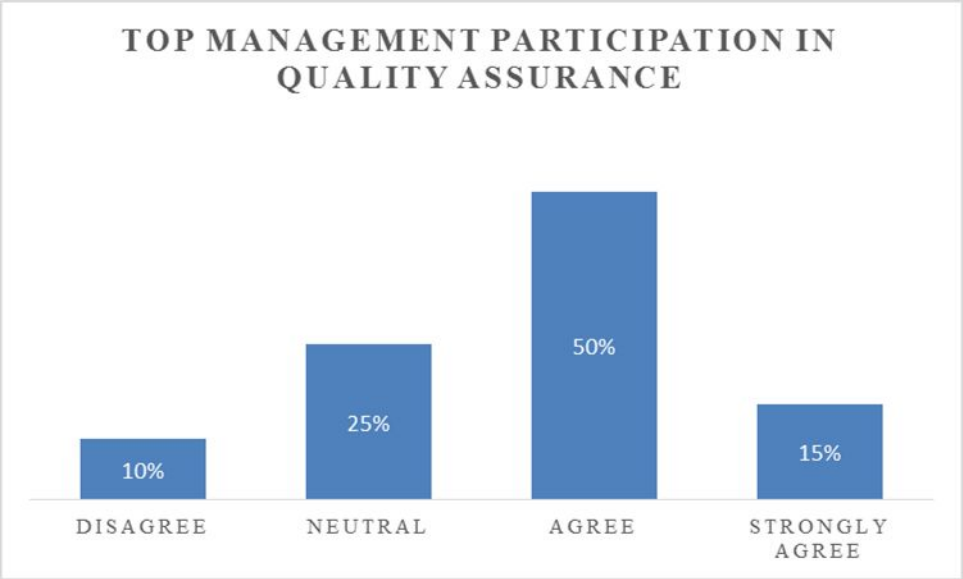
The aggregation and analysis of data from the respondents on the above six questions about top management participation in quality assurance is summarized in the table below.

Table 4.3 Top Management Participation in Quality Assurance

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	0	0%	0%	0.0
Disagree	37	10%	10%	10%
Neutral	95	25%	25%	35%
Agree	188	50%	50%	85%
Strongly Agree	58	15%	15%	100%
Total	378	100%	100%	
Mean	3.71			
Standard Deviation	0.844			

Overall management participation in project quality assurance is computed by taking averages of each question in quality assurance as rated by the respondents. This gives average rating of as 10 % Disagree, 25 % Neutral and 50 % Agree and 15 % strongly agree. The average of all the

responses of the respondents regarding top management participation in quality assurance is 3.71 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.844. This shows that the average rating of the overall top management participation in quality assurance is Agree with little inclination to Neutral. This indicates that quality assurance activities are not always done or some assurance activities are not being done. The rating is further shown by the below Graph.



4.1.4.2 Top Management Participation in Quality Control

The organization management ensure that purchased product confirm to specified requirements.

The rating for management's assurance of conformance of product purchased to specified requirements is 11.1 % strongly agree, 40.7 agree, 33.3 % neutral and 14.8 % disagree. The average of the response from all the respondents is 3.48 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.885. This shows that the average rating of the question is Neutral with little inclination to Agree. This implies that conformity of purchased products to specified requirements is not always ensured.

The organization management sets specification criteria in the authorization of release of project outputs.

The percentage of respondents who agree to the management's setting of criteria in the authorization of release of projects is 79.6% OUT OF which 14.8 %. The percentage of respondents who disagree is 5.6 % with 14.8 % neutral. The average of the response from all the respondents is 3.89 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.718. This shows that the average rating of the question is Agree.

Quality data is measured on a regular basis.

The extent of agreement with the regular measuring of quality data is 61.1 % out of which 27.8 % is strongly agree. The percentage of respondents who disagree is 14.8 % and 24.1 neutral. The average of the response from all the respondents is 3.74 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 1.031. This shows that the average rating of the question is Agree with very little inclination to Neutral. This implies that most of the time quality data is measured regularly.

The aggregation and analysis of data from the respondents on the above three questions about top management participation in quality control is summarized in the table below.

Table 4.4 Top Management Participation in Quality Control

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	0	0%	0%	0.0
Disagree	19	12%	12%	12%
Neutral	39	24%	24%	36%
Agree	75	46%	46%	82%
Strongly Agree	29	18%	18%	100%
Total	162	100%	100%	
Mean	3.70			
Standard Deviation	0.898			

Overall management participation in project quality control is computed by taking average of rating of each question in quality control by the respondents. This gives average rating of 9.3 % disagree, 27.8 % Neutral and 42.6 % agree and 20.4 % strongly agree. The average of all the responses of the respondents regarding top management participation in quality control is 3.74 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.894. This shows that the average rating of the overall top management participation in quality control is Agree with little inclination to Neutral. This implies that top management might not participate in quality control all the time. The rating is further shown by the Graph below.

4.1.4.3 Top Management Participation in Quality Planning

Customer quality standards are defined and documented.

The percentage of respondents who agree to the definition and documentation of customer quality standards is 70.4 % out of which 24.1 % is with strong agree. 9.3 %of the respondents disagree and 20.4 % are neutral. The average of the response from all the respondents is 3.85 (3 being rated as Neutral, 4 being rated as Agree) with standard deviation of 0.899. This shows that the average rating of the question is Agree.

Regulatory quality standards are defined and documented.

The percentage of respondents who agree to the definition and documentation of regulatory quality standards is 78.8 % out of which 27.8 % is with strong agree. 5.6 % of the respondents disagree and 16.7 % are neutral. The average of the response from all the respondents is 4.00 (4 being rated as Agree) with standard deviation of 0.824. This shows that the average rating of the question is Agree.

Project quality standards and measures are defined and documented.

The percentage of respondents who agree to the definition and documentation of project quality standards is 87 % out of which 33.3 % is with strong agree. 5.6 % of the respondents disagree and 7.4 % are neutral. The average of the response from all the respondents is 4.15 (4 being rated as Agree) with standard deviation of 0.787. This shows that the average rating of the question is Agree.

Quality metrics are identified.

The percentage of respondents who agree to the identification of quality metrics is 72.2 % out of which 29.6 % strongly agree. 27.8 % of the respondents are neutral and none disagree. The average of the response from all the respondents is 4.02 (4 being rated as Agree) with standard deviation of 0.765. This shows that the average rating of the question is Agree.

Quality polices and standards are agreed upon by decision makers

The extent of agreement of respondents to quality policies and standards being agreed by decision makers is 33.3 % strongly agree, 37 % agree and 29.7 % Neutral. The average of the response from all the respondents is 4.04 (4 being rated as Agree) with standard deviation of 0.800. This shows that the average rating of the question is Agree.

Quality Management Plan is created and communicated to the project team

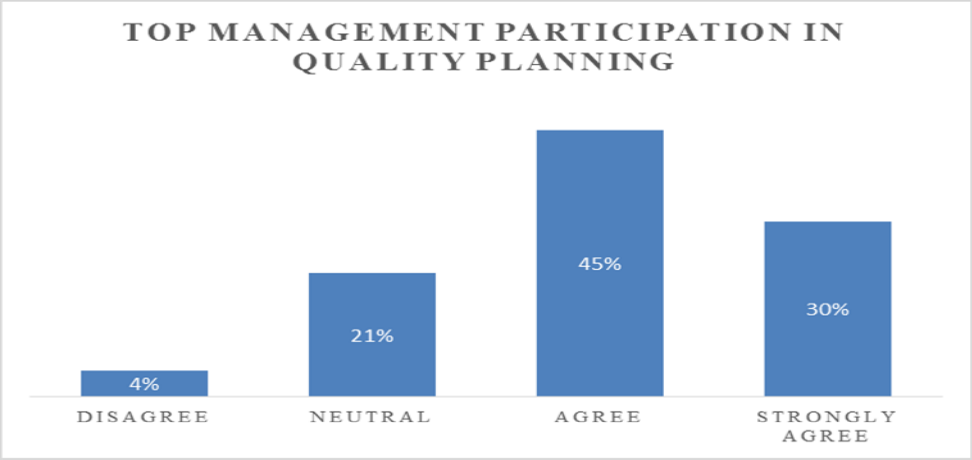
The extent of agreement of respondents to the preparation and communication of quality management plan is 29.6 % strongly agree, 40.7 % agree, 24.1% neutral and 5.6 % disagree. The average of the response from all the respondents is 3.94 (4 being rated as Agree) with standard deviation of 0.878. This shows that the average rating of the question is Agree.

The aggregation and analysis of data from the respondents on the above six questions about top management participation in quality planning is summarized in the table below.

Table 4.5 Top Management Commitment in Quality Planning

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	0	0%	0%	0%
Disagree	14	4%	4%	4%
Neutral	68	21%	21%	25%
Agree	146	45%	45%	70%
Strongly Agree	96	30%	30%	100%
Total	324	100%	100.0	
Mean	4.00			
Standard Deviation	0.825			

Overall management participation in project quality planning is computed by taking average of rating of each question in quality planning by the respondents. This gives average rating of 30% strongly agree, 45 % agree, 21 % Neutral and 4% disagree. The average of all the responses of the respondents regarding top management participation in quality planning is 4.00 (4 being rated as Agree) with standard deviation of 0.825. This shows that the average rating of the overall top management participation in quality planning is Agree. The rating is further shown by the Graph below.



4.4.5 Implementation of Project Quality Management

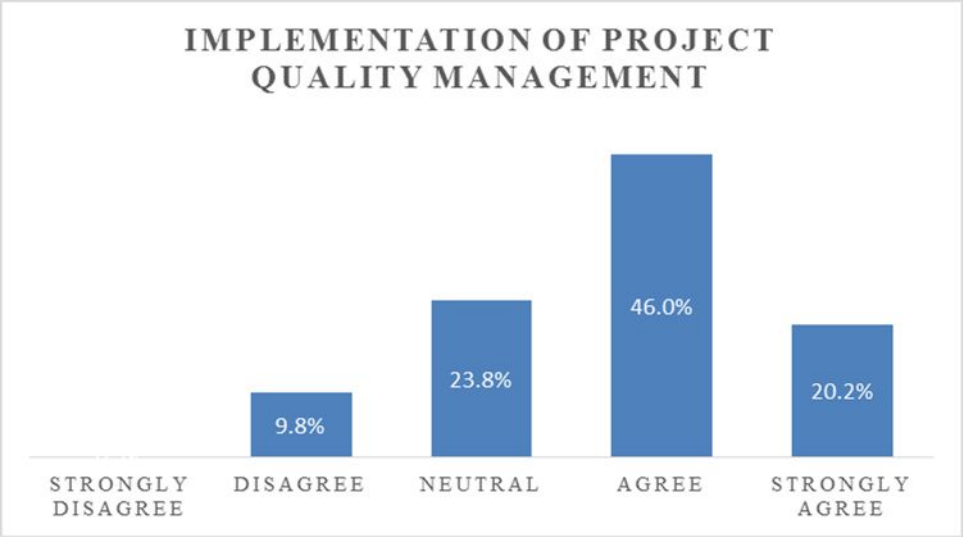
As stated by different researchers and discussed in the literature review there are different factors of implementation of project quality management. Top management participation, communication of quality information and employees training and participation are among the factors stated by the researchers. Referring to that, the researcher assumed the overall top management participation in project quality management, communication of quality information and employee training and participation are reflection of implementation of project quality management. With this assumption, rating of respondents with in the three issues will be aggregated and analyzed to see its implication in the implementation of project quality management.

The aggregation and analysis of the three issues stated above addressed through the 27 questions is summarized in the table below.

Table 4.6 Implementation of Project Quality Management

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	3	0.2%	0%	0.0
Disagree	143	9.8%	10%	10%
Neutral	347	23.8%	24%	34%
Agree	670	46.0%	46%	80%
Strongly Agree	295	20.2%	20%	100%
Total	1458	1.0	100.0	
Mean	3.76			
Standard Deviation	0.892			

Overall project quality management implementation is computed by taking average of rating of all the 27 questions by the respondents. This gives average rating of 20.2 % strongly agree, 46 % agree and 23.8 % Neutral, 9.8 % Disagree and 0.2 % strongly disagree. The average of all the responses of the respondents in implementation of project quality management is 3.76 (3 being rated as neutral and 4 being rated as Agree) with standard deviation of 0.892. This shows that the average rating of implementation of project quality management is Agree. The rating is further shown by the graph below.



The findings in the previous section described that most the respondents agree that there is a proper flow of project quality information between project teams. But there is a lower level of agreement to the flow of information between different sections of the organization as well as with customers. And, only half of the respondents agree to the existence of well-developed feedback mechanism in the organization.

The analysis of data on employees training and participation shows most of the respondents agree that employee's idea is welcomed by top management. Unlike the previous rating, only less than half of the respondents agree with employee's involvement in quality management programs. In addition, only half of the respondents agree that employees know the importance of their activities to the quality objectives of the organization. 60 % of the respondents agree that training is provided which equips them with the necessary understanding on quality management and their role in it.

The result of the data analysis on top management participation gives that 64.8 % of the respondents agree that top management is involved in quality assurance and 63 % agree that top management participates in quality control. Unlike the above two, top management participation in quality planning is rated as agree by 81.5 % of the respondents.

4.2 Secondary data analysis

In reference to the company policy, the Enterprise strives for continual improvement in measures of performance such as time, quality and cost to enhance customer satisfaction through human resource development and project management capacity building. The Enterprise ensures that professional services comply with national guidelines, international standards and codes of practices by fulfilling the requirements of ISO 9001:2008 quality management system.

As it can be seen from the documentation there is a detailed procedure and manual for every sub sector of the organization. Every employee is expected to have the detailed procedure and manual and perform their duties accordingly. Work performed is deemed to be evaluated with reference to global standards. The procedure requires that at every deliverable the top technical team reviews the deliverable and it is send to customers for approval of conformance with requirements agreed.

As part of the explanation of the procedures and manuals by a senior staff of the company, it can be depicted most of the time customers don't give feedback on time. This is harmonized with a study by Birhanu Beshah. The study stated that one of the reasons for poor quality is that the customers' knowledge about quality is not adequate. Customers do not impose quality as a requirement (Birhanu Beshah, 2011).

4.3 Discussion

The findings of the study show that rating of the overall employee training and participation in project quality management might be an indication of either not all employees participate and are trained in project quality management or they participate and trained but not always. As the study of Massoud and Seyd investigated employee empowerment, training and Supplier quality management critical success factors for implementing total quality management. That means employees training and education contribute much to the effectiveness of total quality management (Massoud and Seyd, 2013). The study by Ephantus, Hellen & Josep concluded that an employee training is a critical factor in implementation of TQM. The study further concluded that employee training has positive influence on implementation of TQM. This means that employee training can be used to enhance implementation process of TQM (Ephantus, Hellen & Joseph, 2015).

The findings of the study revealed that there is a lower level of agreement to the flow of information between different sections of the organization as well as with customers. And, only half of the respondents agree to the existence of well-developed feedback mechanism in the organization. The results of a study by Teena show that lack of communication is one of the factors which affect quality (Tena, 2014).

The result of the data analysis on top management participation indicates that top management is involved in quality assurance, quality control and quality planning. But top management gives much emphasis to quality planning. Unlike the above two, top management participation in quality planning is rated as agree by 81.5 % of the respondents.

A study by Keng & Hamzah stated that to improve quality management implementation problems there is need to strengthen leadership and participation of top management in quality management and allocation of financial and human resources should be increased (Keng & Hamzah, 2011). Juran stated this as non-delegable role of managers in quality management (Juran, 1999).

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

INTRODUCTION

In this chapter summary of major findings of the data analysis will be presented. Based on the findings, Conclusion will be made on implementation of project quality management system, the extent of management commitment, communication of project quality information and employees training in quality management. Finally, recommendation for future action will be given by the researcher.

5.1 Summary of major findings

The findings of the study show that Ethiopian Construction Design and Supervision Works Corporation (ECDSWCo.) implement project quality management system. The results show that the management of ECDSWCo. is committed towards implementation of projects quality management. But it is revealed that the management is more committed to project quality planning processes that the assurance and control. As it can be seen from the analysis there is a better communication of project quality information with in project team than between sections and with customers. Finally, it was found out that employees are trained but their involvement in project quality programs was not evident.

5.2 Conclusion

From the findings obtained from data analysis it can be concluded that the top management of ECDSWCo. is committed towards implementation of project quality management. It can be seen from the findings that the top management is committed in the project quality planning process to higher degree than the project quality assurance and project quality control.

The findings also indicate that there is free flow of project quality information with in project teams. However, there is minimal flow of information between sections of the organization and between the organization and customers.

Finally, it can be inferred from the findings that training is provided to employees to equip them with the necessary competencies. But employee's participation in project quality programs and awareness on their contribution to project quality is low. This can also be inferred from the higher percentage of respondents rating of neutral to questions raised to address issues of project quality management implementation in the organization.

5.3 Recommendation

It is evident that top management commitment is critical in implementation of project quality management. This study therefore recommends that organizations who are implementing project quality management give equal emphasis to participation of top management to project quality planning, project quality assurance and quality control. The effectiveness of project quality implementation depends on the effectiveness of the three processes. Majorly top management needs to assure that projects being released are as per standards, ensure regular quality audit is taking place, manage non-conformities on time and avail resources needed for checking quality of projects at each stage.

Top management needs to ensure that employees at all levels of the organization are aware of project quality management and their contribution to it. Unless they know the value of their activity, they cannot feel sense of ownership and act per company procedure. In addition, employees will be much motivated by using reward and recognition of employees who participated in a project which is completed with the desired quality and accepted well by customers.

The researcher also recommends that top management develop communication systems that allow free flow of quality information at all levels in the organization and between the organization and customers. The flow information between sections can be better improved by preparing experience sharing events and announcing major accomplishments. The flow of information with customers can be improved by assigning of specific employee responsible for

communicating with customers and creating awareness to customers on quality and the value of on time communication.

Further studies may be done to explore the relationship between project quality management implementation and organizational performance.

BIBLIOGRAPHY

Birhanu Beshah, (2011), Quality Management and Engineering Practice and Challenges in Ethiopia, Addis Ababa Institute of Technology.

Daniel F. Ofori, (2013), Project Management Practices and Critical Success Factors, International Journal of Business and Management; Vol. 8, No. 21, page 14-31

Eng. Ephantus Ndirangu, Dr. Hellen Mberia & Joseph Oduor ,(2015),European Journal of Business and Social Sciences, Vol. 4, No. 03, page 14-28

Fetene Nega, (2008), Causes and effects of Cost Over run on public building construction Projects in Ethiopia, Addis Ababa University Faculty of Technology

Garold D. Oberlender , (2000), Management for Engineering and Construction, 2nd ed, The McGraw-Hill Companies, Inc.

Gray & Larson,(2011), Project Management The Managetial Process, 5th ed, The McGraw-Hill Companies, Inc.

Gvozdenovic, T Miljanovic, M Aleksandar, J and Crnogorcic, Z (2008) Bodies of knowledge in project management and project quality management. International Journal for Quality Research, 2(1), 69-76.

Harris, F., & McCaffer, R. (2001). Modern construction management (5th ed.). Oxford Blackwell Science Ltd.

Harold Kerzner, (2003). Project Management A System Approach to Planning, Scheduling and Controlling (8th ed.). Jhon Wiley & Sons, Inc.

John W. Creswell (2009), Research Design Qualitative, Quantitative & Mixed Method Approach, 3rd ed. , SAGE Publications, Inc.

Juran & Godfrey, Juran's Quality Handbook (1999), 5th ed, McGraw-Hill Companies, Inc.

Kenneth H.(2005), Project Quality Management Why, What & How, J. Ross Publishing, Inc.

Massoud M. Arshida & Syed Omar (2013), Critical success factors for Total Quality Management Implementation with in the Libyan Iron and Steel Co, Proceedings on

International conference on Information and Social Science Nagoya Japan, September 24-26,

Meredith & Mantel, (2009), Project Management A managerial Approach, 7th ed., John Wiley & Sons, Inc.

Neuman, W.L. (2005) Social Research Methods , 6th ed.. London: Pearson.

Nicholas Walliman (2011),Research Methods: The Basics, Taylor & Francis Group

Project Management Institute, (2013), a guide to Project Management Body of Knowledge (PMBOK GUIDE), 5th ed., Project Management Institute Inc.

Solomon S. Desta, (2015), The Management of Construction Processes in Developing Countries: A Case Study of the Ethiopian Roads Authority , University of Cape Town

Tadesse AYALEW1, Zakaria DAKHLI2, Zoubeir LAFHAJ2, (2016) Assessment on Performance and Challenges of Ethiopian Construction Industry, Journal of Architecture and Civil Engineering Volume 2 ~ Issue 11 (2016) pp: 01-11

Takim, R and Akintoye, A (2002) Performance indicators for successful construction project performance. In: Greenwood, D (Ed.), 18th Annual ARCOM Conference, 2-4 September 2002,

Tan Chin-Keng & Abdul-Rahman, Hamzah (2011), Study of Quality Management in construction Projects, Chinese Business Review, Vol. 10, No. 7, 542-552

Teena Joy (2014), A Study on Factors Influencing Quality of Construction Projects, International Journal of Innovative Research, Vol 3, Issue 5, page 384-387

Uma Sekaran(2003), Research Methods for Business Skill Building Approach, 4th ed. John Wiley & Sons, Inc.

APPENDIX A

ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE GRADUATE STUDIES
DEPARTEMENT OF PROJECT MANAGEMENT

TITLE OF THE THESIS "Assessment of Project Quality Management Practices in ECDSWCo."

Research questionnaire to filled by employees of ECDSWCo.

Dear respondent,

The aim of the thesis is to assess the project quality management practice of ECDSWCo. You have been identified as one of the respondents for this research. You are kindly requested to fill the questionnaire honestly and exaustively. Please note that the information given is purely for research purposes and will be held confidential.

Instruction: Please tick inside the boxes as appropriate .

SECTION A: General Information about the respondent

1. Gender
   - Male ☐
   - Female ☐

2. Position Held
   - Top management ☐
   - Technical staff ☐
   - Support staff ☐

3. Department
   - a) Finance and administration ☐
   - b) Projects ☐
   - c) Marketing ☐
   - d) Quality assurance ☐

SECTION B: Statements related with the implementation of Project Quality Management

The following statements are issues related to implementation of project quality management. Using the key (Where: **1= Strongly disagree , 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree**)
Please tick appropriately according to the extent which you agree or disagree with the statements.

		Rating				
		1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
COM01	Specific targets and actions for quality improvement are documented and communicated to the project team.					
COM02	Project's quality standards are communicated to the project team and stakeholders.					
COM03	There if a well-developed feedback mechanism in your organization.					
COM04	Your organization gets timely information about customer quality needs					
COM05	Your organization gets customer complaints on time.					
COM06	There is free flow of quality management information between different sections of your organization.					
ETP01	Employee's ideas on ways to improve quality in the organization are welcomed by the top management.					
ETP02	All employees in your organization are involved in quality management programs.					
ETP03	Training is provided to meet required competencies.					
ETP04	Training received by employees equips them with understanding on quality managment and their role in it.					
ETP05	All employees are aware of the relevance and importance of their activities and contribution to the quality objectives.					
TMPQA01	The organization management ensures quality standards are being utilized.					

TMPQA02	The project's current level of quality are assessed regularly.					
TMPQA03	The process for documenting quality standards and metrics are defined and communicated to the project team.					
TMPQA04	The company has put a procedure to manage nonconformities.					
TMPQA05	The Quality Management Plan align with regulatory quality standards.					
TMPQA06	The company has put quality audit procedure in place.					
TMPQA07	Critical resources required in implementing quality initiatives are made available.					
TMPQC01	The organization management ensure that purchased product confirm to specified requirements.					
TMPQC02	The organization management sets specification criteria in the authorization of release of project outputs.					
TMPQC03	Quality data is measured on a regular basis.					
TMPQP01	Customer quality standards are defined and documented.					
TMPQP02	Regulatory quality standards are defined and documented.					
TMPQP03	Project quality standards and measures are defined and documented.					
TMPQP04	Quality metrics are identified.					
TMPQP05	Quality polices and standards are agreed upon by decision makers.					
TMPQP06	Quality Management Plan is created and communicated to the project team .					
TMPQP07	Your organization incorporate customer needs in developing and offering their services.					

APPENDIX B

SPSS DATA OUTPUT

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	54	100.0
	Excluded[a]	0	.0
	Total	54	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.936	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Communication of Quality Information	15.00	5.744	.857	.916
Employee Training and Participation	15.18	6.467	.814	.926
Top Management Participation in Quality Assurance	15.05	6.219	.891	.913
Top Management Participation in Quality Assurance	15.06	5.463	.851	.919
Top Management Participation in Quality Assurance	14.76	6.056	.775	.931

Frequencies

Communication of Project Quality Information

		Specific targets and actions for quality improvement are documented and communicated to the project team.	Project's quality standards are communicated to the project team and stakeholders.	There if a well-developed feedback mechanism in your organization.	Your organization gets timely information about customer quality needs	Your organization gets customer complaints on time.	There is free flow of quality management information between different sections of your organization.
N	Valid	54	54	54	54	54	54
	Missing	0	0	0	0	0	0
Mean		4.13	4.02	3.43	3.63	3.70	3.69
Std. Deviation		.616	.942	1.039	1.087	.882	.987

Frequency Table

Specific targets and actions for quality improvement are documented and communicated to the project team.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	7	13.0	13.0	13.0
	Agree	33	61.1	61.1	74.1
	Strongly Agree	14	25.9	25.9	100.0
	Total	54	100.0	100.0	

Project's quality standards are communicated to the project team and stakeholders.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	11.1	11.1	11.1
	Neutral	5	9.3	9.3	20.4
	Agree	25	46.3	46.3	66.7
	Strongly Agree	18	33.3	33.3	100.0
	Total	54	100.0	100.0	

There if a well-developed feedback mechanism in your organization.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	13	24.1	24.1	24.1
	Neutral	14	25.9	25.9	50.0
	Agree	18	33.3	33.3	83.3
	Strongly Agree	9	16.7	16.7	100.0
	Total	54	100.0	100.0	

Your organization gets timely information about customer quality needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	13	24.1	24.1	24.1
	Neutral	6	11.1	11.1	35.2
	Agree	23	42.6	42.6	77.8
	Strongly Agree	12	22.2	22.2	100.0
	Total	54	100.0	100.0	

Your organization gets customer complaints on time.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	13.0	13.0	13.0
	Neutral	10	18.5	18.5	31.5
	Agree	29	53.7	53.7	85.2
	Strongly Agree	8	14.8	14.8	100.0
	Total	54	100.0	100.0	

There is free flow of quality management information between different sections of your organization.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	11.1	11.1	11.1
	Neutral	19	35.2	35.2	46.3
	Agree	15	27.8	27.8	74.1
	Strongly Agree	14	25.9	25.9	100.0
	Total	54	100.0	100.0	

Frequencies

Employees Training and Participation

		Employee's ideas on ways to improve quality in the organization are welcomed by the top management.	All employees in your organization are involved in quality management programs.	Training is provided to meet required competencies.	Training received by employees equips them with understanding on quality management and their role in it.	All employees are aware of the relevance and importance of their activities and contribution to the quality objectives.
N	Valid	54	54	54	54	54
	Missing	0	0	0	0	0
Mean		3.87	3.41	3.48	3.63	3.54
Std. Deviation		.848	.880	1.041	.784	.840

Frequency Table

Employee's ideas on ways to improve quality in the organization are welcomed by the top management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	9.3	9.3	9.3
	Neutral	8	14.8	14.8	24.1
	Agree	30	55.6	55.6	79.6
	Strongly Agree	11	20.4	20.4	100.0
	Total	54	100.0	100.0	

All employees in your organization are involved in quality management programs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	13.0	13.0	13.0
	Neutral	25	46.3	46.3	59.3
	Agree	15	27.8	27.8	87.0
	Strongly Agree	7	13.0	13.0	100.0
	Total	54	100.0	100.0	

Training is provided to meet required competencies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	5.6	5.6	5.6
	Disagree	7	13.0	13.0	18.5
	Neutral	11	20.4	20.4	38.9
	Agree	27	50.0	50.0	88.9
	Strongly Agree	6	11.1	11.1	100.0
	Total	54	100.0	100.0	

Training received by employees equips them with understanding on quality management and their role in it.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	7.4	7.4	7.4
	Neutral	18	33.3	33.3	40.7
	Agree	26	48.1	48.1	88.9
	Strongly Agree	6	11.1	11.1	100.0
	Total	54	100.0	100.0	

All employees are aware of the relevance and importance of their activities and contribution to the quality objectives.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	9.3	9.3	9.3
	Neutral	22	40.7	40.7	50.0
	Agree	20	37.0	37.0	87.0
	Strongly Agree	7	13.0	13.0	100.0
	Total	54	100.0	100.0	

Frequencies

Top Management Commitment in Quality Assurance

		The organization management ensures quality standards are being utilized.	The project's current level of quality is assessed regularly.	The process for documenting quality standards and metrics are defined and communicated to the project team.	The company has put a procedure to manage nonconformance.	The Quality Management Plan align with regulatory quality standards.	The company has put quality audit procedure in place.	Critical resources required in implementing quality initiatives are made available.
	Valid	54	54	54	54	54	54	54
	Missing	0	0	0	0	0	0	0
Mean		3.78	3.57	3.80	3.74	3.80	3.67	3.59
Std. Deviation		.816	1.002	.762	.757	.855	.932	.765

Frequency Table

The organization management ensures quality standards are being utilized.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	9.3	9.3	9.3
	Neutral	10	18.5	18.5	27.8
	Agree	31	57.4	57.4	85.2
	Strongly Agree	8	14.8	14.8	100.0
	Total	54	100.0	100.0	

The project's current level of quality is assessed regularly.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	10	18.5	18.5	18.5
	Neutral	13	24.1	24.1	42.6
	Agree	21	38.9	38.9	81.5
	Strongly Agree	10	18.5	18.5	100.0
	Total	54	100.0	100.0	

The process for documenting quality standards and metrics are defined and communicated to the project team.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	7.4	7.4	7.4
	Neutral	10	18.5	18.5	25.9
	Agree	33	61.1	61.1	87.0
	Strongly Agree	7	13.0	13.0	100.0
	Total	54	100.0	100.0	

The company has put a procedure to manage nonconformance.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	3.7	3.7	3.7
	Neutral	18	33.3	33.3	37.0
	Agree	26	48.1	48.1	85.2
	Strongly Agree	8	14.8	14.8	100.0
	Total	54	100.0	100.0	

The Quality Management Plan align with regulatory quality standards.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	5.6	5.6	5.6
	Neutral	17	31.5	31.5	37.0
	Agree	22	40.7	40.7	77.8
	Strongly Agree	12	22.2	22.2	100.0
	Total	54	100.0	100.0	

The company has put quality audit procedure in place.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	8	14.8	14.8	14.8
	Neutral	11	20.4	20.4	35.2
	Agree	26	48.1	48.1	83.3
	Strongly Agree	9	16.7	16.7	100.0
	Total	54	100.0	100.0	

Critical resources required in implementing quality initiatives are made available.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	9.3	9.3	9.3
	Neutral	16	29.6	29.6	38.9
	Agree	29	53.7	53.7	92.6
	Strongly Agree	4	7.4	7.4	100.0
	Total	54	100.0	100.0	

Frequencies

Top Management Commitment in Quality Control

		The organization management ensure that purchased product confirm to specified requirements.	The organization management sets specification criteria in the authorization of release of project outputs.	Quality data is measured on a regular basis.
N	Valid	54	54	54
	Missing	0	0	0
Mean		3.48	3.89	3.74
Std. Deviation		.885	.718	1.031

Frequency Table

The organization management ensure that purchased product confirm to specified requirements.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	8	14.8	14.8	14.8
	Neutral	18	33.3	33.3	48.1
	Agree	22	40.7	40.7	88.9
	Strongly Agree	6	11.1	11.1	100.0
	Total	54	100.0	100.0	

The organization management sets specification criteria in the authorization of release of project outputs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	5.6	5.6	5.6
	Neutral	8	14.8	14.8	20.4
	Agree	35	64.8	64.8	85.2
	Strongly Agree	8	14.8	14.8	100.0
	Total	54	100.0	100.0	

Quality data is measured on a regular basis.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	8	14.8	14.8	14.8
	Neutral	13	24.1	24.1	38.9
	Agree	18	33.3	33.3	72.2
	Strongly Agree	15	27.8	27.8	100.0
	Total	54	100.0	100.0	

Frequencies

Top Management Commitment in Quality Planning

	Customer quality standards are defined and documented.	Regulatory quality standards are defined and documented.	Project quality standards and measures are defined and documented.	Quality metrics are identified.	Quality polices and standards are agreed upon by decision makers.	Quality Management Plan is created and communicated to the project team.
Valid	54	54	54	54	54	54
Missing	0	0	0	0	0	0
Mean	3.85	4.00	4.15	4.02	4.04	3.94
Std. Deviation	.899	.824	.787	.765	.800	.878

Frequency Table

Customer quality standards are defined and documented.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	9.3	9.3	9.3
	Neutral	11	20.4	20.4	29.6
	Agree	25	46.3	46.3	75.9
	Strongly Agree	13	24.1	24.1	100.0
	Total	54	100.0	100.0	

Regulatory quality standards are defined and documented.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	5.6	5.6	5.6
	Neutral	9	16.7	16.7	22.2
	Agree	27	50.0	50.0	72.2
	Strongly Agree	15	27.8	27.8	100.0
	Total	54	100.0	100.0	

Project quality standards and measures are defined and documented.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	5.6	5.6	5.6
	Neutral	4	7.4	7.4	13.0
	Agree	29	53.7	53.7	66.7
	Strongly Agree	18	33.3	33.3	100.0
	Total	54	100.0	100.0	

Quality metrics are identified.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	15	27.8	27.8	27.8
	Agree	23	42.6	42.6	70.4
	Strongly Agree	16	29.6	29.6	100.0
	Total	54	100.0	100.0	

Quality polices and standards are agreed upon by decision makers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	16	29.6	29.6	29.6
	Agree	20	37.0	37.0	66.7
	Strongly Agree	18	33.3	33.3	100.0
	Total	54	100.0	100.0	

Quality Management Plan is created and communicated to the project team.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	5.6	5.6	5.6
	Neutral	13	24.1	24.1	29.6
	Agree	22	40.7	40.7	70.4
	Strongly Agree	16	29.6	29.6	100.0
	Total	54	100.0	100.0	