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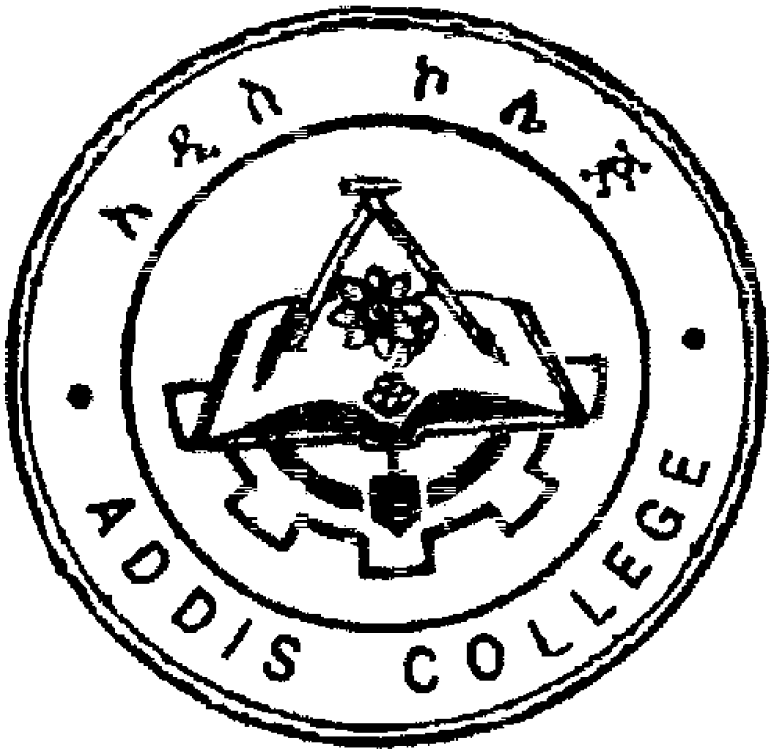

SCHOOL OF GRADUATE STUDIES

MASTERS OF SIENCE IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Department of Construction Technology and management

Post Graduate Program

Assessment on quality management practices of Federal Government Building Projects Office in Addis Ababa

By

Tesfaye Minwuyelet

A thesis is submitted to Department of Construction Technology and Management in Partial Fulfillment of the Requirements for the Degree of Master of Science in Construction Technology and Management.

Advisor

Dr. Dagnachew Adugna

August, 2021

Addis Ababa, Ethiopia

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DECLARATION

I hereby declare that, this thesis is my own work performed under the supervision of my research advisor Dr, Dagnachew Adugna and has not been presented as a thesis for a degree in any other University. All sources of materials used for this thesis have also been duly acknowledged.

Name: Tesfaye Minwuyelet Signature_____ Date: _____

ENDORSEMENT

This thesis has been submitted to Addis College, School of Graduate Studies for examination with my approval as a College advisor.

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Lastly, I express my appreciation to all my families, friends, classmates and colleagues for their technical and moral support which helps me to arrive for this success.

ABSTRACT

Construction industry has complexity in its nature because it contains large number of parties including clients, contractors, consultants, stakeholders, shareholders, regulatory bodies and others. In Ethiopia the number of construction projects is increasing from time to time. However, it has become difficult to complete projects in the allocated cost, time and quality.

The construction industry in Ethiopia is constantly criticized for its performance and productivity. The industry's performance with respect to time, schedule, cost, health and safety dimensions are huge concern: Among these dimensions, the industry has been constantly struggling with quality performance. The quality of a construction should fulfill owner's expectations, satisfy project participants/stakeholders needs and become a critical measure of a project success. Today, other industry sectors are focused on management theories and philosophies in order to achieve high quality and ensure customer satisfaction. Thus, the objective of this study is to assess the practice of quality management and to find the gaps and also to devise the solution for problems existed in FGBPOAA.

Questionnaire and interview surveys were carried out to collected relevant data for this study from primary and secondary sources including books, magazines and literatures related to the objective of study. These methods were conducted to assess and determine the past and current practices of quality management in organization. Accordingly, the major findings of the study includes the absence of quality policy and quality management department, the absence of legally selected contractors and consultants, lack of qualified manpower on contractors and consultants, delivery of expired and poor quality construction materials, presence of incomplete document and design, lack of supervision, poor quality performance evaluation, lack of chain of command, unrealistic deadline of project completion period and poor documentation of quality control report and also to give recommended solutions for the findings.

Key words: Quality management, Building projects, Poor practice, Quality assessment and Quality assurance.

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List of acronyms and abbreviations

ACE	Army Corps of Engineers
ANSI	American National Standards Institute
ASQC	American Society for Quality Control
BMW	Bayerische Motoren Werke
CII	Construction Industry Institute
CIBSE	Chartered Institution of Building Services Engineers
CIOB	Chartered Institute of Building
CQI	The Chartered Quality Institute
CQM	Construction Quality Management
CSCS	Construction Skills Certification Scheme
CSF_S	Critical Success factor
DACF	District Assemblies Common Fund
DMS	Document Management System
EQW	European Quality Award
FGBPOAA	Federal Government Building Project Office in Addis Ababa
FGBPO	Federal Government Building Project Office
FIDIC	International Federation of Consulting Engineers
GDP	Gross Domestic Product
HKOAA	Hong Kong Quality Assurance Agency
HVAC	Heating Ventilation & Air Conditioning
ISO	International organization for Standardisation

ITP	Inspection and Testing Plan
JCT	Joint Contracts Tribunal
JMC	Jashi & Modi Construction
MEP	Mechanical Electrical Plumbing
NEC	New Engineering Contra
PDCA	Plan, Do, Check, Act" PDCA-cycle
QA	Quality Assurance
QC	Quality Controlling
QFD	Quality Function Deployment
QI	Quality Improvement
QIP	Quality Improvement Plan
QMS	Quality Management System
QP	Quality Planning
QP	Quality Policy
TQM	Total Quality Management
UKAS	The United Kingdom Accreditation Service
WTO	World Trade Organization
QMP	Quality Management Procedures

CHAPTER 1: INTRODUCTION

1.1 Back ground of the study

Building Construction industry in Ethiopia is playing a great role to contribute the development of the national economy and it contributes 9.5% the DGP of the country as well as it is used to create job opportunity for the society. However, the development status of building construction industry is affected by poor implementation of quality management.

Quality is one of the critical factors in the success of construction projects. Quality of construction projects is linked with proper quality management in all the phases of project life cycle (Ashokkumar, 2014).

The concept of quality management is to ensure efforts to achieve the required level of quality for a product which is well planned and organized. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies (Tan & Abdul-Rahman, 2005).

Quality management practices include all the means employed by managers in an effort to implement their quality policies. These activities include quality planning, quality control, quality assurance and quality improvement (Harris and McCaffer, 2001).

Based on these concepts, the study is focused on FGBPOAA to assess the practices of quality management in organization. The organization is established as Government Building Project Office on June 8/2007 under the former ministry of works and urban development and the company is re-named as Federal Government Building Project Office on November 28/2012 as well as the organization is working under Housing Development and Government Building Construction Office.

The demand of government office requirement has been increasing from year to year, due to this reason to improve its service and to fulfill government demand the ministry is decided and given an authority for the organization to work as an office independently under Ministry of Urban Development & Construction on February 20, 2014.

The duties and responsibilities of the organization is preparation of design, contract agreement and project follow up. The total number of the Man power in head office of FGBPOAA are 60 excluding Project manpower.

The vision of the organization is to construct 77 government office building projects until 2028 and also the objective of the organization is to construct the buildings with reasonable project cost as well as to transfer completed and convenient offices for the government office end users.

1.2 Statement of the problem

Building construction projects are intricate and time- consuming undertakings (Clough, et al., 2016). The construction of a building project needs good quality management to achieve the satisfied result including functional satisfaction, aesthetic satisfaction, completion on time, completion within budget, value for money, and health and safety (Walker, 2016).

With inefficient or nonexistent quality management procedures, significant expenditures of time, money, and resources are wasted on construction projects (Rounds and Chi,1985) cited in (Battikha, 2002). In addition, the lack of quality due to deficient construction quality management is detected through nonconformance to established requirements. In construction, non-conformance occurs when the finished state of a project and its components deviates from the established requirements. Quality-related problems during construction can be projected on the operating life of the finished project. To a contractor, nonconformance can yield penalties as well as cost time burdens for re-work, which can convert into productivity loss (Battikha ,2000a).

It was discovered that the possible causes of the collapse of the six-storey melcom building is largely due to the inferior quality of materials used in construction (myjoyonline, 2012). In a related development (Osei,2005) found that a lot of concern has arisen over the quality of construction projects being executed at the district level in Ghana, similarly in Bangladesh a Government investigation has established that extremely poor quality construction materials coupled with series of violations caused the collapse of a garment factory building now regarded as the worst garment-industry disaster in history.

In construction industry many parties are participating, due to this reason the problems of quality management are occurred during the construction process of building projects. Poor quality management is a problem to affect the quality performance of FGBPOAA.

The problems are occurring due to poor quality management of building construction projects, such as using choroid reinforcement bars affecting the quality of construction work and it injuring workers healthy, leakage of roofing during rainy season, curtain walls have high reflection during sun light, the settlement of foundation is occurred, concrete structures has got cracking, expired chemical of epoxy and painting works affect healthy of workers and using poor structure and finishing building materials causes to healthy problems of the workers and users, due to these reasons, Some of the problems to the implication of poor quality management are: The client is exposed to an extra costs for rework and maintenance woks, the workers, the users and the owners are exposed to physical accident and to lose their life, the curtain glass wall reflection during sunlight is the causes of injuring the peoples eye, the leakage during rainy season creates dampness which happens bad smelling due to this reason the users exposed to healthy problems, using of poor building construction materials causes to lose its architectural view and aesthetics value, loosing of customers satisfaction is occurring, delaying of project completion time existed, etc. The research gap is quality management system is not properly implemented in FGBPOAA).

Quality problems have significant impact on output of building construction quality and the causes of quality problems are both client (delaying of payment to contractors), consultant (because of preparing improper and uncompleted drawings and contract documents), contractor (perform poor quality of work using unskilled workers) and supplier (delivering poor quality building construction materials).The quality problems existing in FGBPOAA might have a negative implication of the overall quality performance of the organization.

1.3 Objective of the Study

1.3.1 General objective

The general objective of this study is to assess the practices of quality management on Federal Government Building Project Office in Addis Ababa.

1.3.2 Specific objectives

1. To investigate the practices of quality management system in federal government

building projects in Addis Ababa.

2. To identify the causes of quality problems in federal government building projects in Addis Ababa.
3. To investigate construction materials, personnel and construction methods employed in FGBPOAA contract quality requirements.
4. To investigate the measures taken to improve the quality of building projects.

1.4 Research questions

The research questions are: -

1. How is the practice of quality management system in federal government building projects in Addis Ababa?
2. What are the causes of quality problems in federal government building projects in Addis Ababa?
3. How are the construction materials, personnel and construction methods employed in FGBPOAA contract quality requirements?
4. What are the measures taken to improve the quality of building projects?

1.5 Scope of the study

The study focused only on assessment of the past and current practices of quality management on Federal Government Building Project Office in Addis Ababa.

1.6 Significance of the study

The study has a significance contribution to different stakeholders involving in building construction projects, such as for Clients, Consultants, Contractors, suppliers, government policy makers, for future researchers, etc. and particularly it has significant contribution for FGBPOAA to improve the problems existing concerning to the quality management of projects. In addition to this, the study result can be used as a bench mark for overall building construction industry which helps to improve the problems existing in the building construction industry of Ethiopia.

1.7 Justification of the study

The construction industry is a complex in its nature because of involving many participants such as client's contractors, consultants, suppliers and other stakeholders.

The building construction in FGBPOAA is related to quality management suffering problems because of many reasons and factors. This study is very important to identify and to evaluate the critical factors affecting the quality of building projects and the problems existing in the sector and also to devise the basic solutions for the problems existing in the organization as well as it helps to satisfy the end users.

1.8 Limitation of the study

The topic quality management is new for developing countries like Ethiopia, Most of the Quality Management literature reviews are taken as a reference from out of Ethiopian researchers and some of the respondents are delayed to respond the questionnaire on time.

1.9 Organization of the document

The structure of document consists of five main chapters.

Chapter one contains the introduction part such as the background of the study, statement of the problem, objectives of the study, justification of the study, limitation of the study and organization of the document. Chapter two consists of Literature review part of the study. Chapter three consists of research methodology such as study area, data types, data sources, sampling design, data collection techniques, data analysis method and data presentation method. Chapter four consists of result and discussion. Chapter five contains conclusions and recommendations. Finally, it holds proposed research, references and annexes.

CHAPTER 2: LITERATURE REVIEW

This chapter deals with both theoretical and practical findings of various studies related to quality management in building construction industry. It was gathered from different secondary sources such as published books, journals and documents that exhibit points, targeting at the attainment of the research objective.

2.1 Concept of Quality Management

(Collins,2015) described quality as the world's oldest documented profession. Quality professionals use a number of definitions to define project quality. Quality in its simplest form can be defined as: "meeting the customer's expectations," or "compliance with customer's specification." No matter what definition we follow for quality; it becomes very complex when we try to put it into actual practice. For a user, quality is nothing but satisfaction with the appearance, performances, and reliability of the project for a given price range. Quality management in construction implies maintaining the quality of construction works at the required standard so as to obtain customers" satisfaction for long term competitiveness and business survival.

(Ozaki,2013) identified a three-fold meaning of quality management in construction to include getting the job done on time; ensuring that the basic characteristics of the final project fall within the required specifications; and getting the job done within budget. It involves continued evaluation of the activities of planning, design, development of plans and specifications, advertising and awarding of contracts, construction, and maintenance, and the interactions of these activities. Benefits of quality management include higher customer satisfaction and productivity (Akinola ,2012).

(Griffith,2015) argued in support of the conversation that management of quality in design and construction processes is being directed to ensure quality. Also, quality management directed procurement systems which place a greater emphasis upon providing performance, quality and better value for money. (Griffith,2015) further argued that "quality" describes the client requirements for a quality project. Thus, architect design according to the client aims to provide an acceptable standard of construction, to a respectable cost, and to be produced in a realistic production time.

2.2 Quality Management Systems

If properly implemented, formal quality management systems provide a vehicle for achieving quality (i.e. conformance to established requirements). As defined by ANSI, a quality system is "the organizational structure, responsibilities, procedures, processes, and resources for implementing quality management" (Arnold,1994) cited in (Battikha,2002). In other words, Quality management systems refers to the set of quality activities involved in producing a product, process, or service, and encompasses prevention and appraisal (Burati, et al.,1992). It is "a management discipline concerned with preventing problems from occurring by creating the attitudes and controls that make prevention possible" (Crosby,1979) cited in (Battikha,2002). Quality activities include the determination of the quality policy, objectives, and responsibilities and implementing them through quality planning, quality control, quality assurance, and quality improvement, within the quality system (ASQC,1997) cited in (Battikha ,2002).

The main thrust of a QMS is in defining the processes, which will result in the production of quality products and services, rather than in detecting defective products or services after they have been produced. According to (Ammad H. K.,2008), QMS will ensure that two important requirements are met:

1. The customers' requirements – confidence in the ability of the organization to deliver the desired product and service consistently meeting their needs and expectations.
2. The organization's requirements – both internally and externally, and at an optimum cost with efficient use of the available resources – materials, human, technology and information.

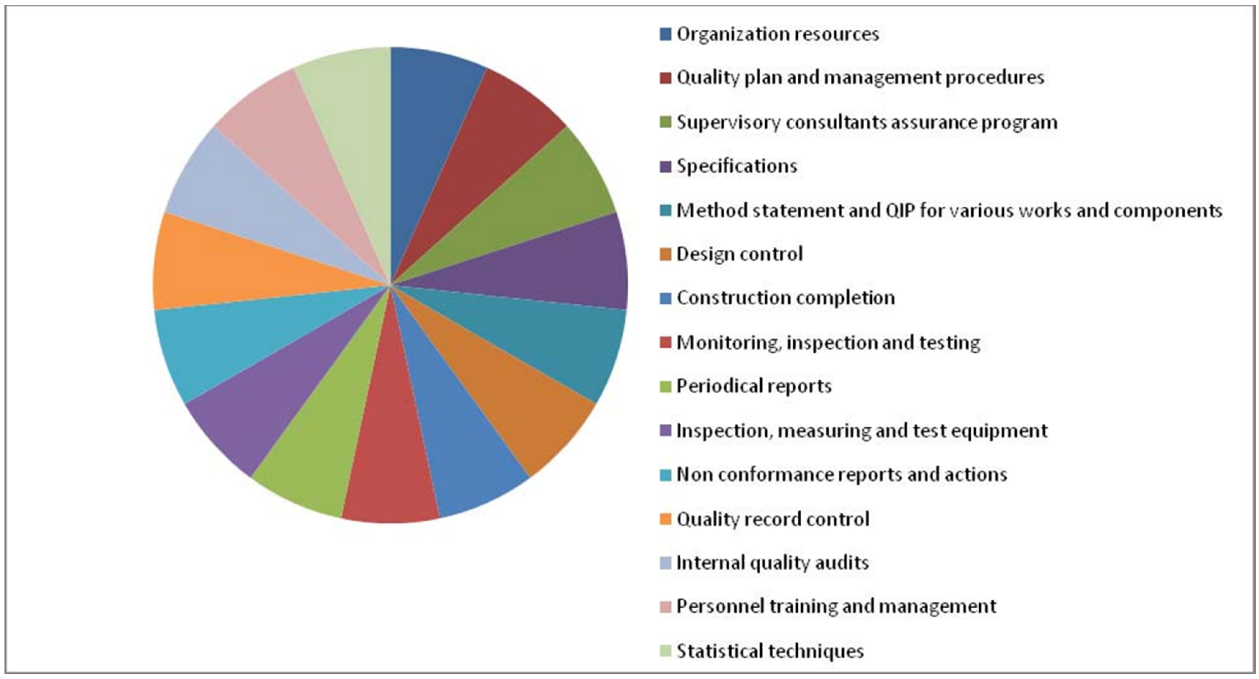

Figure 2.1 Project Quality Management Systems (Ammad H. K., 2008)

2.3 Principles of Quality Management

Quality Management is based on three fundamental principles (Evans and Lindsay,2008) cited in (Sabah,2011); these are:

1. Focus on customer and stakeholders;
2. Participation and teamwork by everyone in the organization;
3. A process focus supported by continuous improvement and learning.

2.4 Quality Policy

As different scholars state quality policy is considered as a guide for improving quality of products and services. As (Dale,2003) stated that an organization's quality policy is part of its strategic planning process, which includes setting the direction for the company to improve its situation for long-term prosperity and ending the means to achieve that direction. The main idea is to communicate throughout the company that something should be done in terms of quality if the company is to survive and compete in the future (Dale,2003).

The Japanese approach known as 'Hoshin Kanri', or policy deployment, can be adopted when defining a company's quality policy (Tennant & Roberts,2000) described its major

elements. The main advantages of this approach over conventional planning systems are that it combines strategic objectives with tactical daily management, covers all functions in a company and increases quality goals' consensus. Moreover, (Kerezen,2003) defined quality policy as "a document that is typically created by quality experts and fully supported by top management. The policy should state the quality objectives, the level of quality acceptable to the organization, and the responsibility of the organization's members for executing the policy and ensuring quality. The quality policy is instrumental in creating the organization's reputation and quality image" (Kerezen,2003). He also described good quality policy as

1. Statement of principles stating what, not how
2. Promote consistency throughout the organization and across project
3. Provide an explanation to outsiders of how the organization views quality
4. Provide specific guidelines for important quality matters
5. Provide provisions for changing/updating the policy

According to (Carol and Roger,2019), **Quality Policy includes** :-

- **Leadership -**Leadership accountable for effectiveness of process embedded in QMS, Quality Policy and achievement of quality objectives
- **Customer Focus –**It must have committed to enhance customer satisfaction by understanding and consistently meeting their current and future needs by complying with all applicable statutory and regulatory requirements to deliver superior value.
- **Process Approach –** It must, while achieving business results, integrate QMS with business & operational processes to achieve organizational objectives in an efficient manner. Our processes are responsive & adaptive for continual improvements technology up gradation etc., and thereby make JMC a learning organization.
- **Planning & Monitoring –** It must have committed to plan business activities & operations with appropriate work breakdown mechanism while identifying risks and mitigating them structurally and optimizing resources.
- **Supplier Relationship –** Suppliers/vendors being essential business stakeholders of companies and accountable for develop nurturing mutually beneficial professional relationships in ethical manner to enhance capabilities of both and thereby create value for our customers.
- **Continual improvement –** By design it must committed to ensure improvement in our

effectiveness of performance to enhance the quality of our deliverables. We identify improvement opportunities through learning from academia, markets, customers, consultants, our own employees etc., and also through correcting, preventing and reducing undesired effects of our deliverables **(**Carol and Roger,2019).

2.5 Quality Performance Measurement

(Takim, et al.,2003), Performance measurement is a fundamental building block of quality management and a total quality organization. Historically, organizations have always measured performance in some way through the financial performance, be this success by profit or failure through liquidation. However, traditional performance measures, based on cost accounting information, provide little to support organizations on their quality journey because they do not map process performance and improvements seen by the customer. According to (Takim, et al.,2003), performance measurement in the manufacturing and construction industries is used as a systematic way of judging project performance by evaluating the inputs, outputs and the final project outcomes.

In a successful total quality organization, performance can be measured by the improvements seen by the customer as well as by the results delivered to the shareholders. Performance can be measured in terms of financial and non-financial terms, or a combination of both (Agbenyega ,2014).

2.6 Quality Management Procedures

Commonly, the followings are quality management procedures (QMP) which are implemented in construction industry.

2.6.1 Quality Planning

Council of Registered Builders of Nigeria cited in (Bala, et al., 2012) perceived quality planning as selecting applicable procedures and standard for a particular project and modifying the procedures as required; Identification and/or verification of quality standards that are relevant to the project and the means to implement them. According to (Bala, et al.2012), Quality plan should include:-

1. A quality policy statement (vision and mission)
2. Project quality structure and quality management system
3. Quality objective

4. Rectification of defects and prevention of future problems.

(Harris and McCaffer,2001) cited in (Agbenyega,2014) captured quality planning as a set of activities whose purpose is to define quality system policies, objectives, and requirements and to explain how these policies will be applied, how the objectives will be achieved, and how the requirements will be met.

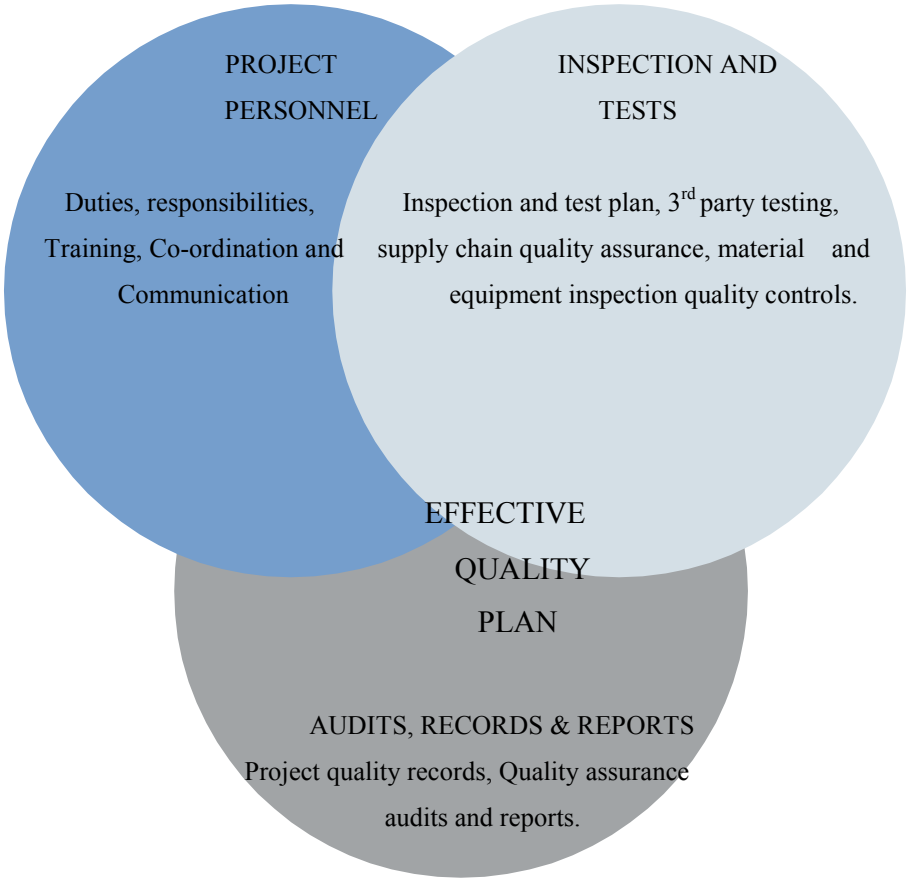

Figure 2.2 Effective Quality Planning (Carol & Roger, 2019)

2.6.2 Quality Control

Quality control is about workmanship inspection, whereas Quality assurance is the process of managing for quality. Quality control verifies the quality of output. It provides the tools and processes for quality management (Carol and Roger,2019).

Whilst quality assurance is the responsibility of everyone involved in a project, quality control is usually the responsibility of a specific team / person. The aim of quality assurance is to improve

processes and development to prevent defects; quality control's goal is to identify and correct defects as soon as possible.

Quality assurance is a management tool that is process-oriented. Whereas Quality control is a corrective tool that is product oriented (Carol and Roger, 2019).

Quality control according to (Sirbadhoo, et al.,2010) is concerned with monitoring results to determine if they comply with relevant quality standard and identifying ways to eliminate causes of unsatisfactory performance. It focuses on measuring correction and should be performed throughout the project lifecycle. (Agbenyega,2014) stated that quality control verifies that a project is built to plan and the allowable tolerance by the industry standard and engineering practices are met or bettered and that the finished project met with the quality standards.

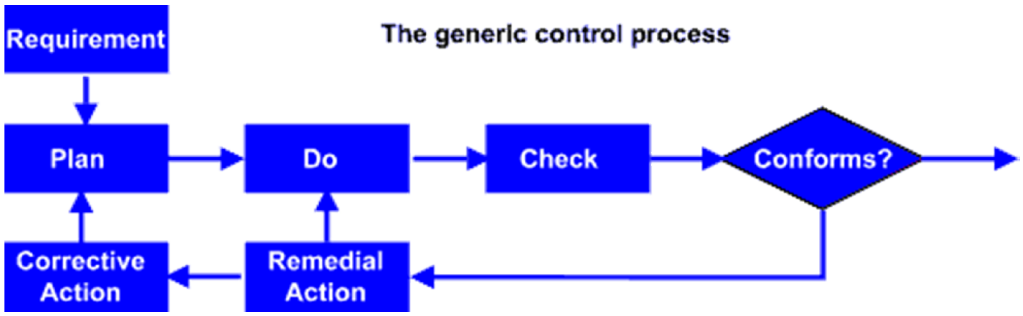

Figure 2.3 The Generic Control Process (Ian A., 2014)

2.6.2.1 Importance of Quality Control in Construction

Quality Control (QC) in construction is the process of verifying that the project is built to plan, that the tolerances allowable by industry standard and engineering practices have been met or bettered, and that the finished project (and all phases to get there) meet with the quality standards of the architect, engineer, owner, and general contractor (A.K.S Priyadharsan & M.Naveen, ,2020). On construction projects there are dozens of subcontractors, all of which have specific responsibilities. Superintendents and project managers try to maintain high quality standards but they can't be everywhere at once (A.K.S Priyadharsan & M.Naveen, 2020).

Required inspections by cities and counties (as well as other jurisdictions, depending on the project) help to ensure safety and code issues. In addition, a good general contractor or developer will have on staff a QC person, someone who is responsible for going through the building or project, ensuring compliance, and maintaining an ongoing list of corrective items that must be accomplished before the contractor who installed it is paid or leaves the job. QC

technicians generally keep a very detailed binder, separated by areas/rooms/phases of the project with notes of items that must be either verified or corrected, with sign-off as each is accomplished. This binder becomes part of the project record and is an important element to completing the project on time and with expected quality maintained (A.K.S Priyadharsan & M.Naveen ,2020).

The following points are the part of quality control implementation in construction industry.

1. Quality Inspection

The aim of an inspection is to ensure that the material, component or system conforms to the relevant standards and the required performance. Inspections during the production stage may be non-destructive, such as visual, ultrasound, eddy current or thermography. An inspection undertaken at a later stage than planned, may involve dismantling of the construction. Accuracy in inspection is important and depends upon the people involved (level of human error), instrument accuracy and the efficiency / thoroughness of the inspection routine planning and operation (Carol and Roger, 2019).

2. Quality Testing

Apart from regular testing and inspections, the on-site inspections that require the presence of a specialty contractor (or designated third party) are electromechanical systems, conveying systems, and electrically operated equipment, including: HVAC system, Firefighting system, Fire alarm system and telephone system, communication system, Electrical lighting and power system, Electrically operated equipment, Emergency power supply system, Electronic security and access control system, Public address system, Integrated automation system (building automation system), Water supply, plumbing, and public health system and Grounding (earthing) and lighting protection system (Carol and Roger, 2019).

2.6.3 Quality Assurance

Quality assurance establishes organizational procedures and standards for quality implementation. It ensures periodic review and evaluation of the overall project to provide confidence that the project will satisfy the relevant quality standard, Council of Registered Builders of Nigeria cited in (Bala, et al.,2012). The importance of quality assurance according to (Agbenyega,2014) is based on the principles of getting things right first time, by implementing, maintaining, reviewing and continually improving a quality assurance program.

Quality assurance exists because of the degree of dissatisfaction experienced by the industry's client over a period, combined with the growing impatience by some of their advisers to achieve value for money. Furthermore, (Agbenyega,2014) stated that quality assurance ensures that projects are completed in accordance with the agreed time, cost and specifications to meet customer's satisfaction. (Sirbadhoo, et al.,2010) perceived it as a system for prevention and should be performed throughout the project lifecycle. Quality assurance could be internal or external. At the internal level, it is provided for the performing organization, while at the external level, it is provided for the customers and stakeholders (Sirbadhoo, et al.,2010).

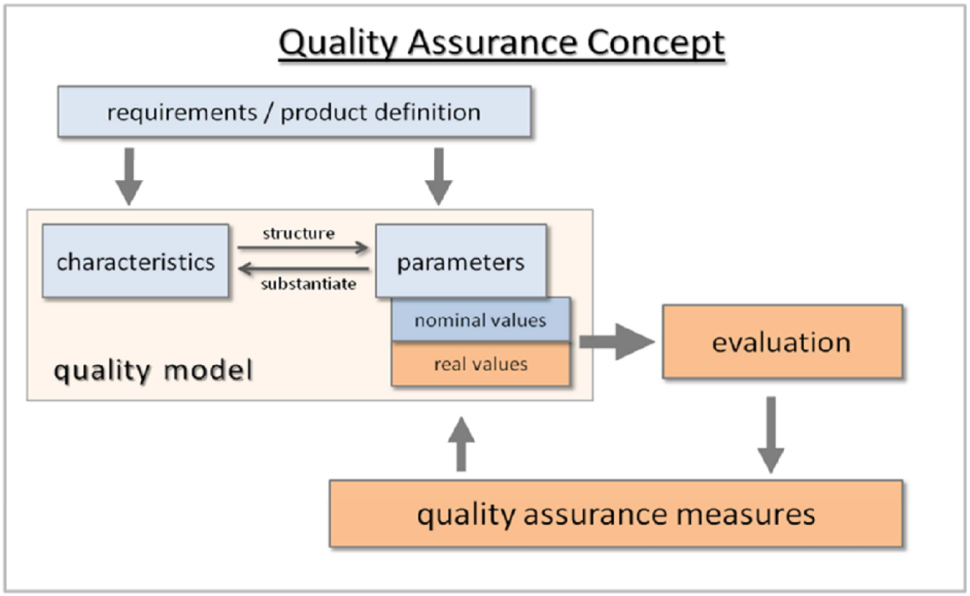

Figure 2. 4 Quality Assurance Concept (Ammad H.K, 2008)

2.6.3.1 Quality Assurance in Construction

The importance of Quality Assurance is based on the principles of getting things right first time. By implementing, maintaining, reviewing and continually improving a Quality Assurance System, a construction company can achieve and reap the benefits of having such a system in place (Sirbadhoo, et al.,2010). Quality Assurance exists because of the degree of dissatisfaction experienced by the industry's clients over a long period, combined with a growing impatience by some of their advisers to achieve value for money. An increasing number of building companies are also frustrated by the inadequacy of a system which however valiantly they try, leaves their efforts lacking in some regards. A revolution has occurred in the assembly of

buildings from what was a craft process to one where the critical work of connecting interdependent units is done in the main by semi-skilled labour from a multiplicity of separate employers. This makes great demands upon supervision and management systems (Agbenyega ,2014).

A Quality System is designed to provide an assurance to Clients, which can be supported through documented records, that all contracts will be completed in accordance with the agreed time, cost and specification. It should also further ensure that the company personnel, sub-contractors and key suppliers are aware of customer requirements and that they are fully met (Sirbadhoo, et al.,2010). Conformance with requirements of the detailed procedures developed in accordance with the Quality Manual has to be mandatory for all staff employed in the company. It is essential to the system that encouragement is given to each employee to develop and maintain an attitude of continuing quality improvement and customer satisfaction. Quality Assurance is concerned with developing and planning the necessary technical and managerial competence to achieve desired results. It is also about attitudes, both of management and of all those for whom they are responsible (Bubshait and Al-Atiq,2014).

2.6.4 Quality improvement

Quality improvement is focused on increasing the ability to fulfill quality requirements. It is important to know that there is no single definition of quality improvement and no one approach appears to be more successful than another. The most important ingredient in successful and sustained improvement is the way in which the change is introduced and implemented health foundation 2009 cited in (Agbenyega,2014). (Shofoluwe, et al.,2012) cited in (Agbenyega,2014) opined that quality improvement practices are common among non-residential builders and developers. Most of these practices have been collectively grouped under a successful management, philosophy called “total quality management”.

Quality management has grown from some simple control techniques into a system of improvement that is increasingly becoming a common practice in both the public and private service sector. (Philip,2009) concluded in his research that the construction industry needs to experience two true paradigm shifts; one to move the industry from resources spent on quality non-conformance to resources spent on quality conformance, and the other is to move the construction business perspective from thinking in quality compliance mode to actual quality

performance mode. (Rosenfeld,2009) as cited in (Philips,2009) revealed the need to strike a balance between the proactive cost of quality and the resulting cost of non-quality; the research concluded that "the more you invest in prevention and appraisal, the less you will have to spend on internal and external failures".

(Al-Ani and Al-Adhmawi,2011) conducted a research and concluded that a well-structured and effective quality management plan should lay emphasis on identifying the actual or potential quality problems and the initiation of improvement measures; checking and judging construction works against the required specifications before, during and after the completion of the works. They further said that construction quality management is not a temporal work, rather it must be a continuous work during the whole construction period of the project.

(Jay and Bruce,2009) concluded that the selection of a good constructor is obviously very important; however, selecting a third party to perform construction quality management early on the project will have a very significant impact on the project outcome. A clear commissioning strategy underpinned with a good construction program, established at the pre-construction stage of a project can help translate good engineering design into field execution/construction and help alleviate many of the problems encountered at the back end of the project. It also should give the overall project team a better chance of delivering the capital project on time, to budget, with good design, great quality, zero defect/accidents, good operability and maintainability as well as high availability and reliability.

2.7 Delivering of quality in Construction Industry

The big question is how to deliver quality in an industry that builds bespoke products, with low standardization and off-site assembly, on projects not fully designed at the outset. It relies upon a long supply chain that is interdependent and interconnected. It is a like being in a relay race with the baton passed to the next runner; the time is only as good as the slowest runner. If someone drops the quality baton, the whole team suffers (Carol and Roger,2019).

They guarantee quality; construction struggles with the concept of guarantees and liability, mainly because of the procurement approach, the fragmented supply chain, and the way the contracts allocate risk and responsibility between multitudes of parties. Roles and responsibilities are often poorly defined across the project lifecycle, but particularly lacking during the pre-construction phase (Carol and Roger,2019).

The drive for quality management must involve the development of a planning mentality that focuses on problem prevention.

Preventive actions will reduce the overall cost of quality. Re-work to remedy defects costs time, money, reputation and motivation, and leads to unhappy clients and an unhappy workforce. Very often, the true cost of time, labor and attitudes is not recorded, and rework is 'accepted' on a day-to-day basis. It is often easier to identify the cost of poor quality, where things go wrong, the cost of re-work and remedying defects (Carol and Roger,2019).

A cost-of-quality approach means a company can ascertain what resources are used to prevent poor quality, but that is a cost where nobody wins. Getting it right first time saves money and stress, and leads to satisfied customers (Carol and Roger,2019).

Digitalization makes communications faster and more reliable. Digitalization, virtual reality, augmented reality with automation has all improved the link between design and production. However, on the job site, it is the people that matter; given the right tools, the information, and the right materials, they want to produce a good quality product. Construction is renowned for being a low profit margin industry. Poor quality is costing the industry annually more than the combined profits of the large construction companies in the industry (Carol and Roger,2019).

2.7.1 The Drivers, Issues, Disruptors and Enablers of Construction Quality Management

The CIOB call for evidence and research identified major drivers that influence construction quality summarized into eleven main Drivers (Carol and Roger,2019):

1. **Good design** means well developed design that is buildable and sufficiently complete at the project award stage, to allow commencement on site without information gaps, everyone suffers when there is lack of sufficient information.
2. **Realistic Project Programming** at the outset of the project, with sufficient float in the program to cope with uncertainty.
3. **Climate** and the impact of weather on materials, workforce and the process. Over optimistic assumptions about the impact of inclement weather lead to delays and poor quality.
4. **Timely and relevant data and information** provided by the design team and by the principal contractor to the supply chain and the site workforce.
5. **Site Management and Production,** with a production team that has the appropriate skills for

the project, with a supply chain that is fully committed to deliver to the required quality.

6. **People and Performance** by motivating the workforce, training the workforce, and respecting the work of others. Engendering a culture of the importance of quality on projects.
7. **Clients** understanding the importance of effective and timely decision-making. Recognizing that changes in scope and design after production has commenced on site:
8. **Governance** structures and principles identify the distribution of rights and responsibilities among different stakeholders and include the rules and procedures for making decisions. Governance should provide transparency. Good governance for quality systems should be clear, simple, and understandable. Overburden some governance and regulations / Procedures that add little to improve quality take time and add unnecessary paperwork for the site.
9. **Corporate behavior** demonstrating leadership from the top about the importance of quality.
10. **Realistic budgeting** at the outset, taking account of risk and uncertainty, and building in contingencies to take account of the unexpected. Avoiding the blame culture and focusing on commitment to quality.
11. **Materials** procurement, storage and handling, with clear information about the requirements to ensure the materials and components meet the design specification.

The Issues comes from the drivers. For example; climate will create a multitude of issues, such as productivity on site, requirements for temporary protection of finished work against inclement weather to ensure quality standards are maintained. The Disruptors and Enablers are the items that will influence each of the Drivers and Issues. It may be necessary to increase expenditure on plant commissioning by an independent team to ensure all the plumbing systems are working effectively. The actions are a summary of the items to be included to ensure the maintenance of the quality standard Carol and Roger (2019).

Realistic programming and budgeting are key to project success that will heavily influence quality. As one respondent commented in the Call for Evidence (CfE) (Carol and Roger,2019):

"Design is about buildability and appropriate specifications as well as the importance of being close to 100% complete before production begins."

Timely information means there is not the last minute rush because of lack of information when the work package started. Everyone will change their minds, but there has to be recognition that late changes are de-motivating for the workforce and can slow the project, putting pressure on

the workforce to deliver top quality in an unrealistic time frame. People's attitude to quality and the underlying culture cuts across all the drivers. They are particularly important in site production, the delivery team / supply chain, corporate culture and data and information e.g. their willingness to share information and collect data effectively (Carol and Roger,2019).

Site issues such as the procurement, correct delivery, storage and handling of materials can influence quality. Furthermore, the materials specified need to be appropriate to their designed function. Corporate culture needs to focus on customer care and demonstrate a commitment to quality. Regulations, codes and standards require compliance, which in turn, necessitate a program of monitoring / supervision. Governance and compliance are important drivers in health and safety, and quality (Carol and Roger,2019).

2.8 Barriers of Quality management implementation in building construction.

The following points are the barrier of quality management system in building construction industry.

2.8.1 Lack of trained workers

A majority identified lack of training as the main barrier to quality in the construction industry. Not surprisingly, the construction industry ranks second to last (among nine major industries) in per-employee spending on training. The construction industry spends two times less than manufacturers and five times less than the leader in training and public administration (Mark & Mike,1993).

Few construction companies have training programs, and most use on- the-job training as their only training tool. The problem with on-the-job training is that new employees learn from other employees who may or may not know how to do the job correctly. At best, the result is inconsistent training. At worst, employees are trained to do their jobs incorrectly. For a company to produce a quality product, employees need to know how to do their jobs. For QM to be successful, construction companies must commit to training employees at all levels. QM should provide comprehensive training, including technical expertise, communication skills, small team management, problem-solving tools, and customer relations (Mark & Mike ,1993).

2.8.2 Competitive markets

Construction has become more competitive in the last 25 years. Since 1965, U.S. construction spending has increased 35%. At the same time, the number of contractors has increased by 400%.

This competitive market is a driving force behind many of the other obstacles to quality. One of the effects of a competitive market is to lower quality standards to a minimally acceptable level. This barrier to quality is mainly a mental barrier caused by a misunderstanding of the definition of quality. Unfortunately, too many companies equate quality with high cost. Their definition leads to the assumption that a company can't afford quality (Mark & Mike,1993).

A broader definition needs to be used to look at quality, not only in the company's product, but in every function of the company. All company functions have an element of quality. Examples include delivering tools, filling out a time card, and planning a job. If the quality of tasks performed is poor, unnecessary cost is incurred by the company and, ultimately, passed to the customer (Mark & Mike ,1993).

TQM works by inspiring employees at every level to continuously improve what they do, thus rooting out unnecessary costs. Done correctly, a company involved with QM can dramatically reduce operating costs. The competitive advantage results from concentrating resources (the employees 'brain power) on controlling costs and improving customer service (Mark & Mike ,1993).

2.8.3 Poor plans and specifications

Architects and engineers are impacted by the same competition and dwindling profit margins contractors face. Many architects and engineers have responded by reducing the resources committed to the planning phase, resulting in poor plans and specifications. The problem is com- pounded by a number of factors, including fragmented planning phases, poor coordination of design professionals, the litigious nature of the industry, and the fact that many owners don't understand what they are buying with design services (Mark Mc. C. & Mik,1993).

Perhaps the root cause of poor plans and specifications is that the industry, as a whole, has done a poor job of convincing owners of the importance of construction planning. Many owners do not understand the impact that poor drawings have on a project's quality, cost, and time. Regardless of the cause, poor plans and specifications lead to a project that costs more, takes longer to complete, and causes more frustration than it should. Companies using QM respond by impressing upon owners the need to spend money and time on planning. They take time to plan projects thoroughly and invest in partnering to develop an effective project team. These investments in prevention-oriented management significantly improve the quality of the construction process (Mark Mc. C. &

Mike,1993).

2.8.4 Bad attitudes

The competitive environment, poor management practice, and a general lack of higher expectations have contributed to unproductive and unhealthy attitudes. These attitudes often are expressed in popular sayings, such as “It’s not my job” and “If it isn’t broke, don’t fix it.” Some may sound uncomfortably familiar. All are clear indicators of trouble (Mark Mc. C. & Mike,1993).

QM works on fundamentals that build better attitudes by involving employees in teams that identify and solve problems. Employees are transformed from part of the problem to part of the solution. They are encouraged to be motivated and creative. This wider view of their job changes “It’s not my job” to “It’s up to us.” Continuous improvement is the heart of QM. With QM employees look at all aspects of what they do and ask is this necessary? Is there a simpler way? Can this task be combined with others? QM builds productive and healthy attitudes that focus employees on basic fundamentals, such as: keep customer needs in mind, constantly look for improvements, and accept personal responsibility for your work (Mark Mc. C. & Mike,1993).

2.8.5 Lack of competent field managers

Less than competent field management has been a longstanding problem in construction. Although there are many contributing causes, two primary reasons are field management selection and training. Who gets hired as a field manager? Traditionally, it has been the best craftsman or operator. Unfortunately, technical accomplishment does not mean an employee has the skills to be a good manager. Worse still, be- cause of their technical ability, many managers continue to work in their trade and ignore or avoid their management duties (Mark & Mike,1993).

The problem is compounded by the fact that many field managers have no managerial training. Basic training needed by field managers includes time management, goal setting, negotiating, conflict resolution, and problem solving Mark & Mike (1993.

2.9 The Construction industry of Quality Management

In a construction project, quality management has been widely used by world-class companies to ensure successful projects delivery (Aichouni, et al.,2014). The interactions and interrelationships between key participants (e.g. the client, the architect, and the contractor) largely determine the overall performance of the construction project. Notwithstanding this mutual dependency, the

performance of individual participants remains important because the overall performance is a function of the performance of each participant (Lianying and Weijie ,2013).

According to (Rwelamila and Wisemant,1995), Arditi and Gunaydin,1997), (Turk, 2006) and (Saeed and Hasan,2012), quality in the construction industry can be defined as meeting the requirements of the designer, constructor and regulatory agencies as well as the owner. Based on the three studies above, quality can be characterized based on meeting the requirements of the owner (e.g. functional adequacy, completion time, budget; and lifecycle costs), design professional (e.g. well-defined scope, qualified staff, adequate information prior to design, provisions for decisions by owner and design professional, and contracting to perform work), constructor (e.g. contract plans, specifications, timely decisions, and contracting to perform work), and regulatory agencies (e.g. public safety and health, environmental considerations, protection of public property, and laws and regulations).

The construction industry and its quality presently are facing urgency of shaping a sustainable construction process (Zhai, et al.,2014). The role of quality in construction has been emphasized by the use of various aspects of quality tools and techniques (Metri,2005). Many organizations are frustrated in their effort to improve quality because these companies have exclusively focussed on financial measures instead of quality measures (Torbica and Stroh,1999), (Sharmma and Gudanne,2002). Construction firms, therefore, need to understand the quality factors for their success in order to establish quality factors for construction firms Saeed and Hasan (2012).

According to (Kazaz and Birgonul, 2005), (Turk ,2006) and (Haseeb, et al.,2011), construction firms have some deficiencies in getting stability in a quality concept when their business structures use temporary labors and change their location constantly and consequently. Furthermore, construction projects are widely seen as unpredictable in terms of delivery time, budget, profitability, and the standards of quality expected (Love, et al.,2000). Some differences must be considered when applying a quality program to construction projects (Arditi and Gunaydin,1997), (Pheng and Teo,2004), (Romeo, et al.,2014). These differences illustrate that almost all construction projects are single order-production products, each construction production site always displays different conditions; the lifecycle of a construction project is much longer than the life- cycle of most manufactured products, and there is no uniform

standard in evaluating overall construction quality. Thus, construction projects usually are evaluated subjectively, and the participants in the construction project (e.g. owner, designer, general contractor, subcontractor, material supplier, etc.) differ for each project Romeo, et al. (2014).

The following points are discussed as quality management elements in building construction industry quality management systems.

2.9.1 Embedding quality into contracts

Standard forms of contract require quality management plans to be incorporated within the contract. NEC refers to quality management where the contractor must prepare and issue a quality management policy statement, and plan. If defects occur, the plan identifies the procedure and timing to be followed. In Joint Contracts Tribunal (JCT) contracts, the emphasis is on the responsibility of the 'Employer' to provide drawings / Bill of Quantities / Specification / Schedule to define quantity and quality. They also address the issue of risk related to different types of procurement (Carol and Roger,2019).

The FIDIC suite of contracts has a quality management requirement. It uses the term 'quality assurance', where the contractor must institute a quality assurance system to demonstrate compliance with the contract requirements. Details of all procedures and compliance documents must be submitted to the engineer before each execution stage is commenced. The Quality Management (QM) system must ensure co-ordination and management of interfaces between the specialty contractors and the submission of documents to the client for review. It requires the contractor to carry out regular internal audits of the quality management system, and at least once every six months. If the contractor is required by the quality assurance certification to be subject to external audit, the client must be informed of any failings (Carol and Roger, 2019). FIDIC also requires a compliance verification system requiring tests, inspections, and verification to be undertaken. The terminology used in some forms of contract is not conducive to achieving good quality. For example, the term 'Practical Completion' condones projects handed over incomplete, with 'snagging items' permitted to be cleared post-handover. Good practice is to provide a definition of quality assurance for the project (Carol and Roger,019).

PPA (2011) also suite of contracts has a quality management requirement. On article 80 Origin and Quality of Works and Materials and sub articles includes:

80.1 All goods purchased under the contract shall have their origin in any eligible source country as defined in the Section 5 of the Bidding Documents.

80.2 The works, components and materials shall conform to the specifications, drawings, surveys, models, samples, patterns and other requirements in the SCC which shall be held at the disposal of the Public Body or the Engineer for the purposes of identification throughout the period of performance.

80.3 Any preliminary technical acceptance stipulated in the SCC shall be the subject of a request sent by the Contractor to the Engineer. The request shall indicate the reference to the contract, the lot number and the place where such acceptance is to take place, as appropriate. The components and materials specified in the request must be certified by the Engineer as meeting the requirements for such acceptance prior to their incorporation in the works.

80.4 Even if materials or items to be incorporated in the works or in the manufacture of components have been technically accepted in this way, they may still be rejected and must be replaced immediately by the Contractor if a further examination reveals defects or faults. The Contractor may be given the opportunity to repair and make good materials and items which have been rejected, but such materials and items will be accepted for incorporation in the works only if they have been repaired and made good to the satisfaction of the Engineer.

2.9.2 Quality Professionals

Quality Professionals have titles such as quality manager, quality engineer, quality director or assurance manager, while others deal with quality as part of a broader remit. The role of the clerk of works has been as a quality checker on site employed by the client. Smaller companies often cannot afford to have a quality manager and have to resort to inspection by the site manager or trades specialist (Carol and Roger,2019).

2.9.3 Certification of construction materials, components and system

The specification should include certified materials / systems / components in order to satisfy performance requirements. Performance specifications are written for projects that are straight forward and are well-known building types. Prescriptive specifications are written for more complex buildings, or where the client has requirements that might not be familiar to suppliers and where certainty regarding the exact nature of the completed development is more important to the client (Carol and Roger,2019).

2.9.4 Documentation

Records of quality-related actions such as inspections, testing, compliance etc. should be carefully archived, easily retrievable, and part of the project's permanent records. The storage should be protected from loss, fire, and flood. The record includes daily reports, inspection reports, test reports and logs, inspecting technician's certification, as-built drawings contain important information (it is crucial that every construction site has at least one set of completed as-built drawings available at all times), approved submittals, quality audit reports, certifications of materials, non-conformance reports and records of related remedial work and acceptance, photo and video documentation, required records of personnel qualifications as applicable, results of miscellaneous tests, inspections and examinations performed by any responsible party, special process procedures as applicable, final inspections, final system testing, commissioning reports, operation and maintenance (Q&M) manuals, warranties, copies of local authority inspection reports and copies of certificates of occupancy from building officials. Documentation, information, and retrieval are a key part of a quality plan (Carol and Roger,2019).

2.9.5 Site-based Procedures

Consistent quality relies upon having the skills available, learning from mistakes, continuous improvement, and a mind –set that recognizes quality is paramount. However, it cannot exist in a silo. Quality depends upon everybody playing a part from the consultant team to the site production team. Good design and suitable specifications delivered at the right time are paramount. A design detail that fails to reflect the reality of how the production team will construct it, can lead to difficulties. Build ability will make a difference; a poorly planned project with an untidy site will not deliver good quality work; pride in the job is important. Materials, components, and systems must be assembled and constructed in a way that is safe and fit for purpose (Carol and Roger,2019).

2.9.6 Quality through the supply chain

The supply chain is crucial to controlling / maintaining quality across a diverse set of stakeholders. Specialty contractors should submit their quality plan / policy as soon as possible in the procurement process. If they do not have these, they must adopt the contractor's version. If a specialty contractor's quality plan is considered not sufficiently stringent, they must adhere to

the contractor's quality plan. They must submit material certificates, product data, installation instructions, warranties, personnel qualifications, and results of any independent laboratory tests (Carol and Roger,2019).

The specialty contractors may need to provide their own test / inspection personnel where the material / component / system is specialized. Training / induction on quality issues is as important for the specialty contractors as it is for the principal contractor's site workforce; it must take place before starting work on site. Regular meetings with all specialty contractors must review the procedures, critical activity inspections, and other quality-related issues. The person responsible for quality needs to work closely with the supply chain to ensure compliance with the quality requirements (Carol and Roger,2019).

2.9.7 Quality of Construction Materials

Materials delivery is checked for the right quantity and quality. Packaging protects goods in transit, with the supplier's aim to deliver materials and components in perfect condition. More thought must be given to handling the packaging and recycling of packaging material. Before installation, materials are vulnerable to damage in handling, storage, and adverse weather conditions (Carol and Roger,2019). Damage costs money and time; expensive materials need respect. Vulnerable materials may need temporary protection after installation, which is important to ensure maintenance of quality. An inventory tracks the type, quantity, quality, and placement of materials on site, and the control of site materials information (e.g. existing materials on site, existing stock, and dispatched materials (Carol and Roger,2019).

Both internal and external controls can be carried out for assuring quality. For example, the quality control of concrete supply can be carried out by an independent entity; the execution of steelworks can be controlled by the project manager (on behalf of the client), or the construction company can establish an internal control for the execution of the building work (Carol and Roger,2019).

2.10 Factors affecting quality management in building construction industry

According to (Prakash,2017), there are several factors that impede the quality management in building construction industry

1. Limitation of Finance: This was the main factor of construction and in every type of work

where contractor had to plan for financial payment to eliminate the risk because it might affect the project.

2. Limitation of Communication: Construction site sometimes was located in rural areas or far away from the community. It might be a cause which affected transportation causing difficulty and delay, therefore it was a limitation that contactor had to consider.

3. Limitation of Labour and Wage: In many different local areas, the problem related to labour such as lack of skilled labour, complex work, not being able to find labour might occur, which might be causes of work difficulty, delay and low quality.

4. Limitation of Weather: Weather was one of several important limitations because it sometimes cannot be prevented such as flooding, storm, etc.
Problems of building plan and construction detail were found such as drawing not clear, drawing mistake, so they also became big problems in construction.

5. Limitation of building plan and construction detail Problems of building planned construction detail were found such as drawing not clear, drawing mistake, so they also became big problems in construction.

6. Limitation of Material and Equipment: Some construction works might use special machines or equipment which contractor had to study carefully regarding performances, suitability for work and prepare enough equipment for each work.

7. Limitation of Time: Some construction works had to be completed within a time limit such as in cases of urgent works. They caned limitation of work planning and they also caused other management problem. Therefore, contractor had to carefully consider this issue.

8. Limitation of Construction Methodology: Construction works in some areas could not be performed by regular method because there were buildings around construction site, so the contractor had to find new methods that were suitable to construct and sometimes used specialist engineer when some construction works were in step of construction.

9. Limitation of Rule or Regulation: This problem also greatly affected construction such as problem from traffic which had an effect on transportation, problem of labour hiring, problem of building construction regulation, etc.

10. Lack of co-ordination among departments: Co- ordination is very important for

project successful. Because co-ordination between the departments is failed that may lead to wrong execution or may affect the sequence of work. For example, consider the MEP (Mechanical Electrical Plumbing) department not properly co-ordinate with execution team, now execution team done the plastering work before plumbing works are not done due to lack of co-ordination. Here definitely rework required so automatically quality is misplaced.

11. Contractual Provisions

The followings have serious implications on quality:

Award of contract to the lowest bid (L1), inadequate compensation to contractor against escalation, unrealistic time schedule and unachievable specifications have serious implications on quality.

12. Organizational Structure

Baring few corporate firms, most construction companies lack the well-defined organizational setup. The Indian construction sector comprises of approximately 250 corporate firms as against 7.2 lakh Class A contractors and sub- contractors who execute 90 percent of construction jobs. Most contractors operate with skeletal and have anadhoc approach towards resource mobilization. Quality management through sound organizational setup is still an alien concept to these firms.

13. Lack of Technical Expertise

Construction industry in developing countries needs to equip itself with technical capabilities, both the human and nonhuman, to ensure effective quality assurance on and off the construction sites. Most contractors lack the financial capabilities to support such kind of in-house facility. The staff responsible for implementation of quality is inadequately trained and in most construction projects on-site quality checks are carried out by relatively less experienced supervisory personnel.

14. Lack of Training and skills

Construction sector in developing countries provides employment to those with little education or skill. A study of construction workers in five major cities India reveals that 73 per cent of workforce did not have any schooling (Vaid,1999). The situation in China is very similar where 50 per cent of construction workers in Beijing received no more than primary education (ILO ,2001). These facts may support the popular notion that one can do a construction job without

much schooling.

The objective of improving the construction quality can be realized by upgrading the skills of workforce. Thus training becomes vital in meeting the skill requirements of the construction industry. The developing countries need to have an institutional framework to impart quality oriented training for construction sector. The most popular training programme organized by ISO 9001 registered companies was Quality Knowledge.

2.11 Barriers to quality improvement in the construction industry.

There are several possibilities to overcome the barriers to quality improvement in construction: partnering, standardization and using pre-qualification in the bidding process.

2.11.1 Overcoming conflict between actors in the construction process / Partnering /.

Partnering is one of the most promising options and can take the form either of a single project agreement, or of a longer term or strategic agreement covering a number of projects (sometimes manifested as a framework agreement). (Kanji and Wong, 1998) defined project partnering in construction as follows: 'Project partnering is a synergy–a cooperative, collaborative management effort among contracting and related parties to complete a project in the most efficient, cost-effective method possible, by setting common goals, keeping lines of communication open and solving problems together when they arise'.

In both project partnering and strategic partnering, the principle is that the parties try to work as much as possible as if they were a single organization. Different partnerships can be created, for example between architects/engineers/ designers and contractors, between contractors and subcontractors and between contractors and suppliers. To be successful, partnering requires commitment, real mutual trust and discipline. Some authors consider partnering one of the biggest changes in the past decades and one of the biggest opportunities for change (Barlow, et al.,1997), (Holti & Standing,1996). Partnering is claimed to have a positive impact on project performance (time, cost and quality), as well as on improved customer satisfaction, safety and reduced litigation (Bennett & Jayes, 1995, 1998), (Bresnen & Marshall,2000), (Larson ,1997), (Latham,1994). Although most of the literature supports the positive effects of partnering, much of the evidence is descriptive and largely based on case studies.

2.11.2 Standardization

Many authors point out that non-standardisation is one of the main barriers of implementation of quality programmes in construction (Karim, et al.,2005), (Nesan & Holt,1999). Many construction projects are unique and even similar projects are not usually identical. The end product is not repetitive like in manufacturing and, therefore, the construction process cannot start with the same highly defined planning (Karim, et al.,2005). This problem is in itself not easy to solve, but the different stages in the building process have many similarities. Instead of over emphasising the uniqueness of each building process, contractors and designers should focus on the similarities and make more use of standardisation, prefabrication and system-building. Standardisation is defined as: 'The extensive use of processes or procedures, products or components, in which there is regularity, repetition and a record of successful practice' (Gibb & Isack ,2001).

2.11.3 The competitive bidding process and pre-qualification

The competitive bidding process is often mentioned by parties involved in the construction process as one of the biggest barriers against quality implementation. The underlying assumption is often that low cost usually means low quality. Interestingly, in the UK until 20 years ago, the system of competitive bidding did not exist as it does today. Instead, they used a system of mandatory fee scales. Many parties involved in the construction process predicted that abolishing the mandatory fee scales would lead to lower quality. However, results of a study by According to (Hoxley,2000), he showed that introduction of the competitive bidding process did not have lower quality as a result. Furthermore, results also showed that service quality was higher when care had been taken with pre-selection of contractors in the bidding process.

Thus, one possibility to overcome the problems caused by the competitive bidding process is pre-qualification. The use of pre-qualification criteria requires bidders to meet a minimum requirement of experience, performance, safety, or management programmes implemented. Therefore, the owner or general contractor can reduce their risk of working with a poor performing subcontractor by requiring, for example, a maximum experience modification rating (generally indicating good safety performance in the recent past) or evidence of an implemented quality management system (which could indicate a more reliable work product).

2.12 Practices of Quality Management

Quality Management is accomplished through an integrated effort between all levels of a company to increase customers' satisfaction by continuously improving current performance (Biggar,1990). The adoption of QM in construction industry has been promoted in some literatures (Low & Teo,2004), (Biggar,1990), (Haupt & Whiteman,2004). ISO certification is nowadays a trend in most industries including construction industry. The ISO 9001 standard is now on its year 2000 revision.

The five clauses for its implementation are quality management system, management responsibility, resource management, product realization, and measurement, analysis, and improvement. The application of ISO standards has received much attention from researchers. (Moatazed-Keivani, et al.,1999) argued that the ISO 9000 standards series can form and have formed the basis for an efficient and advantageous quality management system in the construction industry. (Dissanayaka, et al.,2001) stressed that the motivators behind the implementation of ISO 9000-certified quality systems for Hong Kong constructors appear to be to qualify for public works tenders, to meet clients'/customers' expectations and to improve the quality of work done. (Love, et al.,2000) commented that ISO 9000 certification is not an option but rather a reality for construction companies that wish to retain and sustain their competitiveness in today's highly competitive markets. (Liu,2003) stated that it is indicative that ISO 9000 has an impact on the contractors' attitude towards quality.

As for the implementation of quality management in project management, the concepts of quality planning (identification of quality standards), quality assurance (evaluation of overall project performance) and quality control (monitoring of specific project results) in the quality management processes were defined by (Project Management Institute, 2000). Several tools and techniques were identified as part of the implementation process, there are, 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.

(Mathews, et al.,2001) divided quality tools and techniques that are in support of quality programs into three main types, i.e., hard quality tools, mixing methods and soft methods. Hard quality tools are formal quality systems, documented quality systems, quality costs, control charts, and statistical sampling standards. Mixing methods are strategy and action plans review,

flexibility of organization structure, control charts, quality circles, and quality planning tools. Soft methods are training, customer satisfaction surveys, regular contact with vendors and external organizations, actions to optimize environment impact, empowerment, self-assessment, and benchmarking.

2.12.1 The practices of quality management of building construction in developed countries.

1. USA

According to O'Brien," one way in which more attention will be given to quality control is development of a project quality control plan. Presently, testing and inspection requirements are scattered throughout the contract specifications. To develop a firm plan, the testing and inspection requirements can be combined into a new division of the specifications. This would emphasize quality control and provide an organized location in which all quality control issues are identified to the bidders. As a part of a quality control plan, the manner in which the construction manager will apply quality control procedures should be described to the bidders. This will permit them to assign appropriate costs to the testing procedures (David & Murat,1997)

Developing and monitoring the activities within the quality assurance program in the construction phase are the responsibility of either the designer or the construction management firm depending on the project delivery system in use. To summarized, there is great potential for quality improvement in the construction process. A study of the literature and of surveys conducted in the USA indicated that management commitment to quality and to continuous quality improvement is very important; construction industry professionals are well aware of the importance of quality training; partnering agreements among the parties in the construction process constitute an important step in securing a high quality product; a feedback loop could upgrade the original quality standards used in the industry; the clarity of project scope and requirements as well as of drawings and specifications is a prerequisite for high process quality management on government building construction Projects (David & Murat,1997).

2. Germany

In general terms quality assurance, quality control and quality planning are including to measure and to meet the required quality. Quality assurance is necessary to prevent errors (not

finding the mistakes (Sehlz ,2010).

The parameter values are evaluated and appropriate quality assurance measures are taken to adjust the quality.In Germany, the literature shows that the quality management of the research activities related to quality assurance in building construction is based on engineering geodesy processes. It is a collaborative work between Civil and geodetic Engineers, which places special emphasis on the interface between construction and geodetic processes. As a result, the quality assurance concept for building geometry of a high rise building can be emphasized, while a quality model for engineering geodesy processes describes the geometric quality and returns quality information to the construction processes. This can happen in real time and in the planning phase (Jurgen, et al.,2012).

3. Australia

Quality is one of the aims of standardization. The quality of a product or a complete building or other constructions is the totality of its attributes that enable it to perform a stated task or to fulfill a given need satisfactorily for an acceptable period of time. For a construction work, a satisfactory product, although essential in itself, is not on its own sufficient. It must be incorporated in the design and construction in a correct manner. In buildings, more defects and failures arise from inadequacies in the treatment of products in design and construction than from shortcomings in the products themselves (Atkinson,2005).

Quality Management has seen a transition from reacting to the outcome of site production activities to becoming a strategic business function accounting for the raison d'etre of construction companies. Unless a construction company can guarantee its clients a quality product, it cannot compete effectively in the modern construction market (Harris, et al.,2006).

Total Quality management (TQM) is widely recognized as an enabler for performance improvement in the construction industry. In Australia when implementing TQM, contractors must align their organizational culture with the objectives of their TQM program (Love,et al. ,2004).

2.12.2 The practices of quality management of building construction in developing countries

Construction firms, therefore, need to understand the quality factors for their success in order to establish quality factors for construction firms (Saeed and Hasan,2012). Although

quality has been widely implemented in the Japanese construction industry since the 1980s and in the American construction field since the 1990s, it has not yet been implemented successfully in developing countries (Abdel-Razek, 1998), (Hiyassat,2000), (Kazaz et, al.,2004), (Abdel – Salam and Gad,2009).

1. South Africa

The construction industry contributes immensely to the global economy. As a result, there appears to be a relatively vigorous competition among building construction firms for various business reasons. Most firms therefore compete with their prowess in production efficiency. The quality of site production activities are often taken into consideration in order to satisfy internal and external stakeholders while building good reputation for the firm. However, the literature shows that the project deviations in the form of non-conformance to quality requirements and other objectives. These deviations constitute a hindrance to the competitiveness of the firm on one hand, and the entire industry on the other hand (Fidelis & Christopher,2015).

(Oakland and Marosszeky, 2005) state that organizations compete on reputation for quality, reliability, price and delivery, and as such people now recognize that quality is crucial to the sustenance of a competitive advantage. As an illustration, when firms become known for poor quality product, it could take a long time to recover that reputation. Hence, quality is a key competitive weapon in the construction industry (Oakland and Marosszeky ,2005).

In particular, the industry in South Africa is currently facing problems related to the standard of construction quality expected by clients (Emuze and Smallwood,2011). It is notable that project delivery that occurs within expected duration, cost, healthy and safe conditions, and to quality standards is a 'difficult' task because least duration and minimal cost tend to conflict with quality and health and safety (H&S) (Patrick,2004). Scope, cost, time, and quality are the four fundamental constraints needed to be considered when managing construction projects, regardless of location. The synthesis of the literature, and the methodology that show how the field work was conducted. The findings and related discussions provide insights that were closed-out in the concluding remarks (Ali and Kamaruzzaman,2010).

In South Africa, construction projects still experience non-conformance to quality requirements as well as cost and schedule overruns to the detriment of clients. For project success to be attained, conformance to these parameters is the minimum expectation in the face of other

considerations related to client satisfaction. Thus, through the use of existing literature, and a field study conducted among site management employees working for general contractors (GCs) in the Eastern Cape province of South Africa, the management of quality on construction sites was examined. The study that was descriptive in nature shows that lack of skilled general workers and artisans contribute to poor quality control and management processes; while defects and rework form the main reason for project quality deviations on the sampled sites (Fidelis and Christopher,2015).

The quality deviations in turn influence the level of cost and time overrun experienced on construction projects. The study corroborates the literature reviewed in that there is an interrelationship between cost, quality, and time in South African construction. For example, when the quality of work is below the required threshold, it leads to cost and time overruns due to rework that requires extra effort and expense. The value of this explorative study is that both site management and workers should be hands-on in terms of managing quality on project sites as failure to do so could have a domino effect relative to other project considerations (Fidelis and Christopher,2015).

Based on the reviewed related literature, it was observed that projects experience non-conformances related to quality, which exacerbate cost and time overruns in the construction sector (Sommerville,2007), (Love, et al.,2004). The immediate effects of these problems are exemplified in dissatisfied clients and end- users of construction products. The researchers thus investigated the reasons for poor quality in building construction production processes so as to evolve ways to improve it in the South African context. Also, the research investigated the relationship between cost, quality and time in a production setting. For instance, to ensure that work conforms to requirements, construction managers have to consider the performance of completed work via functionality, appearance, durability and maintenance (Fidelis and Christopher,2015).

2. Egypt

The construction sector is one of the most dynamic sectors in the Egyptian economy and has been growing rapidly since the 1980s. In 2000, the Egyptian construction market ranked 36th in the global construction market, constituting 0.4% of this market, for a value of $12.711 billion. Despite its fall from 33rd in the 1998 ranking, the Egyptian construction market actually

increased in size by 23% (Mohamed & Laila,2013).

The sector has a significant impact on gross domestic product (GDP), employment, and investment. In 2001–2002 its GDP share reached a value of LE16.56 _$3.84_ billion _LE_livre égyptienne French for Egyptian pound, representing 4.7% of the total GDP. Construction investments reached LE41.2 _$9.5_ billion in 2001–2002 which represents 48.2% of the country's total investment. In 2001–2002, the construction sector employed an estimated 1,550,000 employees, which corresponds to 16.2% of employment in the commodity sector and 8.3% of grant total employment (Mohamed &Laila,2013).

The quality philosophy is better suited for the Egyptian business environment than the traditional management systems that did not succeed quite well because the Egyptians did not accept it as a western, purely materialistic approach. One response to this has been for construction organizations to move away from the traditional 'firefighting' approach to more formal Quality Management (QM) systems to plan, monitor and control their production process. This is in line with the latest ISO 9000 standard, which also emphasizes customer satisfaction and continual improvement (Mohamed &Laila,2013).

In parallel with developments in QM, have been efforts to increase communications between participants. Since construction projects are complex, dynamic and heterogeneous, poor communication can cause major problems. As a recent industry report points out, "effective communication with the project team and close involvement of the client throughout the project delivery process facilitate smooth project implementation", as it helps minimize the gaps between client's expectation and project outcome (Mohamed &Laila,2013).

The construction industry suffers from several problems such as low productivity, poor health and safety, inferior working conditions, and inadequate quality. TQM can be a solution to these problems. However, there are several barriers to the extensive deployment of TQM in the construction industry. The study investigated the potential benefits and problems of the extensive implementation of TQM in the construction industry through a questionnaire survey. The survey results revealed that contractors are aware of the benefits of TQM implementation but there are still several problems of implementation. Lack of top management's support, commitment and leadership are the three most important problems Mohamed &Laila (2013).

The research discusses problems of not applying total quality management (TQM) in the Egyptian construction industry and shows benefits of applying it. The major obstacles to implementing TQM in the Egyptian construction industry were found to be lack of expertise, resources in TQM, rigid attitude and behavior of executive management toward quality. Other issues included the lack of commitment toward quality, lack of education and training to drive the improvement process, and tendency to cure symptom rather than get to the root cause of a problem. Recommendations from the researchers are that extensive awareness and training programs be initiated to improve the clients' understanding and approach toward quality and hence increase their willingness to implement TQM, which would in turn improve coordination, teamwork, productivity, and construction industry performance (Mohamed &Laila,2013).

3. Kenya

Project Quality Management has been strongly emphasized all over the world especially due to its importance in enhancing performance and increasing customer satisfaction. Quality being a universal phenomenon has seen a universal shift in the mindset of many builders and makers of products. They seriously focus towards ensuring that their products do meet their customer's expectations. The emphasis on quality management has increased especially with the current high competition in the market and globalization (Rumane ,2011).

Many organizations are emphasizing on the inspection processes rather than quality approaches that are more structured and advanced. The managers are failing to see the value of quality and they keep side-lining it. For growth and advancement, in this industry, the leaders need to embrace strategic-based quality approaches (Leonard & McAdam ,2002).

In Kenya, the Cases of buildings collapsing are on the rise. Some buildings in Kenya and especially in Nairobi region are of very substandard quality. The construction industry has become a major killer in the country with many innocent casual labourers losing their lives on a daily basis. The Collapsing building structures in Kenya outlined several causes of collapse of buildings. These causes are closely related to inadequate project quality management. It is in this light that the study was conducted with the aim of identifying the factors influencing the project quality management which affects the quality of building construction structures focusing on Nairobi region (Charagu,2013).

Generally, in developing countries, the construction industry has failed to meet the desired expectations of the society, the clients and the government. Since the construction industry is of great significance to the national socio-economic development of developing countries, it goes without saying that something must be done to improve the performance (Ann & Dr. Susan,2016). The performance cannot be improved without proper quality management in the picture, and identifying the factors that affect it (Ofori,2006).

2.12.3 The practices of quality management building construction in Ethiopia

The quality management function is the process of ensuring that all aspects of project and its results fully meet the needs and expectations of the project's client, participants and shareholders-both internally (relating to the project's systems of development), and externally (relating to the project's performance or service). A quality management System is defined in BS 4778 as: The organization structure, responsibilities, activities, resources and events that together provide organized procedures and methods of implementation to ensure the capability of the firm to meet quality requirements (Griffith,1990).

Quality management, in simple terms is "that aspect of the overall management function that determines and implements the Quality Policy". Quality Management Systems and Quality Assurance should be instinctive aspect of the building process (Hellard,1993). During the 1950's, Deming introduced his ideas about Deming's "system" view of quality management to develop a framework for a detailed assessment of the organization (Deming,1986).

As the intensive construction in Ethiopia today becomes more complex, the demand for housing and project management services is increasing. During the housing construction the application of project management the progress against time, cost against tender or budget, quality against specifications is can be confusing for all parties involved in the construction process. Therefore, the main task of the study is to indicate the solutions for the problem Alem, n.d, P.1.

This means, first of all any project before its design starting should have a briefing stage, sketch design stage, scheme design stage and detail design. Also design should include the climatic design of building materials, earth- quake safety and energy conservation for low–cost housing as well as for complex buildings. Apart that, to have quality and effective construction work there should be quality control Alem, n.d, P.1. Quality control is the responsibility of the contractor. However, it could be categorized into two parts i.e.

- The quality of workmanship
- The construction materials.

Concerning the workmanship, it is usual to have experienced Foreman to be on the Construction Site continuously until the project is completed. Apart from this, the building materials are tested to ensure the quality i.e. since the Ethiopian standard code of practice sets minimum quality requirements, the materials should fulfill the standards specified by the code before using them in the construction project. These qualitative tests are mostly done according to the Ethiopian standards institution, by building design enterprise, as well as by the university and other firms Alem , n.d, P.4.

2.12.4 The practices of quality management in Federal Government Building Projects Office in Addis Ababa.

In a construction project, quality management has been widely used by world-class companies to ensure successful projects delivery (Aichouni, et al.,2014). The interactions and interrelationships between key participants (e.g. the client, the architect, and the contractor) largely determine the overall performance of the construction project. Notwithstanding this mutual dependency, the performance of individual participants remains important because the overall performance is a function of the performance of each participant (Lianying and Weijie,2013).

(Loushine, et al.,2006), in their review of the literature on quality and safety management in the construction industry, examined the definition of quality authors used. Researchers in construction quality gave the following definitions for quality performance: 'meeting expectations of the customer' (Chase, et al.,1998), (Kanji & Wong, 1998), (McKim & Kiani,1995), (Torbica & Stroh,1999), 'reduced rework or defects' (Atkinson,1998), (Love, et al. ,1999), (McKim & Kiani,1995), (Pheng & Wee,2001), (Sypsomos,1997).

To summarized up, as per the literature reviews and the conducted study, the research gap is quality management systems were not applied properly in Federal Government Building Projects Office in Addis Ababa. This affects the overall performance of the organization and the solutions for the problems given by the part of recommendation.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Study Area

From establishment year till now the organization has been constructed and completed more than 21 governmental office buildings and more than 6 apartment buildings for the residence of governmental workers and also completed projects are transferred to end users in Addis Ababa.

The study area was selected and conducted on Federal Government Building Projects Office in Addis Ababa (refer table 3.1) and the reason to select the organization was because of saved the government office rent expense 0.9 billion Br. per year as well as the organization creates job opportunity for the society. The study covered 13 projects. Out of these, 10 projects under construction and 3 of the projects were under provisional acceptances which were constructing at different sub cities. The X-Y Coordinate of data and the GIS location map of 11 projects are annexed under annex 5. But some of the projects like information network and security agency main office, government higher officer residence buildings of X-Y coordinates were not given because of security reason. The projects were located at different parts of the city as shown in Table 3.1.

Table 3.1 The location map of building projects X-Y Coordinate

I.N	Project Name	Sub city	Woreda	Plot area (m2)	location	status
1	4B + G+16 Government Communication Affairs Office Building	Arada	9	14742.99	X 473570.75 Y 998017.41	Under construction
2	2B+G+20 Ministry of Foreign Affairs Apartment Buildings and Ministry of Foreign Affairs 2B+G+12 Office Building	Kirkos	8	7172	X 475039.06 Y 996152.02	Under Construction &Provisional acceptance respectively
3	G+24 Federal Documents Authentication and Registration Agency	Lideta	9	2758.27	X 471856.88 Y 996007.32	Under Construction

4	Ethiopian Civilaviation Authority	Bole	3	97830	X 477377.93 Y 993314.44	Under Construction
5	2B+G+9 National Metrology Agency Office Building Lot 2	Bole		18808	X 476307.70 Y 993066.48	Under Construction
6	National Metrology Agency Office Building Lot 1	Bole	2	18808	X 476363.61 Y 993001.04	Under Construction
7	2B+G+11 Ethiopian National Theatre Complex	Kirkos	7	11025	X 472715.18 Y 996357.96	Under Construction
8	Leather Industry Development Institute	Akaki - Kality	5	35852	X 473316.87 Y 996591.09	Under Construction
9	Government Higher Officer Resident Buildings	Meri /CMC at back of Tsehay Real Estate				Under Construction
10	Construction of Central Statistics agency	Arada				Under Construction
11	2B+G+18 Federal High Court Judges Apartment Building	Bole				Provisional Acceptance
12	Information Network and Security Agency Main Office	Nifas Silk				Provisional Acceptance

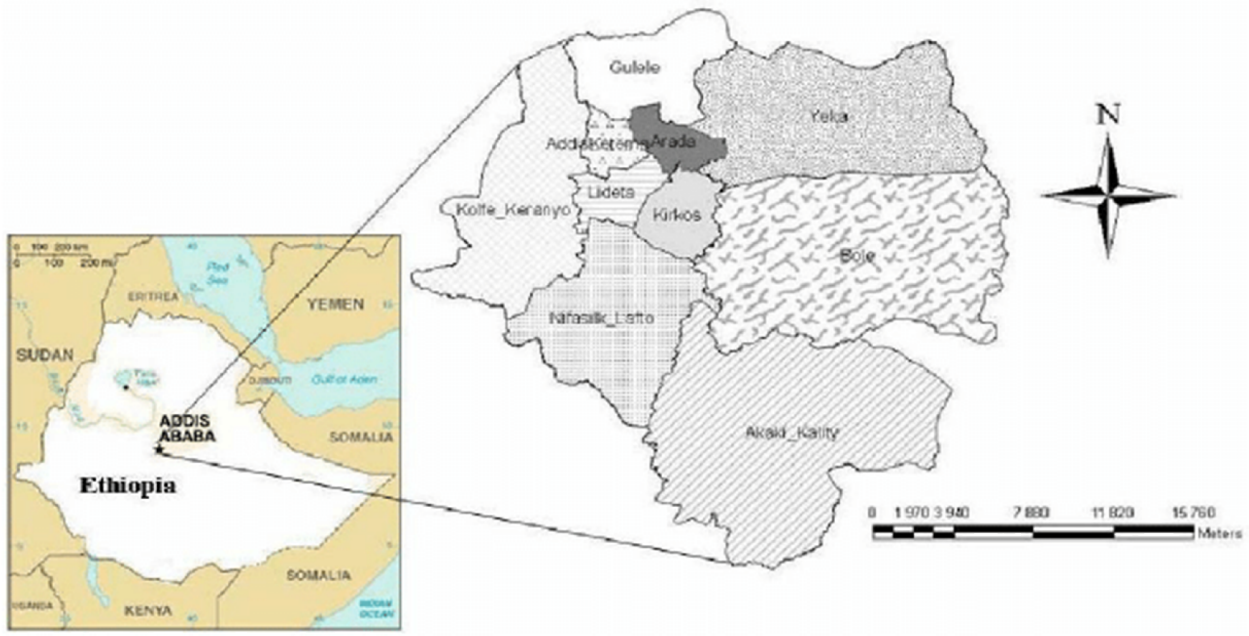

Figure 3.1 The location map of study area in Addis Ababa (Source: Goggle map,2021)

3.2 Data types

This study included both qualitative and quantitative data. The qualitative data included opinions from the respondents using interviews and observations and also the qualitative data included questionnaire responses from the respondents. The quantitative data included those data which can be expressed in terms of numeric values.

3.3 Data sources

The data for this study was collected both from primary and secondary sources. Primary data is a source from where first-hand information is gathered. Primary sources are original sources of data. Primary data were collected from interview and questionnaire. The Secondary data included both quantitative and qualitative data, and they were used principally in both descriptive and explanatory research. Secondary data were collected from census and survey reports, journals, newspapers, official records, books, reported experimental results, previous research papers, bulletins, magazines, web sites and other publications.

3.4 Sampling design

This study used a purposive /judgment/ sampling method to select respondents for questionnaire. This sampling method chosen because of limited time and finance, In this study head office and projects were taken as unit of analysis. The population considered professional and skilled workers

rather than unskilled workers and laborers in order to collected reliable response and core information for the study. The respondents selected based on their education, experience, position, and area of work about their practices of quality management implementation of building projects in FGBPOAA.

3.4.1 Sample population

The sample population used in this research covered 12 building projects constructing by FGBPOAA and 110 professionals and skilled workers taken as sample population. The Sample population taken from clients 13 , consultants 26, contractors 43 and Subcontractors 28.

3.4.2 Sample type

The Sample type was included different types of professionals working in federal government building project office in Addis Ababa. The sample drawn by using Non probability technique like purposive / judgment/ method. The study selected deliberately, those who were knowledgeable and able to deliver reliable and relevant information that suited for the purpose of assessment about practices of quality management in FGBPOAA.

3.4.3 Sample size

The Samples size was chosen purposively with using the sample size determination formula of Kothari (2004). Hence, the sample size taken for this study was 86**.** Sample size taken using purposive method very useful for situations where it needs to reach quickly for a targeted sample. The following formula used to determine sample size of study.

$$n = \frac{Z^2 * pqN}{e^2 (N-1) + Z^2 * pq}$$

Where,

N = size of population

n = size of sample

e = acceptable error (the precision) =0.05

Z = standard variate at a given confidence level

P = sample proportion q = 1 – p = 1- 0.5= 0.5

$$n = \frac{1.96^2*0.5*0.5*110}{0.05^2 (110-1) + 1.96^2*0.5*0.5} = \underline{86}$$

Source: Research methodology methods & techniques (Kothari, 2004)

3. 5 Data collection techniques

The necessary data for this study was collected through interview and questionnaires. Structured questions prepared related to specific objectives of study. Non structured interview conducted on targeted focus groups of clients, consultants, contractors and subcontractors and also the questionnaires distributed to selected professionals and skilled workers from clients, consultants, contractors and other participant stakeholders in FGBPOAA (refer on Annex, 1).

3.6. Validity and Reliability

3.6.1. Validity

The validity of questioners developed for this study was checked before distributing the final questionnaires to the respondents in Federal Government Building Projects Office in Addis Ababa, it was be checked and commented by professional colleagues and building projects personnel and the advisor of the stud and pilots done to check the valid. The final version of the questioners was distributed after incorporating all the comments and feedbacks obtained from different professionals and skilled workers in FGBPOAA.

3.6.2. Reliability

The reliability analysis was carried out for overall 29 variables and carried out regarding four specific objectives of the study for internal consistency with regard to respondent's data on quality management of building projects rating using cronbach's alpha and in principle cronbach's alpha of 0.7 is acceptable for internal consistency of data obtained from different source of respondents. It is expressed as a number between 0 and 1 where the higher the score of Cronbach alpha, the more reliable the generated scale when the closer the alpha coefficient is to 1.0, the greater the internal consistency and the reverse is true. Hence, the reliability is checked based on the data process on SPSS version 25 software (refer on Annex III) and for this study the overall Cronbach's alpha coefficient for all scaled questions were 0.754 which satisfies the reliability test requirements. The summary of the reliability statistics is shown in table 3.2.

Table 3.2 Reliability Statistics

I.N	Description	No. of Variables /Items/ included	Cronbach's alpha result
1	The overall quality management assessment variables in FGBPOAA.	29	0.754
2	The practices of quality management in FGBPOAA	6	0.841
3	The causes of poor quality management in FGBPOAA	9	0.834
4	The construction materials, personnel and construction methods employed in FGBPOAA	9	0.804
5	The measures taken to improve the quality management in FGBPOAA.	5	0.862

Source: Field Survey output, (2021)

3.7 Data analysis method

The collected data analyzed using SPSS (Version 25), GIS Software, and Excel. The qualitative data was analyzed by Excel; conversely, the quantitative data analyzed by SPSS (Version 25).

3. 8 Data presentation methods

Collected and analyzed data presented by using different types of methods, such as tables, graphs and charts. All these methods used easily to express and show the interpretation of study result for clients and customers /end users/.

CHAPTER 4: RESULT AND DISCUSSION

4.1 Socio economic description and response rate of respondents

4.1.1 Socio economic description

4.1.1.1 Educational back ground of respondents

The respondents of educational background in the organization, 15% were Diploma, 51% were Bachelor Degree and the remaining 34% were Master's & above. The summary of response rate of educational background is shown on figure 4.1.

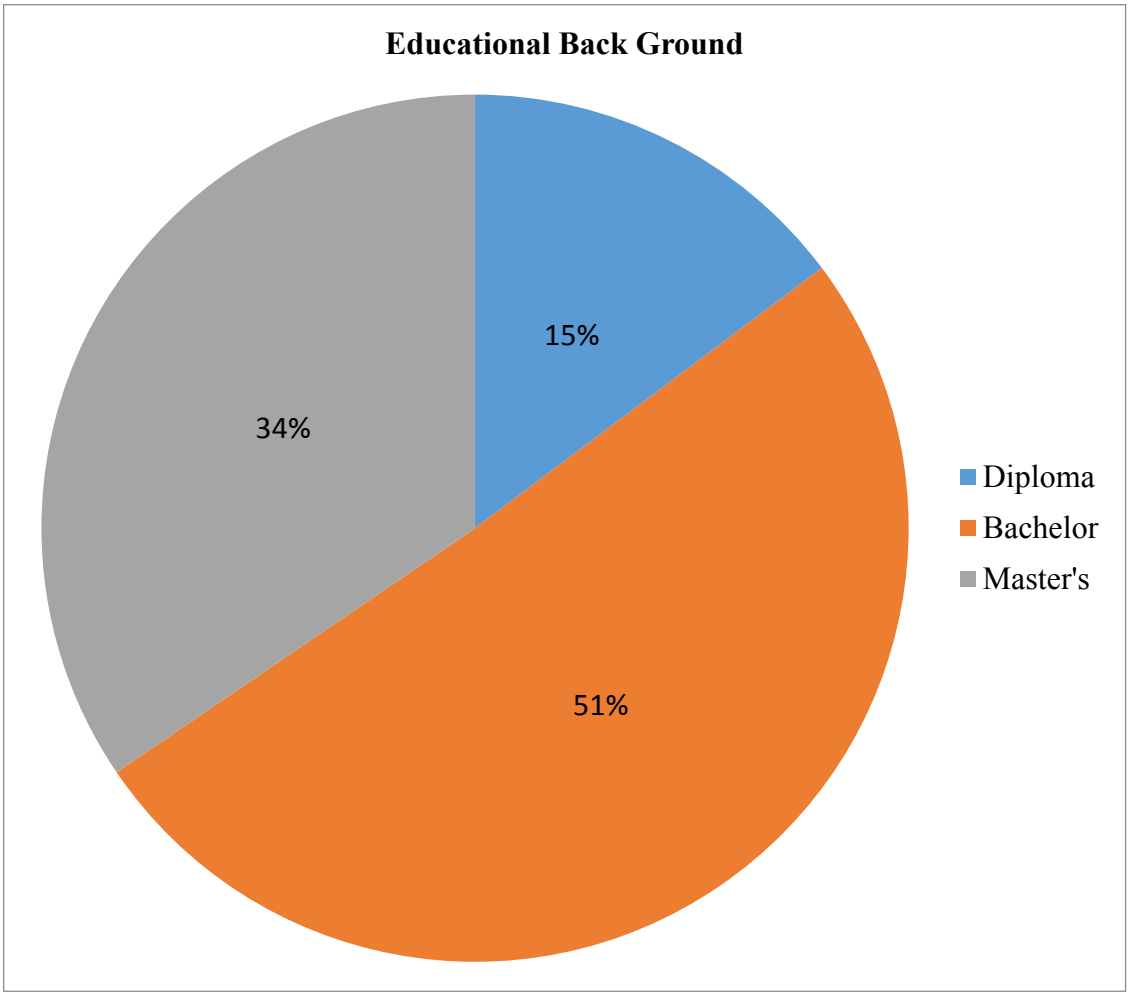

Figure 4.1 Educational back ground of respondents (Source: Field Survey, 2021).

4.1.1.2 Gender composition of respondents

The respondents of gender compositions used in the study, 68% were male and the remaining 32% were female. The summary of gender composition is shown on figure 4.2.

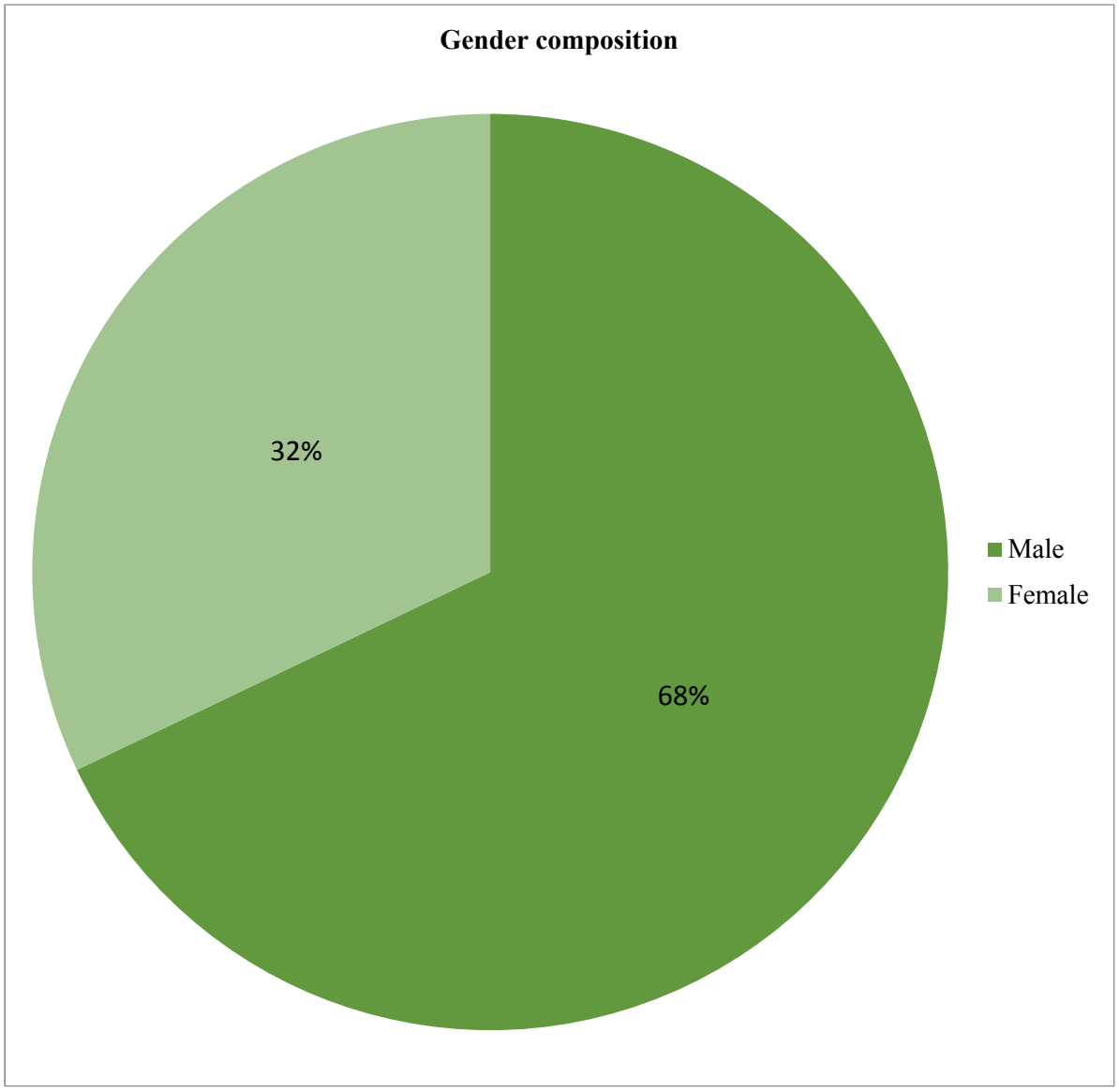

Figure 4.2 Gender composition of respondents (Source: Field Survey, 2021).

4.1.2 Response rate of respondents

4.1.2.1 Response rate by position

A total of 86 questionnaires were distributed to FGBPOAA workers in head office and projects. The questionnaires covered professionals from client, consultant, contractor and sub-contractor. The selection done based on purposive sampling technique of judgment and distributed questionnaires focused on engineers & highly skilled technicians in order to get relevant and reliable response for study. Based on this, out of 86 questionnaires 81 respondents or 94% of respondents returned and used for analysis of this study. The summary of the response rate is shown in table 4.1

Table 4.1 Response rate by Position

I.N	Position	Distributed Questionnaire	Returned in no.`	Not returned in no.	Returned in %	Not returned in %
1	P. Manager	10	10	–	100	–
2	Cons. Eng.	9	9	–	100	–
3	Contract Eng. & Res. Eng.	26	23	3	88.5	11.5
4	Site Eng.	29	27	2	93.1	6.9
5	Others	12	12	–	100	–
	Total	**86**	**81**	**5**	**94.2**	**5.8**

Source: Field Survey, 2021.

Table 4.2 Distribution of respondents for each stakeholders & projects

I.N	Project	Position	Contractor	Consultant	Sub Contractor	Status	Remark
1	4B + G+16 Government Communication Affairs Office Building	P.Manager	1			Under Construction	
		Cons. Eng.	1				
		Site Eng.	1		1		
		Office.Eng.	1				
		Foreman	3				Not Returned=1
		Resid. Eng.		1			
		Ass.Res.Eng		1			
2	2B+G+20 Ministry of Foreign Affairs Apartment Buildings	P.Manager	1			Under Construction	
		Cons. Eng.	1				
		Site Eng.	1		1		
		Office.Eng.			1		
		Foreman	1				
		Resid. Eng.		1			
		Ass.Res.Eng.		1			Not returned = 1
3	Ministry of Foreign Affairs 2B+G+12 Office Building	PM	1			Under Provisional Acceptance	
4	G+24 Federal Documents Authentication and Registration Agency	PM	1			Under Construction	
		Cons.Eng.	1				

		Site Eng.	2		1		Not returned = 1
		Office.Eng.	1				
		Technician	3				
		Resid. Eng.		1			
5	Ethiopian Civilaviation Authority	PM	1			Under Construction	
		Cons.Eng.	1				
		Site Eng.	1		1		
		Office Eng.			1		
		Mech. Eng.	1				Not returned = 1
		Elec. Eng.	1				
		Foreman	1				
		Resid. Eng.		1			
		Ass.Res.Eng.		1			
6	2B+G+9 National Metrology Agency Office Building Lot 1	PM	1			Under Construction	
		Cons.Eng.	1				
		Site Eng.	1		1		
		Resid. Eng.		1			
7	National Metrology Agency Office Building Lot 2	PM	1			Under Construction	
		Cons.Eng.	1				
		Site Eng.	1				
		Office. Eng.			1		
		Resid. Eng.		1			
		Foreman	1				
8	2B+G+11 Ethiopian National Theatre Complex	PM	1			Under Construction	

		Office Eng.	1				
		Site Eng.	1		1		
		Resid. Eng.		1			
9	Leather Industry Development Institute	PM	1			Under Construction	
		Cons. Eng.	1				
		Office Eng.	1				
		Technician	1				
		Resid. Eng.		1			
10	Government Higher Officer Resident Buildings	PM	1			Under Construction	
		Cons. Eng.	1				
		Site Eng.	1				
		Office Eng.	1				
		Technician	1				
		Resid. Eng.		1			
11	Construction of Central Statistics agency	PM	1			Under Construction	
		Site Eng.	1				
12	2B+G+18 Federal High Court Judges Apartment Building	PM	1			Under Prov.Accep.	
13	Information Network and Security Agency main office	PM	1			Under Prov.Accep.	
14	FGBPOAA Head office	Contract Eng.	Client = 8				Not returned = 1
		Design	>> = 7				
		Survoyer	>> = 1				

		Summary Returned = 81 Not Returned = 5 **Total = 86**	

4.2 Comparison of respondents with the previous scholar's work

The previous scholars about quality management argued that quality management should be implemented in the construction industry for building projects success. However, according to the data collection of different sources more than 50% of the respondents were replied that there were poor practices of quality management in Federal Building Projects Office in Addis Ababa.

The previous scholars were said that to improve poor quality management practices in construction industry was recommended the following methods such as using preventive and collective mechanism, using through continuous controlling & Supervision, using quality performance method, using quality management training for workers and using collection of customers feedback as well as more than 50 % of the respondents of FGBPOAA were replied and recommend that the above methods recommended by previous scholars such as preventive and collective mechanism, using through continuous controlling & Supervision, using quality performance method, using quality management training for workers and using collection of customers feedback were used to improve poor quality management practices of Federal Government Building Projects Office in Addis Ababa.

4.3 The Practices of Quality Management Systems in FGBPOAA.

According to the data collected from different sources, the results corresponding to the practices of quality management systems are subdivided in to the following subsections which are regarded as practices of quality management systems.

4.3.1 The practices of quality management policy and quality management department.

According to the responses from FGBPOAA, of the total 81 participants about 19.8% respondents replied that yes there is quality management policy and quality management

department, 61.7% respondents said no and the remaining 18.5% respondents replied that no opinion. The summary of the response is presented in table 4.3.

The implication of the result about absence of quality management policy in the organization shows that the authority can't control the contractors, the contractors may not be abide by the policy if they fail to maintain the quality of a project, the company can't manage the workers about the quality of buildings and exposed to rework costs, the company exposed to delay of project completion period, dissatisfaction of customers existed in organization, and the company loses its good image because of poor practices of quality policy existed in organization.

Table 4.3 Quality management policy & quality management department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	16	19.8	19.8	19.8
	No	50	61.7	61.7	81.5
	No opinion	15	18.5	18.5	100.0
	Total	81	100.0	100.0	

Source: Field Survey , 2021.

4.3.2 The practices of contractor's selection.

As per the responses from FGBPOAA, of the total 81 participants about 18.5% respondents replied that yes about presence of legal selection of contractors as per their competence and experience in organization, 63% respondents said no and the remaining 18.5% respondents replied that no opinion. The summary of the response is presented in table 4.4.

The implication of the result about absence of legal selection of contractors as per their competence and experience in organization shows that the company can't get the potential and competent contractors to achieve required quality and this causes the company exposed to extra rework expenses and the organization was also exposed to unfair contract agreement and corruption.

Table 4.4 The Contractors working in projects are legally selected based on their experience and competence.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	15	18.5	18.5	18.5
	No	51	63.0	63.0	81.5
	No opinion	15	18.5	18.5	100.0
	Total	81	100.0	100.0	

Source: Field Survey , 2021.

4.3.3 The practices of quality control guide manuals implementation

According to the responses from FGBPOAA, of the total 81 participants about 17.3% respondents replied that yes there is quality control guide check lists / manuals in organization, 56.8% respondents said no and the remaining 25.9% respondents replied that no opinion. The summary of the response is presented in table 4.5.

The implication of the result about absence of quality control guide manuals implementation in organization shows that the company can't control the quality failure made by contractors this causes failure of projects quality performance existed on structural and finishing works such as poor quality of reinforced concrete, poor ceramic, poor granite, poor masonry , poor plastering works, poor painting works etc. occurred in organization and because of these reasons, the company can exposed to delay of completion period of building projects. This causes the organization exposed to incur extra project costs.

Table 4.5 Quality control guide check lists /manuals & specification of building construction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	14	17.3	17.3	17.3
	No	46	56.8	56.8	74.1
	No opinion	21	25.9	25.9	100.0
	Total	81	100.0	100.0	

Source: Field Survey, 2021.

4.3.4 The practices of implementing quality management training

As per the responses from FGBPOAA, of the total 81 participants about 22.2% respondents replied that yes there is quality management training in organization, 40.7% respondents said no and the remaining 37.1% respondents replied that no opinion. The summary of the response is presented in table 4.6.

The implication of the result about absence of quality management training in organization shows that the workers in organization were incompetent to produce the required quality of building projects and the workers can't easily familiar with technologies . This causes the company exposed to rework project costs and dissatisfaction of customers existed in organization.

Table 4.6 Using quality management training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	18	22.2	22.2	22.2
	No	33	40.7	40.7	63.0
	No opinion	30	37.1	37.1	100.0
	Total	81	100.0	100.0	

Source: Field Survey,2021.

%age of frequency

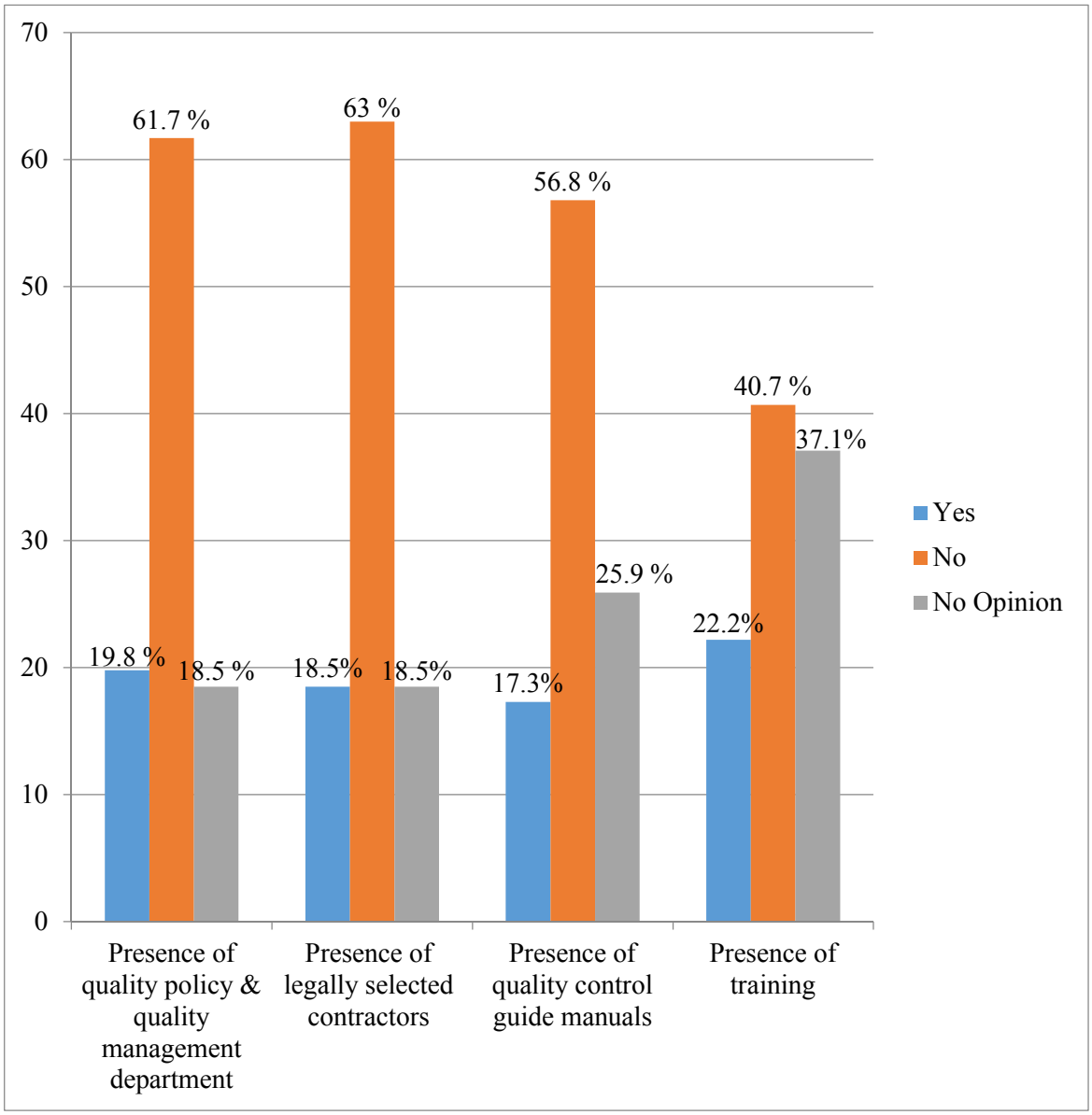

Figure 4.3 The Practices of Quality Management Systems by percentage in FGBPOAA.

4.4 The causes of poor quality management in FGBPOAA.

According to the data collected from different sources, the results corresponding to the causes of quality are subdivided in to the following subsections which are regarded as causes of quality management systems in organization.

4.4.1 The participation of incompetent contractors.

According to the responses from FGBPOAA, of the total 81 participants about 6.2% respondents replied that disagree about the participation of incompetent contractors considered as a cause of poor quality management in organization, 7.4% respondents said no opinion, 21% respondents said agree and the remaining 65.4% respondents replied that strongly agree. The summary of the response is presented in table 4.7.

The implication of the result about participation of incompetent contractors in the organization shows that the authority can't get the required quality of performance from incompetent contractors, this causes, the company exposed to incur rework costs and delay of completion period of projects existed in organization and the company resources misused by incompetent contractors.

Table 4.7 Participation of incompetent contractors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	6.2	6.2	6.2
	No opinion	6	7.4	7.4	13.6
	Agree	17	21.0	21.0	34.6
	Strongly agree	53	65.4	65.4	100.0
	Total	81	100.0	100.0	

Source: Field Survey, 2021.

4.4.2 The absence of formal quality management.

According to the responses from FGBPOAA, of the total 81 participants about 3.7% respondents replied that strongly disagree about the absence of formal quality management implementation considered as a cause of poor quality management in organization, 1.2% respondents said disagree, 9.9% respondents said no opinion, 23.5% said agree and the remaining 61.7% respondents replied that strongly agree. The summary of the response is presented in table 4.8.

The implication of the result about absence of formal quality management implementation strategies and policies shows that the authority can't manage the contractors working in the organization regarding failure of quality existed , the organization can be exposed to rework costs and the quality of structure and finishing works such as foundation works, aluminum curtain walls, sanitary works, electrical works, screed flooring, carpet flooring, etc. were not properly managed as per the requirement of quality standard in organization.

Table 4.8 Absence of formal quality management implementation strategies & Policies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	3.7	3.7	3.7
	Disagree	1	1.2	1.2	4.9
	No opinion	8	9.9	9.9	14.8
	Agree	19	23.5	23.5	38.3
	Strongly agree	50	61.7	61.7	100.0
	Total	81	100.0	100.0	

Source: Field Survey, 2021.

4.4.3 The delivery of expired & poor quality construction materials.

According to the responses from FGBPOAA, of the total 81 participants about 3.7% respondents replied that strongly disagree about the delivery of expired & poor quality construction materials considered as a cause of poor quality management in organization ,1.2% respondents said disagree, 25.9% respondents said no opinion, 9.9% said agree and the remaining 59.3% respondents replied that strongly agree. The summary of the response is presented in table 4.9.

The implication of the result about delivery of expired & poor quality construction materials to the project shows that the buildings structure and finishing works quality were seriously affected, this causes the company exposed to incurred extra rework costs, dissatisfaction of customers

existed in organization, expired materials could be affected workers healthy and delay of time completion period of projects existed in organization.

Table 4.9 Delivery of expired & poor quality construction materials to the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	3.7	3.7	3.7
	Disagree	1	1.2	1.2	4.9
	No opinion	21	25.9	25.9	30.9
	Agree	8	9.9	9.9	40.7
	Strongly agree	48	59.3	59.3	100.0
	Total	81	100.0	100.0	

Source: Field Survey, 2021.

4.4.4 Lack of qualified manpower on the contractor and consultant side.

According to the responses from FGBPOAA, of the total 81 participants about 7.4% respondents replied that disagree about lack of qualified manpower on the contractor and consultant side considered as a cause of poor quality management in organization, 25.9% respondents no opinion, 4.9% respondents said agree, and the remaining 61.7% respondents replied that strongly agree. The summary of the response is presented in table 4.10.

The implication of the result about lack of qualified manpower on the contractor and consultant side in organization shows that the company can't get the expected quality performance as per quality standard of building projects. Failure of quality on building projects causes the company to incur rework costs and maintenance costs. Because of this reason, building projects were not completed on contractual time and dissatisfaction of customers exited in organization.

Table 4.10 Lack of qualified manpower on the contractor and consultant side

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	7.4	7.4	7.4
	No opinion	21	25.9	25.9	33.3
	Agree	4	4.9	4.9	38.3
	Strongly agree	50	61.7	61.7	100.0
	Total	81	100.0	100.0	

Source: Field Survey, 2021.

4.4.5 Incomplete contract document and design.

According to the responses from FGBPOAA, of the total 81 participants about 2.5% respondents replied that disagree about incomplete contract document and design considered as a cause of poor quality management in organization , 35.8% respondents said no opinion, 4.9% respondents said agree, and the remaining 56.8% respondents replied that strongly agree. The summary of the response is presented in table 4.11.

The implication of the result about presence of incomplete contract document and design in organization shows that the company can't manage easily project quality works when failure occurred in building projects and the company could not get the expected standard of quality output from constructed building projects such as the contractors made poor quality of masonry works, plastering works, concrete works, painting works, etc. and the consultant made poor supervision of works and made poor contractual agreement documents, these contributed for poor practice of quality management in organization.

Table 4.11 Incomplete contract document and design

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.5	2.5	2.5
	No opinion	29	35.8	35.8	38.3
	Agree	4	4.9	4.9	43.2
	Strongly agree	46	56.8	56.8	100.0
	Total	81	100.0	100.0	

Source: Survey output (2021)

4.4.6 Low rate of salary or wages of employees.

According to the responses from FGBPOAA, of the total 81 participants about 13.6% respondents replied that strongly disagree about low rate of salary or Wage payment for employees considered as the cause of poor quality management practice in organization, 9.9% respondents said disagree, 21% respondents said no opinion, 25.9% respondents said agree and the remaining 29.6% respondents replied that strongly agree. The summary of the response is presented in table 4.12.

The implication of the result about payment of low rate of salary or wage for employees considered as the cause of poor management in organization shows that the authority can't get the competent workers to produce the required quality of performance and well competent workers were not interested to in organization. Most of the time workers were not motivated to improve the quality of projects, due to these reasons the company exposed to incur rework costs, delay of completion of period existed, dissatisfaction of customers and loss of good image existed in organization.

Table 4.12 Low rate of salary or Wages of employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	11	13.6	13.6	13.6
	Disagree	8	9.9	9.9	23.5
	No opinion	17	21.0	21.0	44.4
	Agree	21	25.9	25.9	70.4
	Strongly agree	24	29.6	29.6	100.0
	Total	81	100.0	100.0	

Source: Field Survey, 2021.

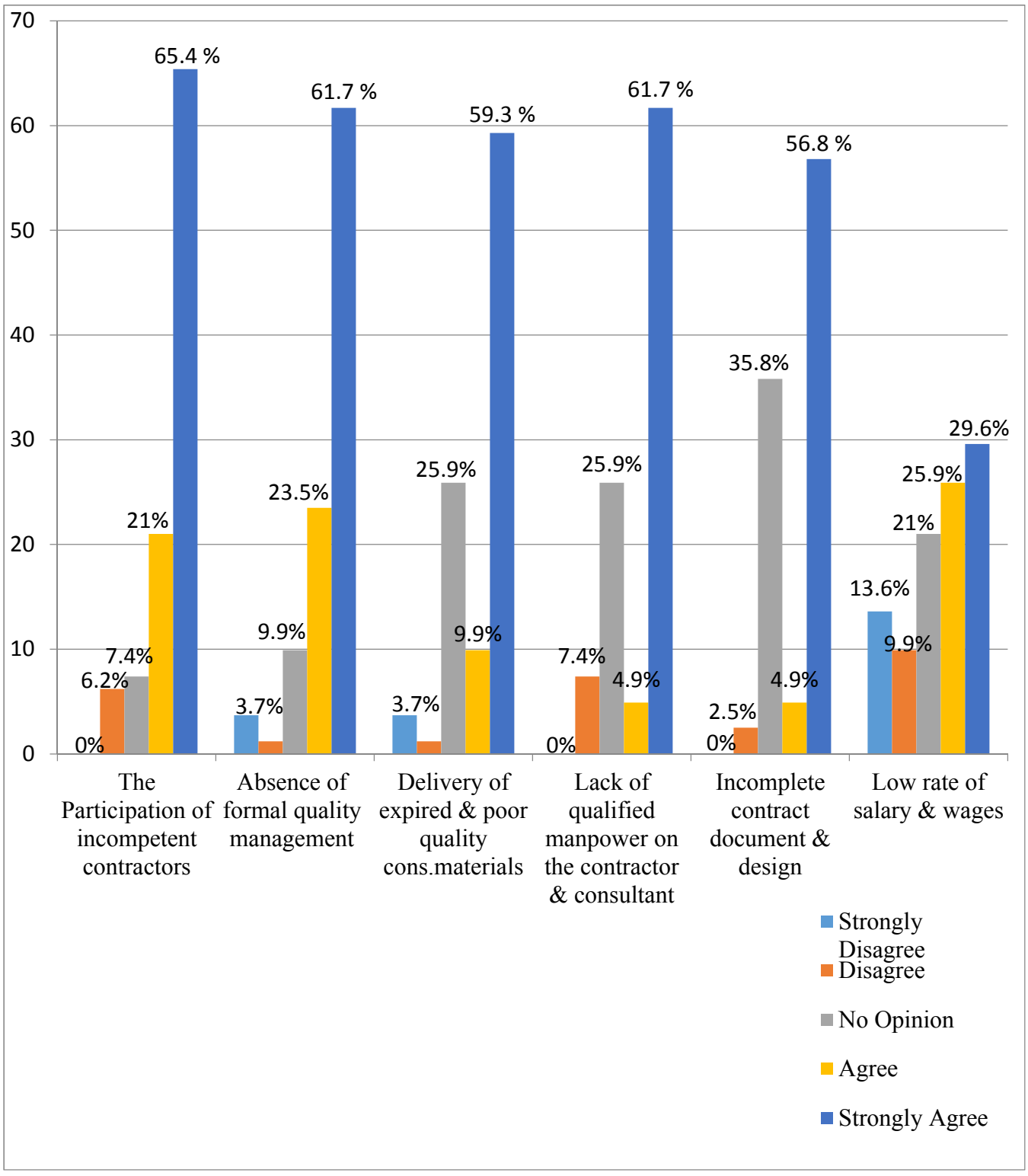

Figure 4.4 The causes of poor quality management by percentage in FGBPOAA

4.5 Construction materials, personnel and construction methods employed in FGBPOAA contract quality requirements.

According to the data collected from different sources, the results corresponding to construction materials, personnel and construction methods employed in FGBPOAA contract quality requirements regarding to quality management systems are subdivided in to the following subsections.

4.5.1 The practice of construction materials employed in the projects are fulfilled quality standard.

According to the responses from FGBPOAA, of the total 81 participants about 16% respondents replied that strongly disagree about structure & finishing building construction materials used in the projects are fulfilled the quality standard in order to improve the quality management systems, 55.6% respondents said disagree, 17.3% respondents said no opinion and the remaining 11.1% respondents replied that agree. The summary of the response is presented in table 4.13.

The implication of the result about the structure & finishing building construction materials used in the projects are not fulfilled the standard of building quality in organization shows that the quality of the building projects output, such as structure works (foundation and reinforced concrete works) and finishing works (masonry, ceramic, plastering, painting , sanitary, electrical works, etc. were contributed poor quality performance existed in the organization and because of these reasons the company exposed to extra costs to maintain rework works, dissatisfaction of customers existed, delay of projects completion period occurred, the organization loses its good image and the company can not a competent regarding to quality of building projects.

Table 4.13 Structure & finishing building construction materials used in the project are full filled the standard of quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	13	15.9	16.0	16.0
	Disagree	45	54.9	55.6	71.6
	No opinion	14	17.1	17.3	88.9
	Agree	9	11.0	11.1	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021

4.5.2 The construction method of approval requesting practice from resident engineer before the work started.

According to the responses from FGBPOAA, of the total 81 participants about 17.3% respondents replied that strongly disagree about submission of work permit given for consultant engineer for approval and to procede project work , 38.3% respondents said disagree, 30.9% respondents said no opinion, 11.1% respondents said agree and the remaining 2.5% respondents replied that strongly agree. The summary of the response is presented in table 4.14.

The implication of the result about the projects worked without resident engineer approval shows that, the organization building projects quality performance was weak and the company exposed to rework and maintenance costs, due to this reason the project's completion period extended over contractual completion period, end users becomes dissatisfied and miss utilized of resources occurred in organization.

Table 4.14 Before the work started, work permitted should be submitted to Resident Engineer for approval in order to proceed the work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	14	17.1	17.3	17.3
	Disagree	31	37.8	38.3	55.6
	No opinion	25	30.5	30.9	86.4
	Agree	9	11.0	11.1	97.5
	Strongly agree	2	2.4	2.5	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

4.5.3 The practices of qualified personnel employed in building projects by the contractor and consultant side.

As per the responses obtained from FGBPOAA, of the total 81 participants about 12.3% respondents replied that strongly disagree about both consultant and contractor have qualified workers and quality control personnel in order to improve poor quality management in organization, 48.1% respondents said disagree, 25.9% respondents said no opinion, 9.9% respondents said agree and the remaining 3.7% respondents replied that strongly agree. The summary of the response is presented in table 4.15.

The implication of the result about the absence of qualified personnel in the organization shows that the company loses the required quality standard in building projects. Without competent and qualified manpower the organization can't perform its objective, because of this reason the organization exposed to extra costs for rework and maintenance works, the completion period of projects delay over contract completion period and overall poor quality performance of constructed building projects affected the organization.

Table 4.15 Both the consultant & the contractor have qualified workers & quality control Personnel.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	10	12.2	12.3	12.3
	Disagree	39	47.6	48.1	60.5
	No opinion	21	25.6	25.9	86.4
	Agree	8	9.8	9.9	96.3
	Strongly agree	3	3.7	3.7	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

4.5.4 The practices of purchasing process of construction materials are employed as per the contract requirement of quality standard.

As per the responses obtained from FGBPOAA, of the total 81 participants about 22.2% respondents replied that strongly disagree about construction materials are purchased and delivered to site based on the standard of building quality and the contract specification, 37% respondents said disagree, 21% respondents said no opinion, 12.3% respondents said agree and the remaining 7.4% respondents replied that strongly agree. The summary of the response is presented in table 4.16.

The implication of the result about construction materials were not purchased and delivered to site based on the standard of building quality and contract specification in organization shows that the organization regarding to quality of building project outputs like structural works (foundation, reinforced concretes, formworks, etc.) and finishing works (aluminum, stair, partition wall, masonry, carpentry, sanitary, electrical, air conditioning, painting works, etc. were contributed poor quality management in organization), these were affected the overall quality performance of building projects, dissatisfaction of customers, delay of completion period of projects were occurred and the company exposed to rework and maintenance costs.

Table 4.16 Construction materials are purchased and delivered to site based on the standard of building quality and contract specification.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	18	22.0	22.2	22.2
	Disagree	30	36.6	37.0	59.3
	No opinion	17	20.7	21.0	80.2
	Agree	10	12.2	12.3	92.6
	Strongly agree	6	7.3	7.4	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

%age of frequency

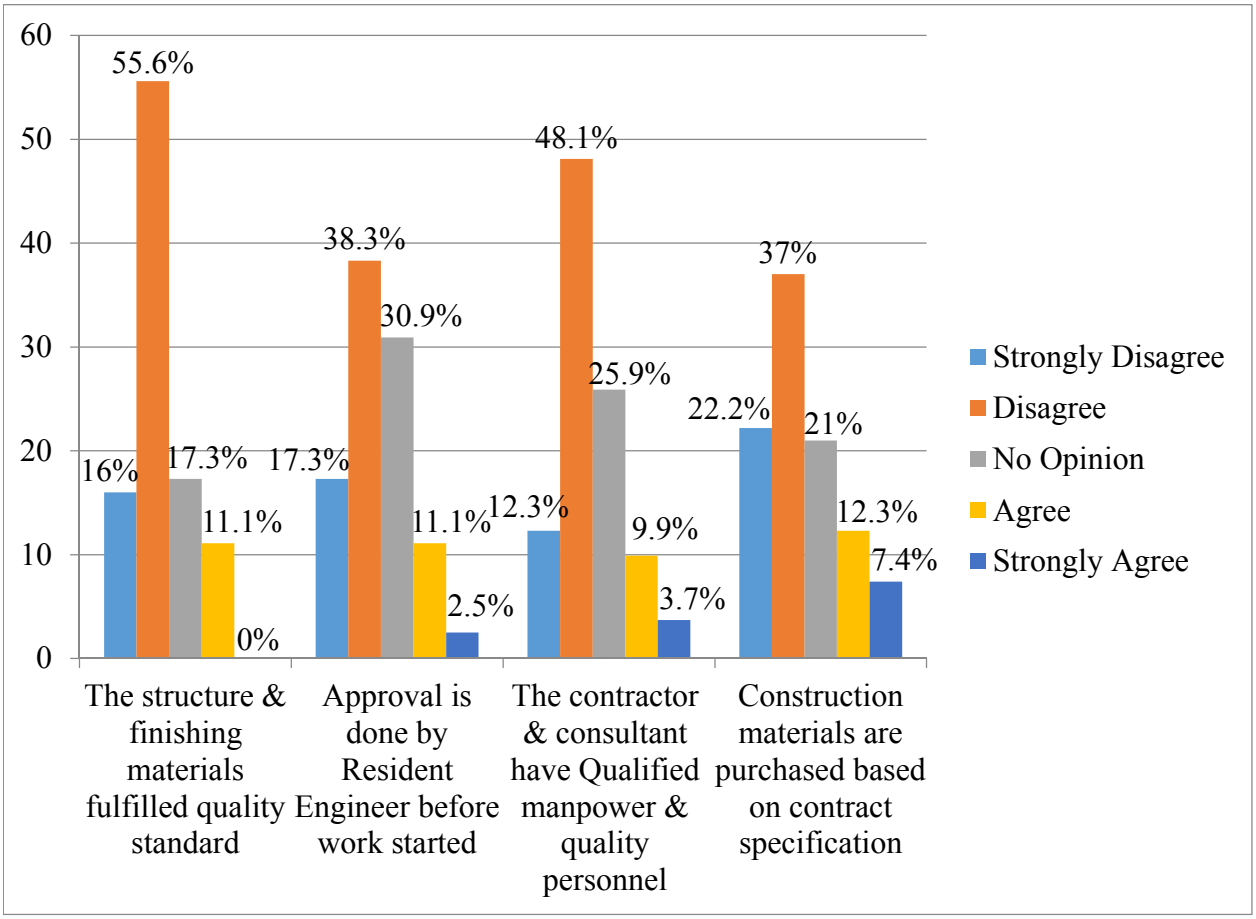

Figure 4.5 The percentage of Construction materials, Personnel and Construction methods employed in FGBPOAA contract quality requirements.

4.6 The measures taken to improve quality of building Projects in FGBPOAA.

As per the data collected from different sources, the results corresponding to the measures taken in order to improve poor practices of quality management systems are subdivided in to the following subsections which are regarded to improve building quality management systems.

4.6.1 Preventive and corrective action to improve quality management.

According to the responses obtained from FGBPOAA, of the total 81 participants about 3.7% respondents replied that no opinion about the method using preventive and corrective action to improve poor quality management system in organization, 33.3% respondents said agree and the remaining 63% respondents replied that strongly agree. The summary of the response is presented in table 4.17.

The implication of the result shows that using preventive and corrective action was acceptable in order to improve poor practices of quality management of building projects in the organization.

The company should give attention to take preventive actions before the quality problems occurred and corrective action regarding quality should be taken after the problems existed. Therefore, the company can improve its quality performance by using these preventive and corrective actions which helps to save the company from rework costs and delay of the completion period of building projects.

Table 4.17 Using Preventive and corrective action

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No opinion	3	3.7	3.7	3.7
	Agree	27	32.9	33.3	37.0
	Strongly agree	51	62.2	63.0	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

4.6.2 Improving quality management through continuous supervision and controlling system.

According to the responses from FGBPOAA, of the total 81 participants about 2.5% respondents replied that no opinion about the method using continuous supervision and controlling system to improve poor practices of quality management of organization, 37% respondents said agree and the remaining 60.5% respondents replied that strongly agree. The summary of the response is presented in table 4.18.

The implication of the result shows that the method used continues supervision and controlling system was advisable in order to improve poor quality management existed in the organization and the company can reduce rework project costs and projects can completed during the contract period of projects, the customers become satisfied, the organization can achieved good image and the overall quality of building projects can be improved.

Table 4.18 Through continuous supervision & controlling system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No opinion	2	2.4	2.5	2.5
	Agree	30	36.6	37.0	39.5
	Strongly agree	49	59.8	60.5	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey output, 2021.

4.6.3 Quality performance measurement to improve quality management.

As per the responses obtained from FGBPOAA, of the total 81 participants about 1.2% respondents replied that no opinion about the method used quality performance measurement to improve poor quality management practices in the organization, 39.5% respondents said agree and the remaining 59.3% respondents replied that strongly agree. The summary of the response is presented in table 4.19.

The implication of the result shows that using quality performance measurement used as a method to improve poor quality management practices existed in organization. The company can

also improve its quality performance by giving recognition & rewarding for the parties to perform successfully for quality of building projects and termination /punishment given for weak quality performed parties. In addition the company can reduce rework project costs, the projects can completed within contract agreement of completion period and the customers satisfaction can be improved in organization.

Table 4.19 Using Quality performance measurement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No opinion	1	1.2	1.2	1.2
	Agree	32	39.0	39.5	40.7
	Strongly agree	48	58.5	59.3	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

4.6.4 Quality management training to improve quality management.

According to the responses obtained from FGBPOAA, of the total 81 participants about 13.6% respondents replied that no opinion the method used training about to improve poor quality management practices in organization, 39.5% respondents said agree and the remaining 46.9% respondents replied strongly agree. The summary of the response is presented in table 4.20.

The implication of this result shows that the method used training helps to improve poor quality management practices existed in organization and also training has a significant role in organization, training given for all workers helps the company can reduce rework project costs, the company can complete the projects within contract agreement of completion period, it improves the customers satisfaction and the training helps to improve successfully the overall quality performance in organization.

Table 4. 20 Using quality management training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No opinion	11	13.4	13.6	13.6
	Agree	32	39.0	39.5	53.1
	Strongly agree	38	46.3	46.9	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

4.6.5 Customers feedback to improve quality management.

According to the responses obtained from FGBPOAA, of the total 81 participants about 1.2% respondents replied that disagree about customers feedback using as a method to improve poor quality management practices existed in organization, 17.3% respondents said no opinion, 42% respondents said agree and the remaining 39.5% respondents replied that strongly agree. The summary of the response is presented in table 4.21.

The implication of the result shows that to improve the quality of building projects using feedback of customers / end users /. The company can improve its poor quality performance by using customer's feedback. Hence, the company should give attention to collect the feedback from customers which helps to improve successfully the quality performance of building projects as well as the company reduces maintenance and rework project costs, the customers become satisfied, projects completion time can be as per the contractual time and training builds good image for organization.

Table 4.21 Using feedback of customers / end users /

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.2	1.2	1.2
	No opinion	14	17.1	17.3	18.5
	Agree	34	41.5	42.0	60.5
	Strongly agree	32	39.0	39.5	100.0
	Total	81	98.8	100.0	
Missing	System	1	1.2		
Total		82	100.0		

Source: Field Survey, 2021.

%age of frequency

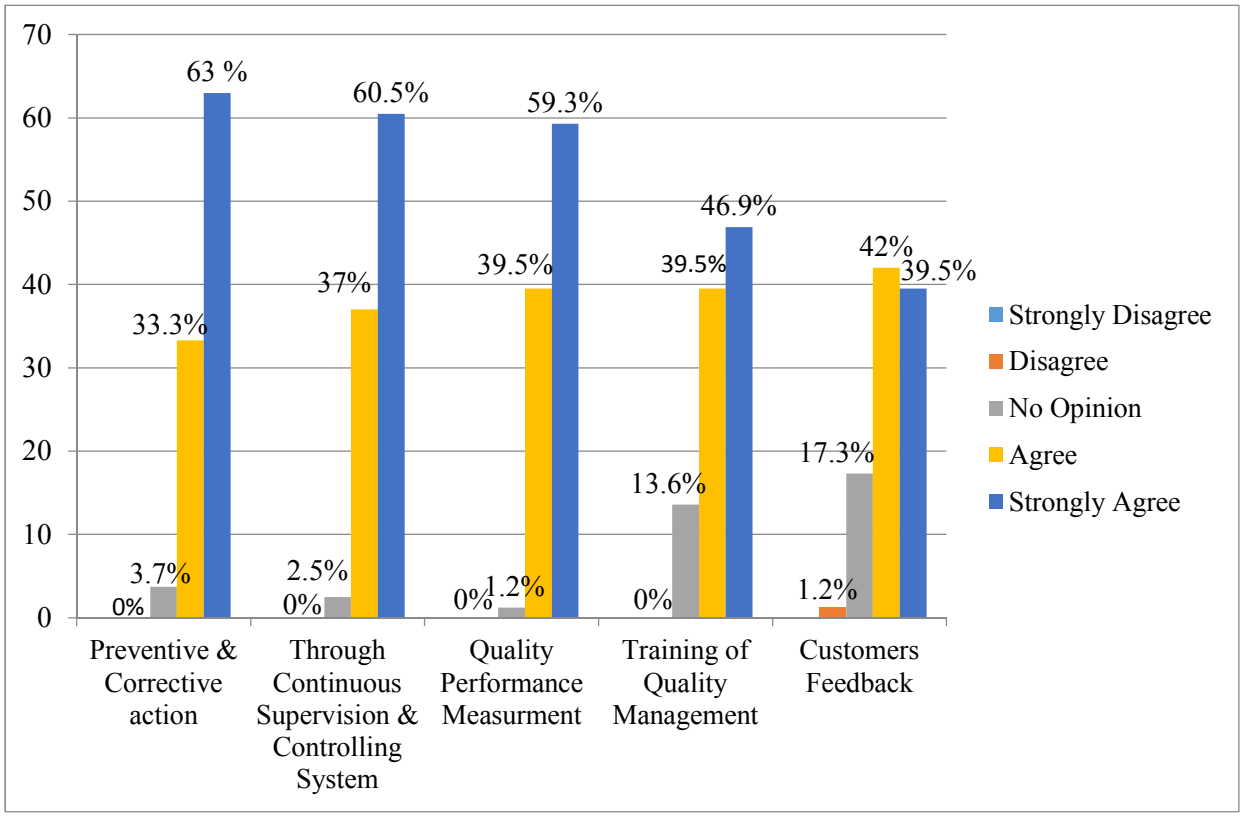

Figure 4.6 The measures taken to improve quality of building Projects by percentage in FGBPOAA.

4.7 Analysis from interview

According to the response obtained from FGBPOAA, a total of 54 interview result shows that about the presence of quality policy and quality management in organization, most of the interviewers said that there is no quality policy and quality management system in the organization but some of the interviewers argued that quality management implemented jointly in contract and project follow up department in the organization.

Most of the interviewers said their opinion about the following points, Such as quality plan did not frequently updating through construction life of the project, controlling mechanisms of construction materials quality used in building construction projects were poor and nobody was assigned as a responsible person to control the quality problem of construction materials existing in the organization, absence of proper quality performance evaluation meeting was existed between all participant parties, weak chain of command existed between participants in the organization and resistance happened by workers to accept and implement quality procedures, and most of the workers were not easily familiar with new technologies, Customers were dissatisfied by quality of building projects.

Majority of the interviewers agreed that there was poor practicing of quality management in FGBPOAA. As per interviewer responses the implication of results shows that because of the absence of quality policy and department, the company can't control properly quality in building projects. This affected the quality performance of projects and the company exposed to rework and maintenance costs, delay of completion period of projects existed, dissatisfaction happened by its customers, loss of good image and competitive advantage of the organization.

Finally, most of the interviewers said that to improve poor quality management system in the organization by using different types of improving mechanisms such as implementing preventive and corrective action, through continuous controlling and supervision, using training and customer's feedback and also by using proper quality performance evaluation. The summary of a case study of analysis from interviewer's response result is presented in excel table 4.6.1.

4.8 SUMMARY

The summary of the study according to the majority of questionnaire and interviewer's response result were quality management and quality policy were not present independently as a department, contractors and consultants were not selected legally as per their competence and experience, the practices of quality control guide manuals were not implemented, the practices of quality management training was not implemented, the organization had not clear construction and procurement program, chain of command was not respected between participant parties and workers, evaluation of quality performance was not properly implemented, the practice of construction materials employed in the projects were not fulfilled the standard of quality, the practices of qualified personnel were not employed in building projects by both, the contractor and consultant side, the practices of purchasing process of construction materials were not employed as per the contract requirement of quality standard, documentation of quality control and quality status report recording system was not Properly implemented in FGBPOAA.

As per the questionnaire and interviewer's result of the study, the causes for poor quality management practices in FGBPOAA were the participation of incompetent contractors**,** **t**he absence of formal quality management**,** the presence of delivery of expired & poor quality construction materials, lack of qualified manpower on the contractor and consultant side, Incomplete contract document and design, low rate of salary or wages of employees as per the current market price, lack of top management commitment to improve quality problems, the workers were not voluntary to implement quality procedures and they were not easily familiar with new technologies in the organization, unrealistic deadline of project completion period was made during the contract agreement of projects.

Generally, the study of the questionnaire and interviewer's response result showed that as there was poor quality management practices in Federal Government Building Project Office in Addis Ababa and to improve such problems, they recommended that using preventive and corrective action, using training, through controlling and supervision and using customers feedback.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The Federal Government Building Project Office in Addis Ababa has been constructing 21 governmental buildings for the purpose of office and 6 governmental apartment buildings completed and given for governmental users. Currently, 11 governmental buildings for office purpose and 2 governmental apartments are under construction and some of the projects are arrived to provisional acceptance. As per the study, FGBPOAA contributed significant role for the benefits of government and society. Some of the benefits were, the government used its own constructed buildings and free from office rent expense payment of 0.9 billion Br per year and the finance used to infrastructure works for city development of Addis Ababa, job opportunity has been creating for society, knowledge and technology skill transferring existed between the participant parties such as between contractors, consultants as well as government used as income generating by means of collecting tax from different involved participants during construction process in FGBPOAA.

The objective of this study was to investigate the practices of quality management systems in FGBPOAA. Accordingly, the findings of the study showed that there were poor quality management system practices in FGBPOAA.

According to the specific objectives of the study the following findings were the result of the research.

1. As per the investigation of the practices of quality management system in federal government building projects in Addis Ababa, the causes which contributed to this poor quality management system practices includes: -

- Quality management and quality policy were not present independently as a department
- Contractors and consultants were not selected legally as per their competence and experience, because of this incompetent contractors and consultants were involved in building projects.
- The practices of quality control guide manuals were not implemented.
- The practices of quality management training was not implemented.
- The organization had not clear construction and procurement program.

- Chain of command was not respected between participant parties and workers.
- Evaluation of quality performance was not properly implemented.

2. As per the identification of the causes of poor quality management in FGBPOAA includes: -

- The participation of incompetent contractors**.**
- The absence of formal quality management**.**
- The presence of delivery of expired & poor quality construction materials.
- Lack of qualified manpower on the contractor and consultant side.
- Incomplete contract document and design.
- Low rate of salary or wages of employees**.**
- Lack of top management Commitment to improve quality problems.
- The workers were not voluntary to implement quality procedures and they were not easily familiar with new technologies in the organization.
- Unrealistic deadline of project completion period was made during the contract agreement of projects.
-

3. According to the investigation of Construction materials, personnel and construction methods employed in FGBPOAA contract quality requirements includes: -

- The practice of construction materials employed in the projects were not fulfilled the standard of quality.
- The construction method of approval requesting practice from resident engineer was not done before the work started.
- The practices of qualified personnel were not employed in building projects by both, the contractor and consultant side.
- The practices of purchasing process of construction materials were not employed as per the contract requirement of quality standard.
- Documentation of quality control and quality status report recording system was not Properly implemented.

4. **As per the investigation of the measures taken to improve quality of building Projects in FGBPOAA includes using: -**

- Preventive and corrective action to improve quality management.
- Through continuous supervision and controlling system.
- Quality performance measurement to improve quality management.
- Quality management training to improve quality management.
- Customers feedback to improve quality management.

Therefore; the above mentioned problems of the study findings showed that, the problems were significantly affected the structural and finishing works of quality performance of building projects and they were the causes for presence of poor practices of quality management systems in FGBPOAA.

5.2 Recommendations

The Federal Government Buildings Project Office in Addis Ababa has been contributed significant benefits for government, for society and for all involved participants in building construction sector. Therefore, in order to continuing these benefits, it needed to study the gaps and to devise basic solutions for problems existed in organization. Accordingly, this study presented the following recommendations:

- FGBPOAA should have Quality management policy and quality management department independently.
- Contractors and consultants should be select legally based on their competence and experience.
- Qualified manpower should be assigned by concerned participant parties.
- Purchasing and delivery of building construction materials should be done as per the required quality of the standard.
- Contract documents and design should be completed and applicable for construction process.
- Realistic deadline of projects completion period should be set during contract agreement.
- Supervision regarding quality should be done regularly by qualified supervisors until completion period of the project.
- Salary and wages of employee's payment should be done as per the current market price and living standard of the country to invite and hiring the qualified manpower.
- Top management should be committed to implement quality management systems and the chain of command should be respected.
- The organization should be implementing proper quality performance evaluation.
- To summarized, FGBPOAA should be implement the methods like preventive and corrective action, training, continuous supervision and collect customer feedback in order to improve poor practices quality management systems in the organization.

Recommendation for further study

This study proposes researches to be conducted on assessment of quality management practices of roads.

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Annex I: Questionnaire

Part I. General profile

Please put a "√" mark to all your responses in the provided space beside each statement.

1. Gender

☐1.Male ☐2. Female

2. Education background

☐1.High School completed ☐2.Diploma ☐3.Bachelor degree ☐4. Master's Degree& above

3. Your Position in the Organization ☐1.PM ☐2.Constr. Eng. ☐3.Contract Eng. /Resident Eng. / ☐4.Site Eng. / Office Eng. ☐5.Other

4. Your Total Work Experience in Construction Projects:

☐1.Less than 5 years ☐2.6-10 years ☐ 3.11-15 years ☐4.16 and above

5. Name of the organization ☐1.Client ☐2.Consultant ☐3.Contractor ☐ 4 Subcontractor

6. Total Number of employees in the organization

☐1. <100 ☐ 2. 101-200 ☐ 3. 201 – 300 ☐4. 301- 400 ☐5.> 400

Part II Questionnaires

The following questionnaires cover the practices of quality management, causes of quality management, construction materials & methods & measures taken to improve the quality in FGBPOAA.

I. The Practices of Quality Management in FGBPOAA.

1. Does your organization contain the following?

Please (√) mark your opinion on the appropriate box 1=Yes 2=No 3=No opinion

No.	Description of items	1	2	3
1.1	Quality management policy & Quality management department.			
1.2	Quality management training is given for workers			
1.3	Construction and Procurement processing Schedule.			
1.4	Quality control guide check lists /manuals & specification of building construction works			
1.5	Standardized laboratory testing instruments and measuring tools			

1.6	The Contractors working in the projects are legally selected based on their experience and competence.			

II. The Cause of Quality Management.

Please, indicate your opinion for the following questionnaires by marking (√) the appropriate box on the five-point scale
where: 1=Strongly Disagree 2= Disagree 3 =No Opinion 4=Agree 5=Strongly Agree

2. The followings are the main cause of poor quality management in FGBPOAA.

No.	Description of items	1	2	3	4	5
2.1	Incomplete contract document and design					
2.2	Lack of qualified manpower on the contractor and consultant side.					
2.3	Delivery of expired & poor quality construction materials to the project					
2.4	Absence of formal quality management implementation strategies & Policies					
2.5	Lack of regular supervision & quality control report					
2.6	Participation of incompetent contractors during the construction of projects					
2.7	Unrealistic deadline of project contract completion period .					
2.8	Low rate of salary or Wages of employees.					
2.9	Absence of commitment to follow up the quality by top management.					

III. Construction Materials, Personnel and Construction Methods employed in FGBPOAA Contract quality requirements.

(√) please mark on a scale of 1= Strongly disagree, 2=Disagree, 3=No opinion, 4=Agree, 5=Strongly agree

3. Does the following Construction Materials, Personnel and Construction Methods are employed in FGBPOAA contract quality requirements?

No.	Description of items	1	2	3	4	5
3.1	Cement used in the project is fresh (<1 month from date of production)					
3.2	Reinforcement bars used for the project are brushed & free from corrosion					
3.3	Concrete ingredients are mixed as per the mix design with batching plant & cube samples are taken for compressive strength test					
3.4	The structure & finishing building construction materials used in the project are full filled the standard of quality					
3.5	Props of beams & Soffit form work for slabs and beams are striped only after 21days and also Vertical /side form works are striped only after 16 hrs					
3.6	Selected material fill & proper compaction has been done in layers of 15-20cm as per specifications to assure the specification 95% modified AASHTO dry density.					

3.7	Both the consultant & the contractor have qualified workers & quality control personnel					
3.8	Construction Materials are purchased and delivered to site based on the standard of building quality and the contract specification.					
3.9	Before the work started, the work permitted should be submitted to Resident Engineer for approval in order to proceed the work.					

IV. Measures taken to improve the quality of building projects

(√) please mark on a scale of 1= Strongly disagree, 2=Disagree, 3=No opinion, 4=Agree, 5=Strongly agree

4. How to improve the quality management in FGBPOAA?

No.	Description of variables	1	2	3	4	5
4.1	Through continuous supervision & controlling system					
4.2	Based on the quality performance measurement, by giving recognition & rewarding for the parties to perform successfully the quality of the project and termination /punishment is given for weak quality performed parties.					
4.3	Using feedback of customers / end users /					
4.4	Using preventive action and corrective action					
4.5	By giving quality management training for workers					

Annex II: Questions for interview

1. Can you tell me about your education, experience and position in the organization?
2. Is there quality policy and quality management department in FGBPOAA?
3. Do you have frequently updating the quality plan during the life of a contract in your organization?
4. How do you control the quality of material and work activities? Who is responsible?
5. Is there quality status & quality control report records in the organization?
6. What are the challenges to implement quality management in FGBPOAA?
7. Is there a meeting to evaluate the performance of quality management in FGBPOAA?
8. How do you express the chain of command in your organization?
9. Did the workers are accept to implement the quality management system in the organization?
10. How the workers are to accept and implement new technologies related to quality in FGBPOAA?
11. How the organization is evaluate the customers satisfaction related to quality?
12. How is the current status of quality management in your organization?

Annex IV: SPSS Version 25 Variables analysis & results

1. **The reliability test of overall variables results of quality management system in FGBPOAA.**

Reliability Statistics

Cronbach's Alpha	N of Items
.754	29

2. **The practices of quality management system in FGBPOAA.**

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.841	.848	6

3. **The causes of quality management in FGBPOAA.**

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.834	.827	9

4. **Construction materials, personnel and construction methods employed in FGBPOAA contract quality requirements.**

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.804	.809	9

5. The measures taken to improve the quality of building projects in FGBPOAA.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.862	.870	5