AN ASSESSMENT OF FACTORS AFFECTING QUALITY PERFORMANCE OF GOVERNMENT FINANCED CONSTRUCTION PROJECTS: A CASE OF MOROGORO MUNICIPALITY AT MORUWASA:

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER IN PROJECT MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA

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CERTIFICATION

I, the undersigned certify that I have read and hereby applies for the acceptance of the dissertation titled; "**An assessment of critical factors affecting quality performance of government financed construction projects: a case of** Morogoro municipality at MORUWASA***"*** by **George Zakaria Masuha** that was done under my supervision and guidance for submission to Open University of Tanzania for the award of the Masters of Project Management degree.

Signature……………………………………………..

Dr. Gwahula Raphael

(Supervisor)

Date……………………………………………….

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DECLARATION

I, **George Zakaria Masuha**, do hereby declare that this dissertation is entirely my own work and it has not been presented to any other Institute of higher learning for a similar or other academic award. In addition, all the sources that I have used or quoted have been indicated and acknowledged my means of complete references"

Signature…………………………………………………….

George Zakaria Masuha

(Student)

Date………………………………………………………….

DEDICATION

This dissertation is dedicated to my wife Paulina Boniface Kinallo who at this age allowed me to pursue some additional studies in the field of Project Management. I believe she fulfilled her responsibility as a wife by allowing a husband to spend some of the nights away from home for the purpose of attaining such new undertakings in the field of project management. Likewise to my children Jackson Masuha, Joshua Masuha and Jerry Masuha for being the witness that education has no limit and can be pursued at any time and at any age. The decision to take up this course shall remain as an inspiration for them.

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I take this opportunity, with pleasure, to adopt the good tradition of recognizing all those who in one way or another contributed to make my studies a success story. I greatly value the intellectual guidance, thought provoking and invaluable comments, patience and constructive criticisms I got from Dr. Gwahula Raphael Really I am highly indebted to him for his assistance.

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Lastly but not least my special thanks goes to my family under the leadership of my +dear wife Paulina Boniface Kinallo and our children Jackson Masuha, Joshua Masuha and Jerry Masuha for their understanding and encouragement during my studies.

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ABBREVIATIONS

ANOVA	Analysis of variance data
MORUWASA	Morogoro Urban Water Supply and Sanitation Authority
TQM)	Total Quality Management
VIF	Variance Inflation Factor
UK	United Kingdom
URT	United Republic of Tanzania
UNDAP	The United Nations Development Assistance Plan
SPSS	Statistical Package for Social Sciences

ABSTRACT

The objective of the study was "An assessment of critical factors affecting quality performance of government financed construction projects: a case of Morogoro Municipality". Justification of the study was based on the fact that construction projects spend large amount of government funds that can only be justified by delivering the project in time, at a given budget and at specified quality standard.

Descriptive as well as multiple linear regression methods were used in the study involving a sample of 80 respondents dealing with construction related works. Data analysis was done using Statistical Package for Social Sciences (SPSS) 20.

The findings revealed that the critical quality performance that have direct impact on quality performance of construction projects hence it can be seen that there exist relatively small significant correlations between independent variables (various critical performance factors) and the dependent variable (project quality performance). The correlations are significant at0.01 and 0.05 confidence levels on a two tailed Kendall's tau correlation test.The finding also revealed challenges faced by contractors that deter quality performance of construction projects in Morogoro Municipality.

The study recommends that these six critical factors and the contractor's challenges need to be well thought-out at planning stage of projects, hence ensuring quality performance of the government financed construction projects.

CHAPTER ONE

INTRODUCTION

1.0 Chapter Overview

This chapter focused on the background to the study, statement of the problem, study objectives, research questions to be addressed in the study, justification for carrying out the study and the scope to be considered while undertaking the study.

1.2 Background to the research problem

A number of government financed construction projects have failed to successfully achieve quality performance as provided in the project technical specifications. Many projects had been closed either without achieving the quality requirements or completed with variations to the original quality requirements (URT, 2010). The factors affecting quality performance of government financed construction projects in Tanzania had not been adequately investigated. The general observation had been due to lack of qualified technical personnel for design and supervision of works, lack of competent, experienced and qualified contractors, and lack of appropriate equipment and availability of adequate funds. This paper presents an assessment of critical quality performance factors that if not adequately considered can lead to relatively unacceptable quality performance of projects, and in particular a case of Tanzania.

Project quality performance or as widely viewed by many scholar as project success had been extensively studied by many researchers and came up with different definition or meaning of project success. Traditionally (PMI Book Guide, 2004), the success of projects has been measured through timely delivery, on cost and quality parameters.

Further to the above, Chan, (2004); showed that many researchers filtered the factors affecting project success but fail to reach a general agreement on common factors concerning all projects. Rose, (2005) in his book titled "*Project Quality Management*" overemphasized the importance of customer satisfaction for the survival of the project. The message portrayed was that successes of projects strongly need involvement of stakeholders, (client, customers or end users as well as the project team members). Having noted this ambiguity in defining project success, Prabhakar (2008), generalized that the only agreement is the disagreement on the issue "what is project success".

Abdullah *et al,* (2010), in their paper titled *"Literature Mapping: A Bird Eye View on the Classification of Factors Influencing the Project Success*" made an extensive review of the current state of the art on the widely accepted definitions and on the factors that affect project success. The team noted that different projects will display different factors of success as projects differ in terms of technology, size, complexity, risks and other variables. The researchers came with a conclusion that there is no agreed definition for the project success. Hence it can be argued that important thing is one need to be aware of the project requirements and expectations. These requirements should be clearly defined at the conceptual and planning stage of the project.

Despite the large variability in the project success factors, efforts had been made to develop predictive models (Khosravi & Afshari, 2011; Gwaya *et al.,* 2014), that if only critical factors are considered there could be a specific model that can were used to predict if the project would be or had been successful. Application of such models however has not been widely accepted as the so called critical success factors do keep on changing for different projects. Therefore in view of the above this study is put forward to have an opportunity of determining specific and critical success factors affecting quality performance of construction projects being executed in Tanzania.

1.2.2 Morogoro Urban Water Supply and Sanitation Authority

Morogoro Urban Water Supply and Sanitation AUTHORITY (MORUWASA) Is an entity charged with the overall operation and management of water supply and sanitation services which is responsible for supplying of clean, safe water as well as provision of wastewater disposal services for Morogoro Municipality. The general policies and guidelines to run Authority are provided by the Ministry of Water. MORUWASA was established under the auspices of the Water Works Ordinance Cap. 281 as amended in February 1997. It was declared a fully autonomous entity by order of the Minister responsible for Water Affairs in January 1998,MORUWASA is dealing with the following technical area Non Revenue Water**,** Operation and Maintenance**,** Sanitation**,** Service to the Poor**,** WASH Promotion**,** Water Demand Management**,** Water Safety Plan and Water Supply**.**

Mission

To provide enough, clean and safe water to the Morogoro Municipal area and to avail environmentally and hygienically acceptable high quality sewerage service in the municipality. Water supply in Tanzania accounted for USD 240m or 0.5% of its GDP in 2014, compared to USD 150m or 0.7% of its GDP in 2009, representing an increase of 68% over the 5-year period (URT 2015).

Despite positive economic progress in Tanzania over the last decade, access to safe water and sanitation facilities remains sorely inadequate. Many applications to TDT involve water in some form, and a high proportion of grants awarded. The United Nations Development Assistance Plan 2016-2021 (UNDAP II), published in 2016, reported:*"a high proportion of the Population of Tanzania face serious challenges as a result of poor access to a safe domestic water supply and adequate sanitation services. This leads to a high prevalence of preventable diseases which contribute to poor health, loss of productivity and intensification of poverty."*

Therefore it is from the discussions and observations noted above, this research study brought through so as to have an opportunity of undertaking a more detailed investigation on the quality performance issues related to government financed construction projects in Morogoro Municipality.

1.3 Statement of the research problem

A number of government financed construction projects has failed to successfully achieve quality performance as provided in the project specifications. Many projects had been closed either without achieving the quality requirement or completed with variations in the original quality requirements; URT (2010). The factors affecting quality performance of government financed construction projects in Morogoro municipal had not been investigated before and are not clearly spelt out. The general observation has been due to lack of qualified technical personnel for design and supervision of works, lack of competent, experienced and qualified contractors, appropriate equipment ,availability of adequate funds, poor service delivery, poor quality of the materials used for project construction, Availability of construction materials Project financing processes, Procurement system and processes, Supervision team skills and knowledge, Environment protection, Variation in climate conditions and Local community involvement. Good example of project which have not achieved the quality requirement(goals) are as followed Zombo village water supply project in Kilosa district, Dumila village water supply in Kilosa district and Doma village water project in Mvomero district both in Morogoro municipal (MORUWASA REPORT 2019) . In view of these assumed factors this research is initiated to review critically the main factors that led to relatively unacceptable quality performance and in particular a case of Morogoro municipality at MORUWASA.

1.4 Research objectives

1.4.1 General Objective

This study intended to assess the factors affecting quality performance of government financed construction projects: a Case of Morogoro municipality at MORUWASA .

1.4.2 Specific Objectives

- Identify factors that hinder quality performance of government financed construction project in Morogoro municipality at MORUWASA.
- Identify key issues that seem important in quality assurance of Government financed construction projects in Morogoro municipality at MORUWASA .

- Explore set of challenges faced by contractors that deter quality performance of construction projects in Morogoro municipality at MORUWASA context.
- Examine the relationship between quality performance and the factors that affects performance of government financed construction project in Morogoro municipality at MORUWASA.

1.5 Research Questions

This study is formulated in order to provide response to the following questions derived through the proposed research objectives;

- What are the critical factors that hinder quality performance of government financed project in Morogoro municipality at MORUWASA ?
- What are the key issues that deem to be important in quality assurance of Government financed construction projects in Morogoro municipality at MORUWASA ?
- What are the challenges faced by contractors that deter quality performance of projects in Morogoro municipality at MORUWASA context?
- What is the relationship between quality performance and the critical factors which affect quality performance of government financed construction project in Morogoro municipality at MORUWASA context?

1.6 Justification/Rationale/Significance

Construction projects in Tanzania expend a relatively large amount of government funds. Such huge expenditure is justified by delivering the project objectives in time, at a given budget and at specified quality standard. Hence this study is expected first to present a tool to decision and policy makers in the government on understanding and identifying the real cause of the factors that leads to the failure to achieve the quality performance of construction projects and particular in Morogoro municipality at MORUWASA. Secondly the study will contribute to the body of knowledge on the critical factors that affect performance of construction projects. Thirdly the study is significant as it forms part of the requirements for attaining a Master Degree in Project Management. Hence it will impart the author of this research with adequate knowledge and experiences in project management.

1.7 Scope of the study

The study scope was that, the area of study was small limited to Morogoro Municipal only. The target group of Engineers, Contractors and Employers who are expected to participate in the study were adequately represent other stakeholders in the Municipal as well as nearby regions that faced similar situations in relation to performance of government financed projects. Indeed the selected target group would cooperate and willingly respond to questionnaires to be raised.

1.8 Limitation and delimitation

Some respondents may voluntarily refuse to respond to some questions fearing that management may victimize them. However this intended to be minimized by the researcher via cultivating and instilling a sense of trust in the minds of respondents and assuring them confidentiality.

Difficulty in accessing the respondents due to their busy schedules; however the researcher intended to use multiple skills like call backs, re arranging appointments and extensive mappings.

The questionnaire return rate was relatively low compared to the number administered. However, the researcher administered questionnaires to a large number of respondents to cater for situation where the return rate might be low.

Information asymmetry whereby most of the respondent's interview could not give satisfactory and reliable information relating to the topic under investigation, however, the researcher made use of triangulation and relevant journals articles and the library search for relevant information to enrich the literature.

1.9 Organisation of the study

This study consists of five chapters. Chapter one provides an overall introduction of the study. It comprises of the background of the study, statement of the problem, research objectives and questions, significance of the study and the limitations of the study. Chapter two presents the literature review, with sub-topics containing the introduction, review of relevant literature material forming the theoretical framework; empirical studies on the topic and the conceptual framework for the proposed study.

Chapter three covers the research methodology. It consists of the research philosophy and approaches, target population, sample size and sampling procedure, variables and measurement procedures, data collection procedure, procedures for data processing and analysis. Chapter four provides discussion of the findings in reference to the previous studies on the subject. Finally the research conclusions and recommendations will be presented in chapter five of the study report. The study report will also be appended the list of references, some of the analysis data and the sample of questionnaire used in the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

Chapter two provides detailed discussions on the state of the art in regard to the problem identified and to be investigated. This chapter starts with providing the conceptual definition in regard to project success performance. The chapter also explores the bulk of previous effort and researches done in reference to the problem of study. In the end the available models for prediction of project success performance are discussed.

2.2 Conceptual definitions

2.2.1 A Project

A project is a temporary endeavor undertaken to create a unique product, service, or result,(PMBOK).Projects have limited time, defined deliverables and have not been done before. A project is performed by people, constrained by limited resources, planned, executed and controlled. A project is an endeavor to accomplish a specific objective through a unique set of interrelated tasks and the effective utilization of resources.

2.2.2 Quality

Hoyle (2006);defined the word quality as a degree of excellence, conformance with requirements and the totality of characteristics of equity that bear on its ability to satisfy stated or implied needs. The ISO 9000:2000 defines quality as “the degree to which a set of inherent characteristics fulfills requirements.”

2.2.3 Performance

Performance can be explained as a series of planned, coordinated and controlled activities that can led to success or failure of an endeavor. Performance measures success or failure to achieve specific goals or objectives at a limited scope, time and budget. Deliverables are the key indicators of performance. Satisfactory and quality deliverables implies successful performance while unsatisfactory deliverables signifies poor performance. Ashworth (2004) relates performance to five attributes: appearance; quality; function; durability and maintenance.

2.2.4 Success

Success refers to an ability to accomplish a defined goal at the desired standard or quality. The Dictionary.com cited on Google defines success as a the favorable or prosperous termination of attempts or endeavors; the accomplishment of one's goals, the attainment of wealth, position, honors, or the like or a performance or achievement that is marked by success, as by the attainment of honors: Success is an opposite of failure.

2.2.5 Quality Performance

Quality performance is the tool for measuring the project or organization success. The Business directory cited on Google defines quality performance as a numerical measurement of the performance of an organization, division, or process. Quality performance can be accessed through measurements of physical products, statistical sampling of the output of processes, or through surveys of purchasers of goods or services. The Dictionary of Construction (2013); however defines quality performance as a management tool providing data for the quantitative analysis of certain quality-related aspects of projects by systematically collecting and classifying costs of quality.

2.2.6 Project Success criteria

Ikaa*et al,* 2013 showed that project success criteria are the characteristics or principles that are used to assess the success of the project. The success criteria can be meeting objectives, benefits to the customers, commercial potentials and future potentials..The common ones are project mission, financial arrangements, top management support, monitoring, design, experience of project managers and project team, training etc.

2.2.7 Critical success factors

Are conditions, facts or circumstances that bring about project success, Critical success factors are numerous depending on the nature of the project

2.2.8 Construction

Is the clearing, dredging, excavating, and grading of land and all other activities associated with putting up of buildings, structures or other types of real property such as bridges and dams or roads.

2.2.9 Contractor

Assembles and allocates the resources of labor, equipment and materials to the project in order to achieve completion at maximum efficiency in terms of time, quality and cost.

2.3 Theoretical literature review on Quality Performance of Projects

Referring to the definitions provided under section 2.2 above, a project is a temporary endeavor undertaken to create a unique product, service, or result. Earlier projects were mainly for creation of products for human consumption. Theories on the success performance were developed in trying to improve the quality of products produced. With increase in demand, skills and knowledge, Theories shifted from improving the product to improving the production processes for product or service.

2.3.1 The Dark Age theorem with Quality of Products or Services

The success performance or the need for quality products started in the 1700's (Rose, 2005.) where the craftsmen individually produced items for use by others. The craftsmen were responsible for the item from the start to the finish of the product. The performance responsibility ranged from the design of items, develop techniques and tools, sell the items to others and receive suggestion or complaints from the customers. Under such situation items kept on changing from one to the next one. Craftsmen developed more skills through repetition of similar activities and improve their products to the needs of their customers. Therefore assessment on success performance of particular item was based on improvement of craftsmen's skills through either watching others or gaining experience by repetition of crafting similar products or services. Increase in demand of products led to craftsmen to unite and work together and thereafter there was evolution of industries.

2.3.2 Scientific Management Theorem on Quality of Products

Industrial evolution led to increased products that were characterised with lot of variations. Fredrick Taylor in his book of *"Principles of Scientific Management" 1919,* noted these variations or deviations from the perfect products. To improve performance Taylor postulated that it was the responsibility of the management to determine the method / process for undertaking a particular work. Workers were only required to follow the method. The Taylor's theorem of scientific management changed the success performance focus from the workers (craftsmen) to the process. The theorem separated planning to execution of the work. The management was responsible for planning and workers became responsible to execute the planned work. Taylors'theorem involved: one way of doing something, one standard worker, no variation in performance and no communication between workers and management.

In accordance to the other management scholars; Gaurav Akrani (2011), Taylor's theorem ignored the issue of motivation to workers, as it considered only that workers will be motivated by money. The theorem assumed that highly paid worker will perform precisely in accordance to the prescribed procedure by management. Indeed the theorem assumed that once the procedure is pre-described all workers will follow it and there will be no imperfections or deviations on products, and hence success performance. The quality performance of products or project under Taylor's theorem was primarily based on the quality of process planning, quality of instructions issued to workers, skills and experience of workers and commitment of the workers.

2.3.3 Theory of Variation to Control Quality of Products.

Walter Shewhart in 1918 noted that, any repeatable manufacturing processes always are associated with variations in the product produced. If one does something the same way over and over the results will be similar but there must be some variations. The variations have a certain degree of being predictable. The main focus is to control these variations. Hence Shewhart (1931) introduced a "plan - do – check – act" as a means of controlling variations and improve quality performance. In response to Taylor's theorem; Shewhart considered that even if the process is planned and specified, repetitive work by workers ends with products having deviations or variations. At a large scale such variations led to wastage of time and raw materials. Hence a “plan – do – check – act” theorem was introduced to control variations.

2.3.4 Contemporary Quality Theorem

Further studies in Japan on the need of improving quality performance led to changes from the need for conformance to specifications to the “fit for customer use” (Rose, 2005). The quality performance equation was re-defined to include the customer need. The process involved establishment of quality circles at work. The Quality circles were groups of workers in small number (about 6 - 8) working in the same department who meet regularly to discuss their quality issues and how to improve. The Contemporary Quality theorem focuses mainly on customer requirements. The most important was not what you or how you do it but rather who wants it. Therefore success performance was based on attaining customer needs.

The contemporary quality theorem differs from that presented by Taylor and Shewhart due the fact that involvement of workers in improvement of quality became more important. Contemporary quality focuses on understanding of customer requirements. Customer’s requirement establishes the performance goal and is one of the measures for success performance.

2.3.5 The Square Route Theorem

The Square route theorem is an extension of the contemporary theorem whereby Atkinson, (1999), a UK based researcher made further review and come up with the conclusion that performance success factors could be categorised into two stages of delivery and post delivery. The delivery stage was identified as iron triangle while the post delivery stage included the information system, benefits to the organisation and benefits to the stakeholders. The iron triangle comprised of the traditional factors of time, cost and quality. The success factors were presented in a “square route form” for easy understanding. The square route pictorial presentation as designed by Atkinson is reproduced hereunder as figure one for better understanding of the theorem.

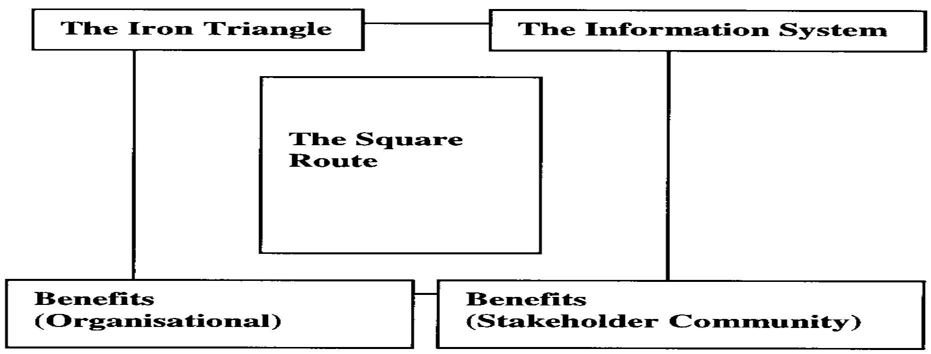


Figure 2.1: Pictorial Presentation of the Square Route theorem.

The four elements of the square route theorem were broken down to show the contents. The Iron triangle consists of time, cost and quality. The information system comprised of maintainability, reliability, validity and the information quality use. The contents of the Benefits of the organisation include; improved efficiency, improved effectiveness, increased profit and strategic goals, organizational-learning and reduced waste. Finally the Benefits to the stakeholder / community contains; satisfied users, social and environmental impact, personal development, professional learning, contractors profit, capital suppliers, content project team, and economic impact to the surrounding community.

The theoretical review as discussed above, have noted the past efforts and approaches to enhance project success performance. The efforts were improvement of individual skills under the dark age through the use of standardized procedures and involvement of end user or stakeholder to determine quality and hence success performance. The square route presentation includes the most and basic elements of project success performance. The project that could adequately address the factors considered under the square route replication significantly could be assessed as a successful project.

2.4 Empirical literature review

Project quality performance or as widely viewed by many scholar as project success had been extensively studied by many researchers who came up with different definition of project success. Project Management Institute Guide Book (2004), argues that the success of projects had been measured through timely delivery, on cost and targeted quality parameters.

The quality performance has developed from the Dark Age period (Rose, 2005), where the craftsmen were responsible for the quality of item. The craftsmen were responsible for design, tools, sales and customers feedback. Quality performance of items depended on craftsmen's skills which kept on improving through repetition of crafting similar products. Taylor (1919), following increased demand of products noted deviations from the perfect products. To improve performance, (he/she?) theorized that it was the responsibility of the management to determine the process for crafting particular item. Craftsmen were only required to follow the methods. The success performance shifted focus from the craftsmen to the process. The Contemporary theories of quality performances focus on understanding of customer requirements (Atkinson, 1999; Rose, 2005). Customer's requirement establishes the performance goal and is one of the measures for quality performance.

Kerzner (1998), noted that the project success in the 1960s was basically measured on technical terms by showing if the product worked or not. In the 1980s' the project success became meeting the three objectives of timely completion, at targeted budget, and at a designed level of quality. The Total Quality Management (TQM) however establishes that the project is considered to be success not only by focusing on the measured time, cost and targeted technical specifications but also by customer acceptance. The three traditional project success performance measures of time, cost and quality are not independent. Other scholars (Chan, 2004; Prabhakar, 2008; Abdullah et al., 2010) have noted that the three traditional project performance measures depend on several other factors such as the nature of the project, location, size, technology, contract type, risks involved, project team, client, contractor etc.

Enshanssi et al., 2009; Abdullah et al., 2010), have come to the conclusion that each project have specific needs and hence specific success performance factors. Project success performance could be adequately related to achieving goals and objectives in time and at specified costs as well meeting or exceeding the customers/stakeholders' requirements or expectations.

despite the large variability in the project success factors, efforts had been made to develop predictive models (Khosravi & Afshari, 2011; Gwaya et al., 2014), that if only critical factors are considered there could be a specific model that can be used to predict if the project will be or had been successful. Application of such models however has not been widely accepted as the so called critical success factors do keep on changing for different projects. Therefore in view of the above this study was put forward to have an opportunity of determining specific and critical success factors affecting quality performance of construction projects being executed in Tanzania

Shenhar, et al, (1997), expounded the concept of traditional factors of performance to include other factors affecting the performance of projects and came up with the classification of the performance factors being; i) project success definition, ii) critical success factors, iii) measurement or dimension project success factors, iv) type of industry, v) location or country of research, vi) specific level of organisation and the project life cycle. The classification however could not clearly spell out issues of customers or stakeholders satisfaction that are considered to be very import elements in project success.

Sadeh et al, (2000), noted that the projects are rated to be successful if they come close on, in or near the budget, schedule and acceptable level of performance. The other factors need to be considered are the contract type and technological uncertainty dimensions. Contract type can be fixed price contract or cost plus contracts. In the fixed price contract the contractor is responsible to deliver the contract at agreed specifications regardless of the actual cost. The cost plus contract both the contractor and the employer tend to share the risks. The contractor is responsible in delivering the end product at an agreed performance standard while the employer is responsible for providing funds to achieve the agreed target. Tubing and Abeti, (1990), noted that fixed price contracts yield better cost performance in comparison to the cost plus contract. Performance based on the contract type focuses only on the cost variable. It does not consider other variables for contract / project success.

The other factor considered by Sadel et al, (2000), was the technological uncertainty dimension. Success performance of the project could depend on the level of technology involved during its execution. The project could be of Low Technology, Medium Technology, High Technology and the Super High Technology. Construction and road building projects fall in a group of low technology. The level of technology involvement determines the risks contained the project and hence its success.

Takim et al (2002), conducted a study to determine critical project performance indicators in Malaysia. The study identified the difference between the performance measurements, performance measures and performance indicators. Performance measurement refers to collection and evaluation of information about inputs, efficiency and effectiveness of the construction project activities. Performance measurements are used to judge project performance both in terms of financial and non-financial aspects. Performance measurement can be applied to both product and service quality as well as to quality management, customer satisfactions and expectations.

A performance measure implies specified measurable evidence that precisely measures and proves that planned effort has achieved the desired result. Where the performance measures cannot be precisely measured it is known as the performance indicator.

To determine the performance measurement of construction projects in Malaysia, Takim et al (2002) prepared and distributed questionnaire to government client, private client, consultants and contractors. Structured questionnaire consisting of 28 performance measurement indicators were issued to participants and required to rank them on a 5 point Likert scale ranging from; not critical (1), somewhat critical (2), critical (3), very critical (4) and extremely critical (5). The highly ranked performance measurement indicators were determined by use of the of the Statistical Package for Social Sciences (SPSS), whereby it was concluded that there are very critical and critical performance measurement indicators. The study identified eight (8) very critical performance measurement indicators which included; client satisfaction on product or service, profitability, development of clear and concise project brief, project feasibility and viability, users' satisfaction on product, procurement and delivery strategy, project quality, and cost growth/overrun.

The remaining 20 factors were concluded to be as 'critical' with the mean scores in the range of 3.24 to 3.97 which was higher than the mid-point score of 2.5. According to Cheung and Yeung, (1998), any score above the midpoint of the Likert scale is considered to be important. Hence all performance measurement factors considered in the Malaysian study were perceived to be important and essential to the project stakeholders.

The Malaysian construction industry could not consider time for project delivery as very critical. The highly ranked factor was the stakeholder's involvement (client, customer, shareholder, community and the project team) and satisfaction.

The project cost performance, (8^{th} ranked factor) included: project manager's competence, top management support, project manager's coordination and leadership skills, monitoring and feedback by the participants, decision- making, coordination among project participants, owners' competence, social condition, economic condition, and climatic condition. Coordination among project participants, however, was identified as the most significant of all the factors, having maximum influence on cost performance.

Dissanayaka and Kumaraswamy (1999) found that project time and cost performances get influenced by project characteristics, procurement system, project team performance, client representation's characteristics, contractor characteristics, design team characteristics, and external conditions. Love et al. (2005) examined project time-cost performance relationship; the results indicated that cost is a poor predictor of time performance.

Enshanssi et al, (2009), apart from the three traditional factors considered other performance indicators could be client satisfaction, client changes, business performance, health and safety. The performance dimensions may have one or more indicators. The indicators could be influenced by various project characteristics.

Table 2.1: Summary of Literature Review

S/N	Identified critical success factors	Country	Analysis Model/tool	Findings	Authors
1	Stakeholders involvement (Client, customer, shareholders, community& project team)	Malaysia	Statistical Package for Social Sciences (SPSS)	Success of projects depends mostly on involvement stakeholders	Takim et al 2002
2	Delays in procurement of materials	Gaza Strip	Relative Importance Index method and Kendall's coefficient of concordance	Project success depend on availability of materials	Enshassi, A., Mohamed, S. and Abushaban, S. (2009).
3	Time performance	Singapore	Statistical Package for Social Sciences (SPSS)	Success project was that completed in the planned time	Khosravi, S. and Afshari, H.(2011).
4	The four COMs variables (Comfort, Competent, Communications and Commitment)	South Africa	Statistical Package for Social Sciences (SPSS) and Mann-Whiteny analysis	Project Success depended on the four COMs	Garbharran, H., Govender, J. and Msani, T. (2012).
5	Technical capacity of stakeholders at district level	Tanzania	Statistical Package for Social Sciences (SPSS)	Project Success depended on the technical knowledge of participants	Mahona 2008

In summary, according to the previous studies one could consider success performance criteria to fall in three categories depending on the stage of the project. The success criteria may be applicable at conception or planning phase of the project, during execution and at delivering the project. The table below presents the proposed suitability use for each of project success performance indicators at various phases of the project.

Table 2.2: Project Performance Indicators at Each of the Four Main Project Phases

Project Phases	**Project success Criteria**
Conception or planning	Project definition, design team, procurement process, contract type, comprehensive contract documentation, coordination among participants,
Execution	Leadership skills, Project team, manager's competence, management support, decision making, health, safety and environmental factors, type of project, location, technological involvement, technical capacity to stakeholders, government funding, political support or interference, contractor, clear objectives, supplier, external conditions, monitoring and feedback, productivity, people, innovations, resources availability, shared project vision, frequent project meetings,
Delivering	Time, cost, budget, stakeholder (customer, end users, client, team members, shareholders etc) satisfaction, community involvement and handing over,
Post delivery	The information system (maintainability, reliability, validity, information quality use), Benefits to the organization (improved efficiency, improved effectiveness, increased profit, strategic goals, organizational-learning and reduced waste), Benefits to the stakeholder /community (satisfied users, social and environmental impact, personal development, professional learning, contractor's profit, capital suppliers, content project team, economic impact to the surrounding community).

From the table above there about 54 success performance factors that needs to be considered. Obviously the list of the performance indicators is endless.

2.5 Research gap

Having gone through the literature review as discussed above, assessment of quality performance of government financed construction projects remains to be phenomenon that requires additional investigation. It is imperatively difficult to pick any of 54 performance indicators as summarized above and use them with confidence to determine performance of a particular project in a particular location. Therefore in view of the above, this study is being put forward to have an opportunity and determine specific and critical success factors affecting quality performance of construction projects being executed in Morogoro Municipal.

2.6 Conceptual framework

The literature review above reveals that there is a general agreement that project success is mainly determined through time delivery, acceptable (projected) cost and at the specified (pre-determined) quality level. These three traditional factors however are not independent. A large number of other sub project success factors that affect achievement of the three traditional factors exist. The conceptual framework hereunder shows the independent success factors that have effects on the three traditional factors that in turn affect project performance.

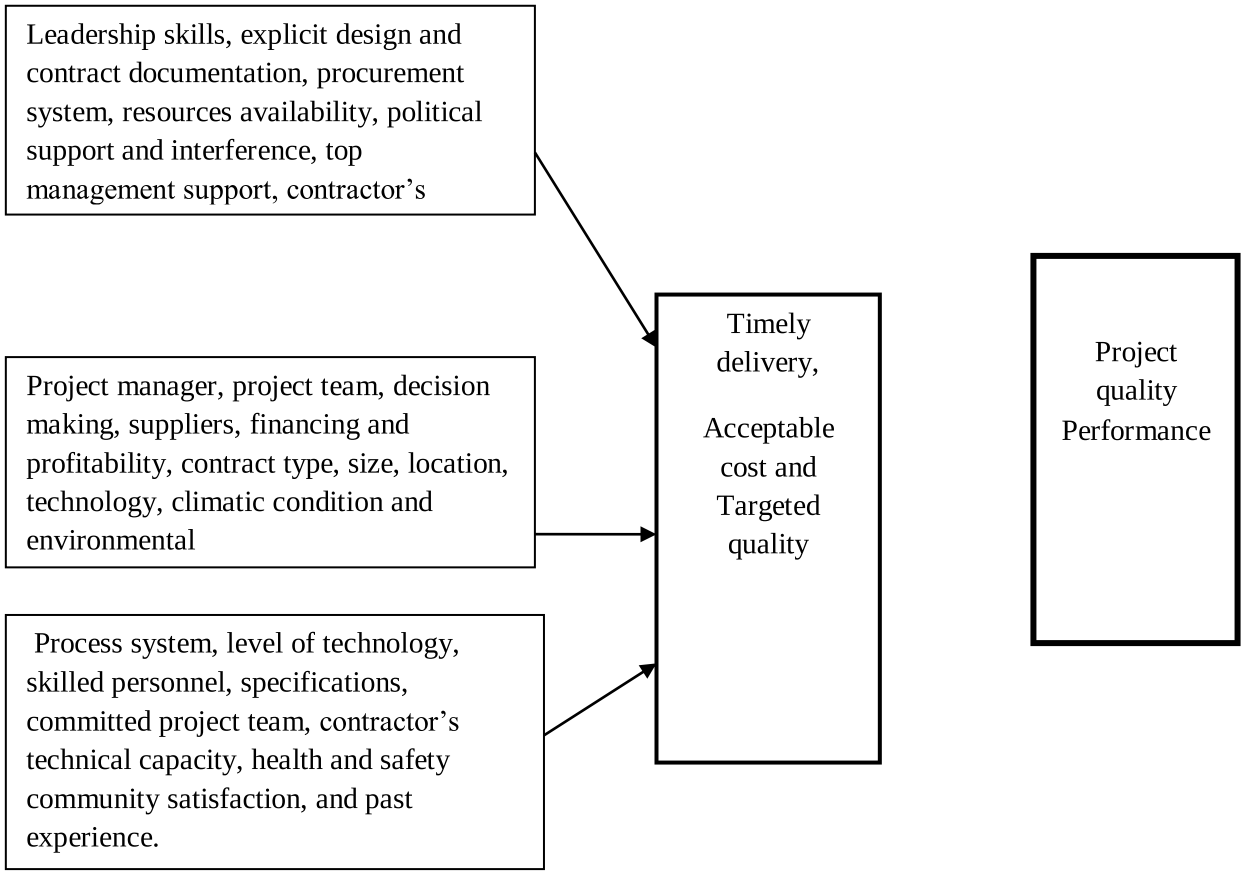


Figure 2.2: Conceptual framework of project success performance factors self and adopted

The three traditional factors as shown above in the conceptual framework are hereby referred as moderating factors. The conceptual frameworks shown above were used to refine and identify factors that could have impact on project performance in Morogoro Municipality. The report will work through the list of refined factors and conclude accordingly.

2.6.1 Discussion of the conceptual framework

Independent variables: Independent variable is the variable that can be controlled and manipulate. In this study the independent variables were divided into three groups; that have impact on time delivery, that have impact on acceptable cost and that have impact on target quality. The list of independent variables in each group of impact is as shown in the conceptual framework.

Dependent variable: A dependent variable is a measurable variable expected to be measured in the experiment. The changes occurring in the independent variable(s) leads to changes in the dependent variable. In this study, the dependent variable is Project quality Performance. Positive changes in the independent variables may result into positive or negative effect on project performance. As project quality performance is a positive effect to project success only the effect of net positive changes or improvement of independent variables will be investigated in this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Chapter Overview

Having defined the research problem, chapter three discusses procedure that used in carrying out investigation of the research problem. The chapter comprises of research philosophy, procedures for selection of the target group for study, sample size, methods for data collection, tool and techniques to be used for data analysis.

3.2 Research philosophy and time line

The proposed research philosophy is based on the main research objective and questions raised in regard to the specific objectives. Having gone through the details of literature review various success factors had been identified that affect the quality performance of construction projects. None of these factors can be considered to apply in every project and at all time and locations. The research structured to address the posed questions in Chapter one.

Question one as per chapter one of this work focused on identifying the critical factors that hinder quality performance of government financed construction project in Morogoro Municipality at MORUWASA. Through literature review some of these factors have been noted in the previous studies. The aim in this study was undertaking qualitative and quantitative tests on the effect of such similar factors for projects undertaken or being undertaken in Morogoro Municipality. This qualitative testing was conducted through structured questionnaires to be issued to various stakeholders involved in government financed construction projects, in Morogoro Municipality. Quantitative tests were carried out during analysis of qualitative test results.

The third question raised is on the challenges faced by contractors that deter quality performance of projects in Morogoro Municipality. Finally the study addressed the last question on examination of the relationship between quality performance and the critical factors which affect quality performance of government financed construction project?

This study used both positivist views and interpretive views. Positivist views are based on the fact that there is a reality on the set of factors that have influence on the quality performance of government financed projects

3.3 Research Approach

Research approach is a plan and procedure that consists of the steps of broad assumptions to detailed method of data collection, analysis and interpretation. It is therefore, based on the nature of the research problem being addressed. Research approach is essentially divided into two categories

The Merriam – Webster Dictionary defines Paradigm as a theory or group of ideas about how something should be done, made or thought about. Egon Guba (1990); showed that paradigm is simply a belief system (or theory) that guides the way we do things or more establish a set of practices. This could range from pattern to actions.

On the other side, interpretive views was used believing that there is an unlimited number of factors that could have effects on project performance but few are critical and relevant to in Morogoro Municipality conditions. The inquiry is to investigate the relationship between quality performances and the critical factors as well what methodologies were needed to be used to explore this knowledge.

Linearity between dependent and independent variable (s)

Adam Lund and Mark Lund (2013), discussed that for a linear multiple regression model to give valid results, they must be a linear relationship between the independent and dependent variables (linearity). Changes in independent variable (critical factors for this study) must have a direct influence on the dependent variable (quality performance). Linearity can be measured by using of Pearson's or Kendall's tau correlation coefficients.

The other basic assumptions infers that the dependent variable must be measured on continuous scale (scores, or test performance measured from 0 to 100) while the independent variable must be measured on continuous or categorical scale. The Likert scale is among of the categorical scales.

Autocorrelation in data

Box, G. E.P and Jenkins G (1976), showed that autocorrelation is a measure of non randomness in data. It occurs mostly due to dependencies within data as the adjacent observations were correlated. The effect of autocorrelation is that the least square underestimates the standard error of coefficients hence the independent variables (predictors) seems to be significant when may not be. For a multiple regression model to give valid results there should be no autocorrelation in the data.

The Durbin-Watson's "d" test is used to check for autocorrelation in data. The "d" value is given by the equation;

$$d = \frac{\sum_{i=2}^{n}(\varepsilon_i - \varepsilon_{i-1})^2}{\sum_{i-1}^{n}(\varepsilon_{i-1})^2} \quad (6)$$

Where ε_i = $y_i - \hat{y}_i$ and y_i and $\hat{y}_i$ are, respectively, the observed and predicted values of the response variable for individual i. "d" becomes smaller as the serial correlations increase.

The value of "d"ranges between 0 and 4, values around 2 indicate no autocorrelation. As a rule of thumb values of $1.5 < d < 2.5$ show that there is no auto-correlation in the data, however the Durbin-Watson test only analysed linear autocorrelation and only between direct neighbors, which were first order effects (Gujarat, 2010).

Multi-collinearity in the data

Multi-collinearity has major effects on the estimated regression line or regression output. Multi-collinearity in data occurs when there is a correlation among independent variables. Multi-collinearity phenomenon tends to increase the standard error of independent variables and hence making the variables less significant. Jim Frost (2013) shows that severe multi-collinearity can increase the variance of the coefficient estimates and make the estimates very sensitive to minor changes in the model. The result was that the coefficient estimates were unstable and difficult to interpret. Multi-collinearity undermines the statistical power of the analysis, can cause the coefficients to switch signs, and makes it more difficult to specify the correct model.

Multi-collinearity in the data was checked using Tolerance – the tolerance measures the influence of one independent variable on all other independent variables; the tolerance is calculated with an initial linear regression analysis. Tolerance is defined as $T = 1 - R^2$ for these first step regression analysis. With $T < 0.1$ there might be multi-collinearity in the data and with $T < 0.01$ there certainly is. The second test performed was Variance Inflation Factor (VIF) defined as $VIF = 1/T$. Similarly with $VIF > 10$ there is an indication for multi-collinearity to be present; with $VIF > 100$ there is certainly multi-collinearity in the sample.

Homoscedasticity

Homoscedasticity in multiple regression models is a situation where the error terms (residuals) between the observed value and the predicted value irrespective of the size of the variable should remain approximately constant. In other words the variance of the error term should remain constant and the sum of errors should always approximate zero. Mathematically it can be expressed as follows;

Variance = $\sigma^2 = \sum(Y-\hat{Y})^2 \approx$ Constant

Sum of error terms (residuals) $= \sum(Y-\hat{Y}) \approx 0$

Homoscedasticity is checked by plotting the values of the residuals (on Y axis) against the predicted values of dependent variable on the scatter diagram. For the linear regression model to be acceptable the scatter diagram should not show any pattern. A situation where the plot of residuals against the fitted value of dependent variables falls into a certain pattern is known as Heteroscedasticity. Heteroscedasticity in linear regression model tends to understate the standard deviation of the regression coefficients, hence makes the independent variables to appear significant while are not.

3.4 Survey population (Area of the research)

The study was conducted in Morogoro Municipality at MORUWASA covering the seven Districts of Morogoro, Kilosa , Mvomero, Ulanga, Malinyi and Gairo. The area has been selected for convenience as the researcher was based in Morogoro municipal. The target population involved 54 engineers working at government institutions such as District or Municipal councils, MORUWASA and at Regional Administrative office. The second target group technical staff working with contractors and contractors themselves. Register available at MORUWASA showed there 50 active contractors registered with the Contractors Registration Board in the region. It is expected that thirty (30) of these contractors involved in the study. Finally there were a group of people responsible for decision making. This group constituted the District, Municipal and Town planners as well as Directors. The third group is expected to have eight (8) participants only. In general the study is expected to involve 92 participants. More than that, the researcher is more conversant with the study location in terms of soliciting people in order to facilitated data collection since the research employed case study methodology. Thus, selections of the setting were based on convenience and suitability (Saunders et al 2000).

Respondents	Frequency
Government engineers	54
Government Contractors	30
Regional Administrative Officer	8
Total	**92**

3.5 Sampling design and procedures

Simple sampling methods in this study were used whereby all participants have equal chances. In accordance to Go vender et al (2014), the study design followed an observational cross sectional analytical survey whereby variable data from the population were collected, analysed and compared.

The sample size was selected based on the assumption that at least 70% of the target group were respond to the issued questionnaires. At 90% confidence level the acceptable error were ±10%. Assuming the population was normally distributed and using the statistical equation for sample size "n";

Sample size $$n = \frac{Z^2pq}{e^2} \tag{7}$$

Where n is an expected sample (minimum sample size)

p is a population proportion (response rate at 70%)

q=1-p

Z is a probability for normal distribution

e is the accepted error margin

Using the normal distribution table, Z =1.645, p= 0.7and q =0.3and e = 0.1. The equation 6 above yields sample size (n) is 57. The selected sample size of 57 members fits well with the statistical minimum requirement.

Participants from each category were selected basing on the weighting equation given as;

$$n_{(category)} = \frac{N(category) X\, n(all\ categories)}{N\ (all\ categories)}$$

where

$n_{(category)})$ = sample size in a particular category

$N(category$ = category population size

$n(all\ categories)$ = sample size for all categories

$N\ (all\ categories)$ = population size for all categories

Hence the sample size for engineers shall be given as follows

n_e = (54 x 57)/92 = 33

The same procedure applied, the sample size for contractors was nineteen (19) and for decision makers shall be five (5).

3.6 Variables and measurement procedures

“People act on the basis of what they perceive the situation to be, whether the perceptions are accurate or grossly inaccurate. Since behavior is based on perceptions, the existence of each of them is a fact to be considered. Similarly, the frustrations, attitudes, loyalties, and hostilities felt by each member and the information and misinformation possessed by each particular course of action under consideration."

The independent variables to be measured were the quality performance factors as discussed under section 3.2 above. Measurement of variables was done through circulation of structured questionnaires whereby the participants were required to rank the effect of independent variables on quality performance of the projects, and rank factors that mostly affect contractor's performance.

3.7 Methods of data collection

Primary data collection made by use of structured questionnaires. The questionnaires were end closed to encourage participation of the selected target group.

Reja et al (2003) observed open-ended and close-ended questions differ in several characteristics, especially as regards the role of respondents when answering such questions. Although close-ended questions limit the respondent to the set of alternatives being offered, it is a preferred approach as it is easier and quicker for respondents to answer, the answers from different respondents are easier to compare, respondents are more likely to answer about sensitive topics, there are fewer irrelevant or confused answers to questions, answers are easier to code and perform statistical analysis.

The design of closed ended questionnaire preceded by general discussions with colleagues with experience in construction projects to establish the scratch contents of the project quality performance factors. The discussions supplemented with the contents of literature review.

Collection of data involved manual follow ups of issued questionnaires. The secondary data were collected through further identification of previous research reports and relevant literature review. The secondary data provided further understanding of the concepts, their correlation to the area of the study and the existing knowledge gaps. The information were useful during analysis of primary data.

3.8 Data processing and analysis

Data to be collected were analyzed through used of frequency tables, proportions and mean analysis. The Statistical Package for Social Sciences (SPSS) is expected to be used in analyzing primary data and justify their validity. The method is chosen because it had been widely used in the previous studies. The correlation coefficients such as Pearson's or Kendall's tau applied to confirm data agreements from various groups to be investigated. Further analysis involved use of multiple regression analysis to determine if the selected performance factors are related to the project performance. A model equation similar to that presented by Eshassi et al (section 2.4), were determined.

3.9 Validity and Reliability of the Data

The foremost element of the research was to verify the validity and reliability of data. Validity and reliability are closely related terms. According to Colin Phelan and Julie Wren (2005), validity refers to how well the test measures what was purported to be measured. It is a test for correctness or credibility of the descriptions, findings, interpretations and accounts for the conclusions. Validity can be tested in form of face validity, formative validity and sampling validity.

Reliability however is the degree to which and assessment tool produces stable and consistency results. It is a measure of homogeneity in the test results. Reliability can be in form of test retest reliability, parallel reliability and internal consistency reliability.

Reliability in data was tested by use of Cronbach's Alpha test. However to ensure validity of data, closed end questionnaires were used in this research. The Cronbach's alpha test measures the internal consistent of the data. It is a factor ranging from 0 to 1 based on the correlation among the data. The Cronbach's alpha closer to 1 means the data are reliable. The Cronbach's alpha is calculated by the equation;

$$\propto = \frac{k\gamma}{\{1+(k-1)\gamma\}} \quad (8)$$

Where $\propto$ is the Cronbach's factor

k is the number of indicators (items)

γ is the inter indicator correlation factor calculated from the correlation matrix

From the above equation, the value of " $\propto$ " increases as the number of indicators "k"increases. Lance et al (2006) shows that there is a rapid increase of reliability as the number of items increase from 2 to 10. Then there is a steady increase from 11 to 30. These increase trend tappers off after 40 items. Furthermore Nunnaly (1978) noted that reliability of 0.7 -0.8 is acceptable for basic social sciences studies.

In reference to the research questions raised under section 1.5 above, the internal consistency of data collected were checked for reliability by use of SPSS analysis tool. Results are presented in table 4.1 below;

Table 4.1: Reliability analysis (internal consistency) of collected data

No	Research Questions	Number of respondents	Cronbach's Alpha	No of items investigated
1	What are the critical factors that hinder quality performance of government financed project in Morogoro Municipality.	80	0.888	18
2	What are the key issues that deem to be important in quality assurance of Government financed construction projects in Morogoro Municipality.	80	0.830	8
3	What are the challenges faced by contractors that deter quality performance of projects in Morogoro Municipality context.	80	0.864	18

Source: Primary data

George and Mallery (2003) established the rule of thumb indicating that a Cronbach's alpha greater that 0.9 means excellent consistency, greater that 0.8 means good consistence, 0.7 means acceptable, 0.6 means questionable, greater than 0.5 means poor and less that 0.5 is unacceptable. Gliem (2003) showed that an alpha equal to 0.8 is a reasonable goal.

The analysis presented in Table 4.1 indicates the reliability coefficients for both questions investigated are good. The SPSS first run for question one has a Cronbach's alpha value of 0.873. The analysis also showed that the "political interference and political support factors" gave a negative and small values (-0.210 and 0.223) for "*corrected item - total correlation*". Wilson (2005), in interpreting Cronbach's alpha noted that the collected data that give such results were considered to be unreliable hence removed in the analysis. The assumed quality performance factors (items) of "political interference and political support" were dropped in the analysis of the data.

Upon removal of these items the Cronbach's alpha obtained was 0.888 and there were no negative or unlikely lower values of the *corrected item - total correlation*. The Cronbach's alpha for the second question was 0.830. Likewise SPSS first run for question three gave the Cronbach's alpha of 0.859. The factors "political interference and political support" showed small values of (0.186, and 0.219) for the "*corrected item - total correlation*". These quality performance factors as noted above were removed in the analysis. Upon their removal the Cronbach's alpha raised to 0.864.

In general both variables indicate a strong internal consistency of the procedure used in data collection. However, a high value for alpha does not imply the measure is un dimensional. If in addition to measuring internal consistency, you wish to provide evidence that the scale in question is un dimensional, Explanatory Factor Analysis is one of methods of checking dimensionality.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter presents the profile information of respondents, analysis and interpretation of the factors affecting quality performance of government financed construction projects: a Case of Morogoro municipality at MORUWASA.

4.2 Descriptive Statistics (Profile Information of Respondents)

Descriptive Statistics involves presentation of the main characteristics of the collected data. Under this section therefore the characteristic of respondent involved in the research is presented. Discussions were based on the sex, age, level of education, experience in the construction industry and the main occupation of the respondent at the time of undertaking this research.

Descriptive statistics was also used to present summaries of the observations or responses in regard to various issues presented to the respondents through the use of closed end questionnaires. The summaries could be quantitative or by use of tabulation, statistical graphs, pie chart or histograms. The respondent and data characteristics were developed by use of SPSS analysis tool.

4.2.1 Gender and Age of respondents

The closed end questionnaires were issued to 110 participants, and the respondents who returned the questionnaires in time were 80, being 73% of the participants. Such rate of response indicates that there was a reasonable interest on the subject of the study from the participants and it was considered to be acceptable.

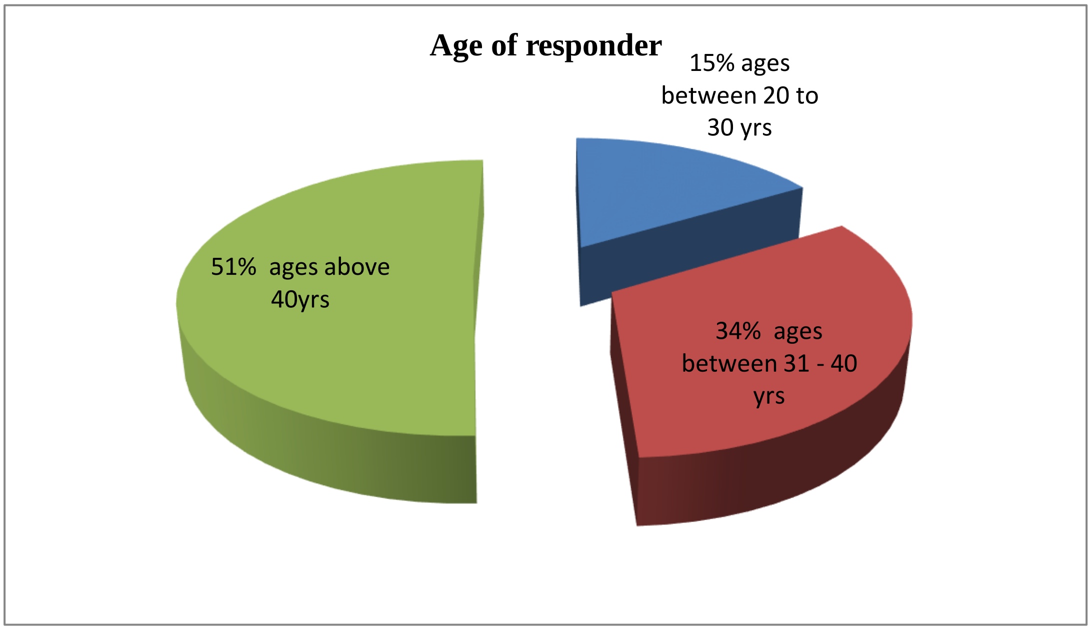
Female respondents were only eight (8) forming only approximately ten percent (10%) of the people that was involved in the study. This showed that still there is a huge male domination in the construction industry for Morogoro municipality. Such domination could be attributed by the traditions that female are not suited for the tough jobs and construction is considered to be one of them. Male domination in construction activities was also observed as a challenge by the Tanzanian Construction Industry Policy (2003). The policy requested that specific efforts need to be put in place for the government and the stakeholders of the industry to promote the development; participation and representation of women in the construction industry to enable them acquire marketable skills and thus enhance income generation opportunities. Subsequent to this male domination no further analysis of data was made in reference to gender of respondents.

The age of the respondent was considered to be important in responding the issues raised through questionnaires. The age could be related to the level of education as well as the experience. Age was divided into three groups; being 20 to 30 years, 31 to 40 years and above 40 years. As can be seen from Figure 4.1 below, 15% of respondent aged between 20 to 30 years, 34% were between 31 -40 years and 51% were above 40 years old.

Majority of the respondents aged above 40 years. This could be attributed by long period of training required for engineers before they can become supervisors to works or establish themselves as contractors. Indeed construction business requires relatively substantial amount of capital, hence only few young people manage to establish themselves as contractors.

Fig. 4.1 Age of respondents

Equation 14.1: Age of Respondents



Source: Primary Data

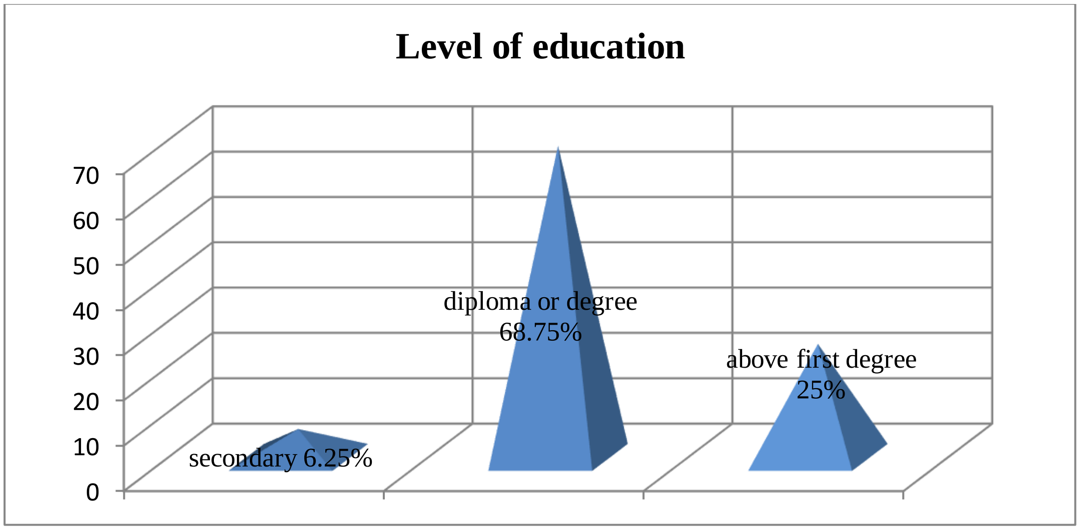
4.2.2 Level of education of respondents

Participants were also requested to indicate their level of education. The level of education and particular in construction industry could be used to determine the suitability and/or qualifications of individuals involved in responding to the questionnaires. The level of education was assessed in terms of secondary school education, diploma or degree education and above degree level of education.

Data analysis show that only 6 % of participants had a secondary education, 69 % were diploma or degree holders while 25% had more than a degree qualifications.

Figure 4.2 Level of education of respondents

Equation 2.4.2: Level of Education of Respondents



Source: Primary data

Generally it can be concluded that most of the participants were suitably qualified for the study as had adequate knowledge to understand the questionnaires and respond accordingly.

4.2.3 Experience of respondents in construction

Experience in construction industry is among of the key qualifications one would need to have to be in a better position to identify and discuss key issues that could have major impact of quality performance of the projects.

Garbharran*et al* (2012), in South Africa, identified "Competence" as among of the key success factor. The competence factor is built on experience in construction, necessary qualifications and skills and utilization of the up to date technology. Experience was among of the issues investigated from the respondent of this study. Respondents experience was divided into three groups namely below 10 years, between 11 to 20 years and above 20 years.

Figure 4.3 Experiences of Respondents in Construction

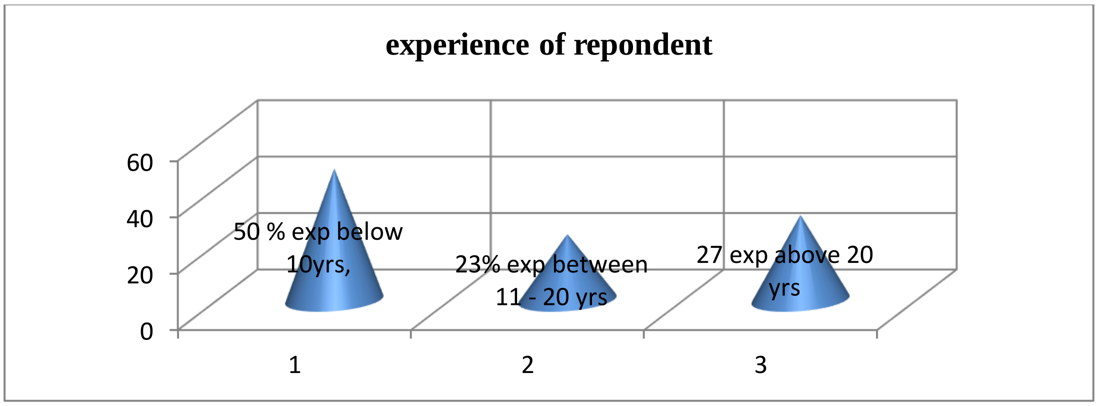


Figure 13.4.3: Experiences f Respondents in Construction

Using SPSS analysis and as shown in Fig. 4.3 above participants with less than 10 years experience were 50%, participants between 11 to 20 years was 23%, while those have more than 20 years experience was 27%.

In other words 50% of participants had adequate experience (over 10 years) in construction industry. Assessment of various factors thought out of having effect on quality performance of government financed construction projects by such group of people could be considered reliable and the critical factors identified do real have impact on the projects.

4.2.4 Occupation of respondents

Current occupations of the study participants were also investigated. The aim was to determine if the participants were being involved with construction works and are suitable for the study. Participants were requested to show if were undertaking supervision of works, if were contractors or employer of contractors. Table 4.2 below shows the distribution of the participants in according to their current occupation.

Table 4.2 Respondents Current occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	supervising engineer	51	64	64	64
	contractor	17	21	21	86
	contractor's employer	12	15	15	100.0
	Total	80	100.0	100.0	

Source: Primary data

From the table above, 64% of participants were projects supervising engineers, 21% were contractors and 15% are contractor's employer. Enshassi, et al (2009) conducted similar study Gaza Strip considered a similar group of experts comprising of experienced owners (employers), project consultants (supervising engineers) and contractors. Therefore the selected participants for this study are rated to be appropriate.

4.3 Respondents views on factors affecting quality performance of government financed construction projects

The first question raised in this study is "what are the critical factors that hinder quality performance of government financed project in Morogoro municipality". The views of respondents was analysed by use of the SPSS tool.

4.3.1 Views of all participants in regard to critical factors affecting quality performance of government financed construction projects

All collected data were analysed using the SPSS package, whereby the mean score of each factor was determined. Table 4.3 below presents the analyzed results for the question one as developed under this study.

Table 4.3: Views of all participants in regard to critical factors affecting quality performance of government financed construction projects

S/No	Factors affecting quality performance of government construction projects	Valid	Missing	Meanscore	Std Deviation
1	Project financing processes	80	1	4.317	0.708
2	Contractor's experiences in industry	80	0	3.900	0.773
3	Availability of construction equipment and spare parts	80	0	3.850	0.901
4	Project's technology requirements	80	0	3.575	0.883
5	Procurement system and processes	80	1	3.532	0.985
6	Availability of construction materials	80	0	3.525	1.055
7	Project managers skills and knowledge,	80	1	3.519	1.108
8	Explicit project planning and design	80	0	3.490	0.994
9	Explicit technical specifications	80	0	3.450	1.135
10	Supervision team skills and knowledge	80	0	3.400	1.165
11	Project team members' performance	80	0	3.375	0.998
12	Environment protection	80	1	3.177	1.308
13	Contractor's profitability	80	0	3.275	1.055
14	Decision making process by clients	80	2	3.000	1.151
15	Explicit contract documentation	80	1	3.063	1.202
16	Health and safety issues	80	0	3.050	1.311
17	Variation in climate conditions	80	0	2.963	1.174
18	Local community involvement	80	0	2.950	1.231

Source: Primary data

From the table 4.3 above, the minimum mean rank score for the 18 success factors was 2.950 being above the midpoint of 2.5. According to Cheung and Yeung, (1998), any score above the midpoint of the 5 points Likert scale is considered to be important. Hence all the factors considered in this study were rated to be important.

The most ten (10) highly ranked quality performance factors however were ; (i) Project financing processes,(ii) Contractor's experiences construction industry,(iii) Availability of construction equipment and spare parts,(iv) Project's technology requirements,(v) Procurement system and processes(vi) Availability of construction materials,(vii))Project managers skills and knowledge, (head of supervision team),(viii)Explicit project planning and design, (ix)Explicit technical specifications and (x) Supervision team skills and knowledge.

The participants views' indicates that where the financing processes of the project is made clear from its commencement, it is anticipated that project will be executed smoothly. Subsequently, when all the project participants (project managers, supervisors and the contractors) remain assured with the project financing arrangements, tend to do the works diligently.

These results are similar to observations made by Garbharran, *et al,* (2012) on the four COMs of project performance in South Africa. Project financing arrangements refers to "Commitment" either from the government or the project financier. Commitment tends to build sense of collectivism among project participants, hence lead to optimal performance of each team members. Commitment also includes, explicit project planning and design, as well as explicit technical specifications. The two factors as also ranked high in this study give the clear objectives and goals of the project.

The other highly ranked quality performance factors, (contractor's experiences in construction industry, availability of construction equipment and spare parts, project's technology's requirements, availability of construction materials and project managers skills and knowledge) constitutes a "Competence" critical success factor as previously noted by Garbharran,*et al*, (2012). Competence refers to project participants have adequate skills and experience, capable of utilizing up to-date technology for equipment, spare parts, materials and the project itself.

Furthermore findings by Mahona (2008), in Kagera – Tanzania, confirms that Project success depended on the technical knowledge of participants, meaning that the participants must be capable of utilizing up to-date technology for equipment, spare parts, materials and the project itself as noted in this study. The last two least ranked performance factors by respondents were variation in climate and involvement of local community. The respondents considered these factors important but not necessary for improving quality performance of construction projects. Similarly the SPSS tool output gave the standard deviation of the respondent's view on quality performance factor ranking. The first five (5) highly ranked factors their standard deviation was noted to be less than one (1.0). Statistically this implies lower data dispersion hence; there is relatively good agreement between participants in the three groups of supervising engineers, contractors and employers that were involved in the study.

4.3.2 Views of individual groups in regard to critical factors affecting quality performance of government financed construction projects

Further analysis by use of SPSS tool was undertaken to determine if individual groups of experts (supervising engineers, contractors and employers) would have similar ranking of the quality performance factors for government financed construction projects in Morogoro municipality. Results are as shown in Appendix 2 of this report. Appendix 2 gives the mean rank scores and the standard deviation for each quality performance factor as ranked by each group of experts;

From Appendix 2, the group of supervising engineers indicated that the ten (10) highly ranked quality performance factors (with their mean score in brackets)for government financed construction projects in Morogoro municipality were;

Project financing processes (4.260), Contractor's experiences construction industry (3.804), Availability of construction equipment and spare parts (3.706), Explicit project planning and design (3.529), Explicit technical specifications (3.431), Procurement system and processes (3.373) Availability of construction materials (3.373), Project managers skills and knowledge, (head of supervision team) (3.373), Project team members' performance (3.373) and Project's technology requirements (3.333)

The first five (5) highly ranked performance factors for supervising engineers include the explicitly technical specifications (ranked fifth) which do not appear in the top five of the ranking by all participants. The least two ranked performance factors are the variation in climate conditions and involvement of local community.

A similar trend of ranking was noted under the views of contractors. However the top five (5) highly ranked quality performance factors do not include the explicit project planning and design as well as the explicitly technical specifications. The contractors top five ranking includes also project's technology requirements and project manager's skills and knowledge, (head of supervision team). Contractor's least two ranked factors are the explicit contract documentation and involvement of local community.

Contractor's profitability was not among of the top ten factors ranked by contractors. Contractors did not consider profitability as one of the critical factors in quality performance of government financed construction projects. Such observation is similar to that noted by Muguiyi (2012), in Kirinyaga County, Kenya*".* To contractors the most important is having programs in place that will assure funds for the project will remain available during life time of the project.

Employer's ranking as well was the same as that of supervising engineers for first top 5 performance factors. Employers however ranked in the 6th place the involvement of local community (mean score 3.417) factor for assurance of quality performance of projects. Employers in this study were mainly local council leaders. This ranking was not surprising as these leaders, most of the times are involved in community based projects, hence no wonder consider involvement of local community is of significant importance. The quality successful project must bring about benefits to the community.

Employer's least ranked quality performance factors were health and safety as well as the decision making processes by the client.

4.3.3 Correlation tests on views of individual groups in regard to critical factors affecting quality performance of government financed construction projects

Referring to the discussions made above and the contents of appendix 2, by using the sample of experts provided in this study one would wish to draw a hypothesis that there is significant association between the views of different groups of experts in regard to the relative importance of the quality performance factors discussed under the first question of this study. The Null hypothesis (H_0) should be stated as that "there is no significant association between the views of different groups of experts in regard to the relative importance of the quality performance factors". The Alternative hypothesis (H_1) is "there is significant association between the views of different groups of experts in regard to the relative importance of the quality performance factors".

Statistically, the significance of the association can be proved by determining the correlation between the mean scores from the three groups of experts. There are number of procedures available in literature to testing association of various data. The choice of test procedure was made as observed by previous studies. Garcia *et al* (2008); noted that parametric statistical procedures rely on assumptions about the shape of the distribution (i.e., assume normal distribution, interval or ration measurements, no outliers and equality of variances) in the underlying population and about the form or parameters (i.e., means and standard deviations) of the assumed distribution. Nonparametric statistical procedures are less restrictive as rely on no or few assumptions about the shape or parameters of the population distribution from which the sample was drawn. Data collected by use of Likert scale are ordinal hence their analysis suites the use of non parametric tests.

Considering that the data collected were ordinal (based on ranking by respondents), a non parametric correlation test was done by use of the Kendall's tau correlation coefficient. The Kendall's tau is a coefficient that represents the degree of concordance between columns of ranked variables. It ranges between -1 to +1 for negative and positive correlations respectively.

The Kendall's tau was preferred to the Spearman's correlation coefficient (Bulter, 2007) because; the interpretation of Kendall's tau in terms of the probabilities of observing the agreeable (concordant) and non-agreeable (discordant) pairs is very direct, the distribution of Kendall's tau has better statistical properties and less sensitive to errors in data.In most situations with large sample sizes the interpretations of Kendall's tau and Spearman's rank correlation coefficient are very similar and thus invariably lead to the same inferences. The SPSS tool was used to determine the Kendall's tau correlation coefficients between the mean scores of the three groups. Shown in table 4.4 below are the Kendall's correlation coefficients between the three groups of experts used in this study.

From table 4.4 below, it can be observed that the mean scores for various quality performance factors from the three groups of experts are highly correlated. The correlation noted between the mean scores of all respondents and the mean scores of engineers only at 99% confidence level was 0.776.The correlation between the mean scores of all respondents and the mean scores of contractors at 99% confidence level was 0.771. The correlation between the mean scores of all respondents and the mean scores of employers at 99% confidence level was 0.629. The correlation between the mean scores of engineers and the mean scores of contractors at 99% confidence level was 0.615. The correlation between the mean scores of engineers and the mean scores of employers at 99% confidence level was 0.461. In all these cases the p values was less than 0.01 and being significant for a 2 tailed test.

However; the correlation between the mean scores of contractors and the mean scores of employers at 99% confidence level was not significant. At 95% confidence level a correlation coefficient of 0.410 was obtained and the p value became less than 0.05 hence statistically significant results.

Table 4.4 Kendall's tau Correlation Coefficient matrix

		Mean score for All respondents	Mean score for Engineers only	Mean score for contractors only	Mean score for employers only
Mean score for All respondents	Correlation Coefficient	1	0.776	0.771	0.629
	Sig.(2-tailed)	.	0.000**	0.000**	0.000**
	N	18	18	18	18
Mean score for Engineers only	Correlation Coefficient	0.776	1	0.615	0.461
	Sig.(2-tailed)	0.000**	.	0.001**	0.010**
	N	18	18	18	18
Mean score for contractors only	Correlation Coefficient	0.771	0.615	1	0.410
	Sig.(2-tailed)	0.000**	0.001**	.	0.021*
	N	18	18	18	18
mean score for employers only	Correlation Coefficient	0.629	0.461	0.410	1
	Sig.(2-tailed)	0.000**	0.010**	0.021*	.
	N	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Primary data

In view of the above analysis, the Null Hypothesis (H_0) that "there is no significant association between the views of different groups of experts in regard to the relative importance of the quality performance factors" was rejected. It is obvious that there are strong associations of views between the mean scores of group of experts involved in the study.

In general there is a strong association among the experts on which factors are considered to be important in ensuring quality performance of government financed construction projects.

4.4.4 Agreement tests on views of individual groups in regard to critical factors affecting quality performance of government financed construction projects

Bland (1986) argues that agreement in measuring techniques for two or more variables can be mistakenly related to the correlation between the variables. High correlation coefficient does not necessarily mean strong agreement between the methods or the data being investigated. "Correlation does not imply causation"; is a phrase used in statistics to emphasize that a correlation between two variables does not imply that one causes the other.

To verify agreement in views of individual groups in regard to critical factors affecting quality performance of government financed construction projects, additional statistical tests were envisaged. Similar to the correlation tests, there are several agreements tests. The test can be parametric or non parametric tests. Assumptions for parametric tests are similar to those noted above. In analyzing the study data, non parametric tests for data agreement were considered.

To test the agreement on the mean scores of different groups in this study; a Kruskal Wallis test was selected. The Kruskal Wallis test is non parametric test version of the independent measurement (one way) ANOVA that is performed on ordinal data set.

Dallal (2012) noted that the Kruskal Wallis test being a nonparametric procedure is based on ranked data. Data are ranked by ordering them from lowest to highest and assigning them, in order, the integer values from 1 to the sample size. Ties are resolved by assigning tied values the mean of the ranks they would have received if there were no ties, e.g., 117, 119, 119, 125, 128 becomes 1, 2.5, 2.5, 4, 5. (If the two 119s were not tied, they would have been assigned the ranks 2 and 3. The mean of 2 and 3 is 2.5.)

The Kruskal Walli's test was preferred over (Mac Donald J.H. 2009) the Mann Whitney and Friedman's two way analysis of variance tests as it has the capacity to analyse three or more groups of data while others can be used to analyse only two groups of data. In accordance to the Statistics Solution (2016), Plichta and Garzon (2009), the Kruskal Walli's test is calculated as per the formulae shown below;

$$H = \left(\frac{12}{N(N+1)} \sum_{j=1}^{k} \frac{{R_j}^2}{n_j} \right) - 3(N+1) \qquad (9)$$

Where,H is the Kruskal Walli's test, k is the number of comparison groups, N is the total sample size, n_j is the sample size in the j^{th} group and R_j is the sum of the ranks in the j^{th} group.

The procedure for calculating the Kruskal Walli's test involve defining the Null and Alternative hypothesis, select the alpha values, determine the degree of freedom, state the decision rule, calculate the test statistics, state the results and state the conclusion.

In this study the Null Hypothesis (H_o) was *"there is no significant difference between the mean scores from the group of experts"* while the Alternative hypothesis (H_1) was *"there is difference between the mean scores from the group of experts"*

The decision rule is stated as "If the calculated value of the Kruskal-Wallis test using the formulae above is less than the critical chi-square value, then the null hypothesis cannot be rejected. If the calculated value of Kruskal-Wallis test is greater than the critical chi-square value, then we can reject the null hypothesis and say that the sample comes from a different population". Moreover the relationship between "*p values* "and the "*level of confidence alpha (α)"*can also be used to make decision as follows; if the *p-value* $\leq \alpha$: the differences between some of the means are statistically significant, the null hypothesis can be rejected and conclude that not all the group means are equal. As well if *p-value* $> \alpha$;the differences between the means are not statistically significant and there is no adequate evidence to reject the null hypothesis that the group means are all equal.

Data in this study comprised of four groups, k value equals 4 (mean scores for all respondents, mean scores for engineers only, mean scores for contractor's and mean scores for employers) at alpha equals 0.01 and the degree of freedom was 3.The total sample size was 72 and each group had 18 mean scores for each independent quality performance factor. Table 4.5 below shows the results obtained having run calculations as per above formulae.

From the table 4.5 the calculated Kruskal Walli's value (9.436) is less than the Chi Square critical value (11.345). Moreover the p value of 0.024 is slightly above the alpha value of 0.01. Hence the Null hypothesis cannot be rejected.

Table 4.5: Kruskal Walli' test data

Data Description	**Values obtained**
Total sample size (N)	72
Sample size in each group (n)	18
Chi-square calculated	9.4361
Chi-square critical	11.3449
p– value	0.02402

Source: Analysed data

In view of the above table; there is adequate evidence that the sample data are in agreement for each group of experts. The mean scores for all four groups (mean scores for all respondents, mean scores for engineers only, mean scores for contractor's and mean scores for employers) are strongly in agreement.

The Kruskal Walli's value (H) is given by a rather formidable formula that basically represents the variance of the ranks among groups, with an adjustment for the number of ties. H is approximately chi-square distributed, meaning that the probability of getting a particular value of H by chance, if the null hypothesis is true, is the p-value corresponding to a chi-square equal to H MacDonald J.H. (2009) observed that, if the sample sizes are too small, H does not follow a chi-squared distribution very well, and the results of the test should be used with caution. The n_i values less than five (5) in each group is the accepted definition of "too small" sample size.

4.3.5. The most 10 critical quality performance factors affecting of government financed construction projects as viewed by individual groups

Having confirmed significant correlations and agreement on respondents views in regard to the quality performance factors affecting government financed construction projects, the study was undertaken to indentify the most 10 critical factors out of 20 factors that were included in the questionnaire for the first research question. In each group, ten (10) quality performance factors with high mean scores were selected and compared with similar factors from the other group.

The highly ranked performance factors with their mean score in brackets are as shown in Appendix 3 of this report. As shown under section 4.4.3 above, the highly ranked factors are similar in each group with the exception of the employers group who has ranked involvement of local community as number six (06). As noted above employers consider involvement of local community is very important for project success.It can be concluded that there is a general agreement between the three groups of experts (supervising engineers, contractors and employers) on the critical quality performance factors that have significant impact on the government financed construction projects for Morogoro municipality.

Having noted the respondent's similarities towards quality performance factors, the task was on how to determine which ones are relatively important in comparison to others. Enshassi *et al*,(2009),established that the relevant perception importance for each of the group of factors was determined using the Relative Importance Index method calculated as;

$$RII = (\sum W)/A \times N \qquad (10)$$

Where W is the weighting given by a participant in a particular group of experts, A is the highest score equals to 5 and N is the number of participants in that particular group of experts. The higher the value of RII the greater importance of the performance factor considered. The relative importance index as presented by Enshassi *et al*, in this study could give misleading perceptions on the importance of performance factors investigated. The weighting factor is mostly influenced by the number of participants in that particular group. Measured variables from groups with fewer members may be unnecessarily given higher weighting factors and influence views of respondents where the sample sizes from different groups vary substantially.

Paule and Mandel (1982); showed that the variance of the weighted average is minimized when the individual weights are taken as the inverse of the variance of the individual measured values, that is,

$$w_i = 1/Var(Y_i) \qquad (11)$$

Where w_i is the weighting factor for measurement $Y_i$and Y_i is the measured variable. Low weights are given to variable values with high variance. The variance or the standard deviation measures the level of disparity of views or observations of a particular group of respondents in regard to the variable being investigated.

Determination of weighting factor in this study adopted both procedures presented by Enshassi et al (2009) and that by Paule and Mandel (1982). The two formula for were combined to give the modified formulae for a weighting factor as shown below;

$$W_i = 1/\square\square(\sum_{1}^{\square} \square\square\square/(\square\square^{2}) \qquad (12)$$

Where

Wi is a weighting factor for group i, *Msi* is the mean score for group of experts, $s_i$is the standard deviation in a particular group of expert, A is the maximum score equals to 5 and *k* is the number of groups of experts under investigation. The ratio *"1/□□"* in equation 11 above is basically constant and was added in the equation to normalize the weighting factor so that it can become a value with no units. The mean scores for a particular quality performance factor as assessed by all respondents given in table 4.3 above were multiplied by the weighting factor obtained as per equation 11 above. The results are presented for only nine (9) most highly ranked factors in table 4.7 below. The entire table showing the relative importance of performance factor is presented in Appendix 4 of this report.

Table 4.6: Weighted Mean Score for Various Performance Factors

S/No	Factors affecting quality performance of government construction projects	Mean score for all respondents	Weighting factor	Weighted Mean score for all respondents
1	Project financing processes	4.317	2.132	9.205
2	Contractor's experiences in construction industry	3.900	1.584	6.176
3	Availability of construction equipment and spare parts	3.850	1.152	4.435
4	Project's technology requirements	3.575	1.858	6.643
5	Procurement system and processes	3.532	1.030	3.637
6	Availability of construction materials	3.525	0.902	3.179
7	Project managers skills and knowledge, (head of supervision team)	3.519	1.044	3.674
8	Explicit project planning and design	3.490	0.891	3.108
9	Project team members' performance	3.363	0.880	2.958

Source: Primary data

From table 4.7 above, the most relative important quality performance factors with their weighted mean score in brackets were as follows;

(i) Project financing processes (9.205), (ii) Project's technology requirements (6.643), (iii) Contractor's experiences in construction industry (6.176), (iv) Availability of construction equipment and spare parts (4.435), (v) Project managers skills and knowledge, (head of supervision team) (3.674), (vi) Procurement system and processes (3.637), (vii) Availability of construction materials (3.179), (viii) Explicit project planning and design (3.108), (ix) Project team members' performance (2.958) The Nine (9) quality performance factors (with weighted mean score above 2.5) were considered to be critical and important in improving quality performance of government financed construction projects in Morogoro municipality. The quality performance factors whose weighted mean score became less than 2.5 were viewed as less relative important. Although such quality performance factors could have attained a mean score of above 2.5 of the 5 point Likert scale, but the level of disparity in opinions among respondents was higher making such performance factors less significant hence low relative importance.

4.3.6 Views of respondents on critical factors affecting quality performance of construction projects

An additional check was made to analyse the views of experts in respect to their experience in construction industry. Respondents were divided into three groups of experience being group with experts having less than 10years in construction industry, experts with experience of 11years to 20 years and experts with more than 20 years experience. Table 4.7 below summarizes the views of experts with different level of experience in regard to the quality performance factors.

Table 4.7: Quality Performance Factors as Viewed by Respondents with Different Experience

S/No	All respondents	Respondents with experience of less than 10 yrs	Respondents with experience of 11 to 20 yrs	Respondents with experience of above 20 yrs
1	Project financing processes (4.317)	Project financing processes (4.308)	Project financing processes (4.278)	Project financing processes (4.364)
2	Contractor's experiences in construction industry (3.90)	Availability of construction equipment and spare parts (3.800)	Contractor's experiences in construction industry (3.889)	Contractor's experiences in construction industry (4.136)
3	Availability of construction equipment and spare parts (3.85)	Contractor's experiences in construction industry (3.775)	Availability of construction equipment and spare parts (3.833)	Availability of construction equipment and spare parts (3.950)
4	Project's technology requirements (3.575)	Availability of construction materials (3.675)	Explicit project planning and design (3.667)	Project's technology requirements (3.727)
5	Procurement system and processes (3.532)	Project's technology requirements (3.555)	Environmental protection (3.667)	Project managers skills and knowledge, (3.773)
6	Availability of construction materials (3.525)	Explicit technical specifications (3.550)	Project's technology requirements (3.444)	Procurement system and processes (3.667)
7	Project manager's skills and knowledge, (3.519)	Procurement system and processes (3.525)	Availability of construction materials (3.444)	Supervision team skills and knowledge (3.54)

8	Explicit project planning and design (3.490)	Project managers skills and knowledge, (5.513)	Procurement system and processes (3.389)	Project team members' performance (3.455)
9	Explicit technical specifications (3.45)	Explicit project planning and design (3.500)	Project managers skills and knowledge, (3.333)	Explicit technical specifications (3.409)
10	Supervision team skills and knowledge (3.40)	Supervision team skills and knowledge (3.425)	Explicit technical specifications (3.278)	Availability of construction materials (3.318)

Source: Primary data

The views of respondents rated as per their experience was noted to be similar to that observed previously when respondent were rated as per their current occupation. The ten (10) highly ranked performance factors were similar even though respondents have different experiences in construction industry. Only respondent with experience of 11 yrs to 20 yrs viewed "environmental protection" as among of the ten highly ranked factors. Respondents with experience of 11 to 20 yrs were only 18 and considered to be in a group of those aged above 40 years. Basing on their age, these are the people who are witnessing the effects of global environmental degradation and are becoming more aware on the need for environmental sustainability.

Further to the observation above, variability of views in respondents with different experience was further analysed by use of equation 12 as presented above. The mean scores with higher standard deviation indicated a certain degree of disagreement among members in that specific group. Hence weighted score was used to identify the relative important quality performance factors.

On applying the weighting factors basing on the experience of the respondents only five (5) quality performance factors attained a weighted mean score of above 2.5. This indicates that the level of disparity in opinions of respondent when analysed based on their experience was higher than when analysis is made based on their occupation. An additional study could be warranted to determine the effect of experience in construction industry while one analyzing quality performance factors.

The highly relative important quality performance factors with their weighted mean scores in brackets were; Project financing processes (7.398), Contractor's experiences construction industry (5.427), Availability of construction equipment and spare parts (3.978), Project's technology requirements (3.169) and Procurement system and processes (2.568). These quality performance factors are the similar with the factors when the weighted mean scores were analysed based on the current occupation of respondents.

4.4 Respondents views on key issues that deem to be important in quality assurance of government financed construction projects

The second research question was, *"What are the key issues that deem to be important in quality assurance of Government financed construction projects in Morogoro municipality at MORUWASA"?*

Respondent's data were first analysed for their reliability as shown under section 4.2 above. Similar to question one above the SPSS tool was used to determine the mean scores for each quality assurance performance factor as viewed by all respondent, mean score as viewed by projects supervising engineers, contractors and employers respectively. The Kendall's tau correlation procedure was applied to examine the correlation of the mean scores from groups of supervising engineers, contractors and employers. Moreover the Kruskal Walls test was conducted on the on the mean scores from three groups of experts to verify that are identical and are in agreement with each other. Finally the weighting factor as per equation 12 above was applied to establish the relative importance of each quality assurance factors as viewed by respondents. Appendix 5 of this report summarizes the results of issues discussed above in respect to responses for research question number 2.

Results from appendix 5 shows that, all the quality assurance performance factors had mean scores of above 2.5. The highest mean score is 4.113 while the lowest mean score was 3.238. This implies that on a five point Likert scale all factors are important. Subsequently analyses made on all respondents show that the most five highly ranked quality assurance performance factors with their mean scores in bracket were;

(i) Supervised construction operations i.e.; no construction operation to be done in absence of supervisors (4.113), (ii) Selection of the sources of materials ie, cement, quarries or borrow areas (3.998), (iii) Explicit technical specifications (3.625), (iv) Carrying out various tests on the quality of construction materials (3.550), and (v) Carrying out tests on completed construction operations to check compliance with specifications (3.513),

A similar trend was observed for analysis made on the views of supervising engineers. Contractors however have rated higher (3^{rd}) the quality assurance factor of Institutions for monitoring the integrity of constructors and works supervisors. This could indicate that Contractors being business oriented are more aware on the losses being incurred while working with unethical people both from constructor’s side and works’ supervisors. The observation by contractors is very important as quality of works at construction projects could be adversely affected by involvement of unethical people.

Employers' ranking are similar to that observed under engineers with exception the quality performance factors for Retention of constructors for a specific period to oversee the completed construction operations and undertake remedies where deemed necessary ranked 5th. Employers are the ones who receive the completed projects on behalf of the community. Such observation could be expected from this group of experts as in most cases are responsible for overseeing performance and sustainability of completed projects. Hence, retention of constructors on site for a specific period of time to oversee and undertake remedial of defects is very significant.

Similar to question one above, Kendall's tau correlation test was undertaken to verify if there exists any correlation between the mean scores from the three groups of expert. Table 4.8 below provides the correlation matrix for the variables investigated.

Table 4.8: Kendall's tau correlation matrix of mean scores for quality assurance performance Factors

Kendall's tau_b Correlations matrix					
		mean score for all respondents	**mean scores for engineers**	**mean scores for contractors**	**mean scores for employers**
mean score for all respondents	Correlation Coefficient	1	0.909	0.500	0.691
	Sig. (2-tailed)	.	0.002**	0.083	0.018*
	N	8	8	8	8
mean scores for engineers	Correlation Coefficient	0.909	1	0.400	0.593
	Sig. (2-tailed)	0.002**	.	0.170	0.044*
	N	8	8	8	8
mean scores for contractors	Correlation Coefficient	0.500	0.400	1	0.327
	Sig. (2-tailed)	0.083	0.170	.	0.262
	N	8	8	8	8
mean scores for employers	Correlation Coefficient	0.691	0.593	0.327	1
	Sig. (2-tailed)	0.018*	0.044*	0.262	.
	N	8	8	8	8

**. Correlation is significant at the 0.01 level (2-tailed).

Source: **Primary data**

From table 4.8 above, it can be seen that the mean scores for various quality assurance performance factors from the three groups of experts are somehow correlated. The correlation noted between the mean scores of all respondents and the mean scores of engineers only at 99% confidence level was 0.909.The correlation between the mean scores of all respondents and the mean scores of contractors at 95% confidence level was 0.500. The correlation between the mean scores of all respondents and the mean scores of employers at 95% confidence level was 0.691. The correlation between the mean scores of engineers and the mean scores of contractors at 95% confidence level was not significant. The correlation between the mean scores of engineers and the mean scores of employers at 95% confidence level was 0.593. The mean score of contractors and employers were not significantly correlated. In these cases the p values was higher than 0.05 for a 2 tailed test.

Likewise in addition to the correlation test, the mean scores data were checked for agreement with each other by use of the Kruskal Walls test method. The calculated Chi square value obtained was (X^2 calculated) 0.149 while the critical Chi square value at 0.01 level of confidence with 3 degree of freedom was 11.345, as well the p value of 0.985. Hence there was strong evidence that the mean score from each group of respondents were identical.

Further to the above in order to obtain the quality assurance performance factors with relative higher importance, the weighted mean scores were determined. Calculation of the weighting factor was undertaken as per equation 12 noted under the section 4.3.5 above. Included in Appendix 5 are the weighted mean score for each of the quality assurance performance factors. Factors that showed higher weighted mean scores were considered to have higher relative importance and recognized by all Respondents to be significant. Factors of higher relative importance were (i) Supervised construction operations i.e no construction operations to be done in absence of supervisors (5.506) (ii) Selection of the sources of materials (cement, quarries or borrow areas) (4.602) (iii) Institutions for monitoring integrity of constructors and works supervisors (2.741)and (iv)Explicit technical specifications (2.620). These four factors were considered to be the key issues that deem to be important in quality assurance of Government financed construction projects in Morogoro municipality at MORUWASA. Quality assurance factors that have weighted mean scores less than 2.5 implies there was a wide disparity in opinions of respondents, hence were considered to be of relatively low importance.

4.5 Respondents views on the challenges faced by contractors that deter in quality performance of government financed construction projects

The third question raised in this study was on the challenges faced by Contractors that deter quality performance of projects in Morogoro municipality at MORUWASA. The same groups of respondents were issued with a closed end questionnaire requesting them to point out their views on various challenges as introduced on Chapter three of this study. Responders were requested to air their by use of a 5 point Likert scale. Responder's views were analysed by the use of the SPSS tool where by the mean score of each challenge was determined. Summarized in Appendix 6 are the mean scores on each challenge as pointed out by all respondents, supervising engineers only, contractors only and employers.

Appendix 6 shows that the challenge that ranked higher by all respondents was Project funding (timely availability) with a mean score of 3.863 while the challenge that had a lowest mean score was Contracts' locations (2.635). Supervising engineers however ranked higher lack of qualified technical personnel on the contractor's team (3.885), contractors ranked higher the availability of construction plant and equipment for works (4.611) and employers have ranked higher the Project funding (timely availability) (4.00). The most five (5) highly ranked challenges by the supervising engineers were (i) Lack of qualified technical personnel on the contractor's team (3.885)(ii) Project funding (timely availability) (3.769)(iii) Lack of management skills by contractor's team (3.745)(iv) Fluctuations on availability of works(3.60) and (v) Availability of plant and equipment for works (3.588).

In contrast, contractors indicated that the most challenges were (i) Availability of plant and equipment for works (4.611) (ii) Contractors experience in construction projects (4.110 (iii) Project funding (timely availability) (4.06) (iv) Access to loans through financial institutions(4.00)(v) Lack of qualified technical personnel on the contractor's team (3.944). Likewise employers had ranked higher the following challenges; Project funding (timely availability) (4.00), Resources availability (3.80), Lack of management skills by contractor 'steam (3.70) Availability of plant and equipment for works (3.60) Government taxation system (3.60)

There is a general agreement on the most five critical challenges that were commented by respondents. Each group however had at least one challenge that differs from the others. The Kendall's correlation test was conducted to check for significant relation of the mean scores as pointed out by the respondents. The Kendall's tau correlation matrix is presented in table 4.9 below.

Table 4.9: Kendall's tau correlation matrix on the mean scores of challenges faced by contractors and deters quality performance of construction projects

Kendall's tau_b Correlations		**mean scores for all respondent**	**mean scores for engineers**	**mean score for contractors**	**mean scores for employers**
mean scores for all respondent	Correlation Coefficient	1	0.765	0.493	0.620
	Sig. (2-tailed)	.	0.000**	0.004**	0.000**
	N	18	18	18	18
mean scores for engineers	Correlation Coefficient	0.765	1	0.414	0.673
	Sig. (2-tailed)	0.000**	.	0.017*	0.000**
	N	18	18	18	18
mean score for contractors	Correlation Coefficient	0.493	0.414	1	0.571
	Sig. (2-tailed)	0.004**	0.017*	.	0.001**
	N	18	18	18	18
mean scores for employers	Correlation Coefficient	0.	0.673	0.571	1
	Sig. (2-tailed)	0.000**	0.000**	0.001**	.
	N	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

From table 4.9 above significant correlations at 0.01 confidence level was noted between the mean scores for all respondents and mean scores for supervising engineers (0.765), mean scores for all respondents and mean scores for contractors (0.493), mean scores for all respondents and mean scores for employers (0.620), and the mean scores for supervising engineers and mean score for employers (0.673). The correlations between the mean scores for supervising engineers and mean scores for contractors and the mean scores for contractors and mean scores for employers were only significant at 0.05 confidence level.

The degree of agreement between the three groups of experts on the five (5) most ranked challenges was tested by use of the Kruskal Walls test. The calculated Chi square at 0.01 confidence level with 3 degree of freedom was (X^2 calculated) 9.542 where as the critical Chi square from distribution tables was (X^2 crit) 11.345. The corresponding p-value was 0.023. The results show that the mean scores from the three groups of respondents were identical with an acceptable degree of agreement.

In line with the above observations, the weighted mean scores were determined as per equation 11 noted above. Included in appendix 6 are the weighted mean scores for each challenge investigated in this study. Higher weighted mean scores point to low disparity in opinions among the respondents. The challenges with higher mean scores were as follows;

(i) Availability of plant and equipment for works (5.048) (ii) Project funding (timely availability) (3.786) (iii) Inadequate learning opportunities for continuous improvement (3.742) (iv) Contractors experience in construction projects (3.009) and (v) Lack of qualified technical personnel on the contractor's team (2.529). The other challenges investigated in this study having a weighted mean score of less than 2.5 were considered not relatively important.

4.5 Relationship between quality performance and critical factors that affects quality performance of government financed construction project in Morogoro municipality at MORUWASA

The fourth objective of this study was to examine the relationship between quality performance and the critical factors that affect performance of government financed construction project in Morogoro municipality at MORUWASA. The issue here is to investigate if there could be an empirical mathematical model that could predict quality performance given that the critical factors are fully fulfilled.

As pointed out in chapter 3 of this study (section 3.7), analysis of the collected data was made with an assumption that there could be a linear relationship between the quality performance (dependent variable) and the critical performance factors (independent variables). The relation can be in a form of linear or multiple regressions. Analysis is made hereunder to determine if the observed critical quality performance factors are related to the project performance.

4.5.1 Correlation tests between project quality performance and observed critical quality performance factors

Referring to observations made under sections 4.4.5; nine relatively important critical quality performance factors indentified were; project financing processes, project's technology requirements, contractor's experiences in construction industry, availability of construction equipment and spare parts, project managers skills and knowledge, (head of supervision team), procurement system and processes, availability of construction materials, explicit project planning and design and project team members' performance.

Similarly under section 4.4.6; five relatively important quality performance factors were noted. These factors were; project financing processes, contractor's experiences construction industry, availability of construction equipment and spare parts, project's technology requirements and procurement system and processes. Observations in sections 4.4.5 and 4.4.6 were combined to come up with six relatively important critical quality performance factors. The identified critical factors with their average weighted mean scores were namely; (i) project financing processes (8.302),(ii) contractor's experiences in construction industry (5.802), (iii) project's technology requirements (4.906), (iv) availability of construction equipment and spare parts (4.204), (v) procurement system and processes (3.103) and (vi) project managers skills and knowledge, (head of supervision team) (2.830).

These are the factors that were considered to have a critical and direct impact on quality performance of the project. The six critical quality performance factors were further used in the analysis to determine if there exists a linear relationship between project quality performance (dependent variable) and the critical quality performance factors (independent variables). The project quality performance was taken to be the total score of the six critical factors as rated by respondents. The project that has adequately covered the six factors will score 30 points of the Likert scale.

A test was made to investigate if there is a correlation between project quality performance and the critical quality performance factors. Correlation test was done by use of Kendall's tau as discussed above.

Table 4.10: Correlation matrix between quality performance factors and project quality performance.

		Project Financing processes	Contractors experience	Project technology	Availability of plant & equipment	Procurement system	Project managers skills	Quality performance
Project Financing processes	Correlation Coefficient	1	0.260	0.212	0.259	0.266	0.207	0.445
	Sig. (2-tailed)	.	0.011	0.034	0.010	0.007	0.036	0.000
Contractors experience	Correlation Coefficient		1	0.381	0.271	0.162	0.337	0.502
	Sig. (2-tailed)		.	0.000	0.006	0.097	0.001	0.000
Project technology	Correlation Coefficient			1	0.352	0.290	0.394	0.602
	Sig. (2-tailed)			.	0.000	0.003	0.000	0.000
Availability of plant & equipment	Correlation Coefficient				1	0.176	0.320	0.518
	Sig. (2-tailed)				.	0.068	0.001	0.000
Procurement system	Correlation Coefficient					1	0.331	0.517
	Sig. (2-tailed)					.	0.000	0.000
project managers skills	Correlation Coefficient						1	0.629
	Sig. (2-tailed)						.	0.000
Quality performance	Correlation Coefficient							1
	Sig. (2-tailed)							

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Primary data

From table 4.10 above it can be seen that there exist relatively small significant correlations between independent variables (various critical performance factors) and the dependent variable (project quality performance). The correlations are significant at0.01 and 0.05 confidence levels on a two tailed Kendall's tau correlation test. The correlation between contractors experience in construction industry and procurement system however was observed to be not significant.

4.5.2 Testing the assumptions of multiple linear regression model

As discussed under section 3.3 above (research paradigm), the assumptions that underline the multiple linear regression models linearity between dependent and independent variable (s), autocorrelation, multicollinearity in data (independence of errors or residuals), homoscedasticity and normality of error distribution.

a) Test for linearity between dependent and independent variable

The test for linearity is done by determining the correction between the dependent variable and the independent variables. The portion of table 4.10 above can be used to determine the linearity between the project quality performance and the critical performance factors as shown under table 4.11 below.

Table 4.11: Correlation between project quality performance and critical quality performance factors

		Project financing processes	Contractors experience	Project technology	Availability of plant & equipment	Procurement system	Project managers skills
Project quality performance	Correlation coefficient	0.445	0.502	0.602	0.518	0.517	0.629
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000

Source: Primary data

Table 4.11 above shows there is a linear relationship between project quality performance and the critical quality performance factors. All correlations were noted to be significant at 0.01 levels using a two tailed Kendall's test.

b) Test for autocorrelation in data.

For a multiple regression model to give valid results there should not be autocorrelation in the data. The Durbin-Watson's "d" test is used to check for autocorrelation in data as shown in table 4.12 below;

Table 4.12: Test for auto correction of Research data

Model Summary b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson (d value)
1	0.998	0.995	0.995	0.251	2.057

a. Predictors: (Constant), Procurement system, project managers skills, Project financing processes, Availability of plant & equipment, Contractors experience, Project technology

b. Dependent Variable: Project quality performance

Table 4.12 above shows that the value of "d"for test data is 2.057.A value around 2 or the accepted range of "d" value is from 1.5 to 2.5. The d value obtained indicates no autocorrelation. Hence the analysis shows that there is no auto-correlation in the data. This implies that the observed data are independent from each other. In other words the residuals or the difference from the model predicted value (predicted scores) and the actual scores are independent from each other.

c) Test for Multi-collinearity in the data.

The data multicollinearity between independent variables (critical quality performance factors) was checked using Tolerance as discussed under section 3.3 above. The tolerance measures the influence of one independent variable on all other independent variables; the tolerance is calculated with an initial linear regression analysis.

Tolerance is defined as $T = 1 - R^2$ for these first step regression analysis. Where $T < 0.1$ there might be multi-collinearity in the data and with $T < 0.01$ there certainly is. The second test performed was Variance Inflation Factor (VIF) defined as $VIF = 1/T$. Similarly with $VIF > 10$ there is an indication for multi-collinearity to be present; with $VIF > 100$ there is certainly multi-collinearity in the sample.

Table 4.13: Results of multi-collinearity test between independent variables (critical perfrmance factors)

Model	Collinearity Statistics	
Quality performance factors	Tolerance	VIF Values (Variance inflating factors)
Project Financing processes	0.761	1.314
Contractors experience in construction industry	0.755	1.324
Project technology	0.678	1.474
Availability of plant & equipment	0.752	1.330
Procurement system	0.783	1.277
Project managers skills	0.693	1.443

a. Dependent Variable: Quality performance

Source: Primary data

From table 4.13 above all values of T are greater than 0.1 and the VIF are less than 5. Subsequently the test shows that there is no problem of multicollinearity in the research data. Data are independent from each other there regression coefficients to be estimated by use of these data will relatively accurate and reliable. The other test for multicollinearity within independent variable is the correlation coefficient between independent variables. The higher the correlation value between independent variables is an indication of multicollinearity within the data. As shown on table 4.13 above, the correlation between independent variables are relatively low, hence there are no evidence of multicollinearity in the test data.

d) Test for data homescedasticity

Homoscedasticity refers to a situation where the difference between the observed value and the predicted value (residuals) by use of multiple linear models remains the same. As well the residuals are normally distributed. The violation of homoscedasticity is referred to heteroscedasticity implying that there are presence of errors in the variances of the in the linear regression model. The presence of heteroscedasticity can be tested by the White test. In accordance to Gujarat and Porter (2010) cited in Magali (2013), the presence of heteroscedasticity can be tested by means of White Test. White Test is done by comparing the value of calculated Chi square and the observed Chi-square values. The calculated Chi square is obtained by using the formula:

$$\chi^2 = N \times R^2 \qquad 13$$

whereby χ^2 = is the calculated Chi-square, N= is the number of observation and R^2 = R-Square or coefficient of determination computed as per table 4.13 above.

The decision rule is that where the calculated Chi-square is less than Chi-square observed there is would be no heteroscedasticity problem in the prediction model.

Using the study data the calculated Chi square is 79.6 and the observed data can be read by use of Microsoft excel functions at alpha (α) of 0.01 and "N" (Number of observations) equals 80 the Chi-square observed is 106.39. The result indicates that calculated Chi-square is less than the observed Chi-square which implies that the model does not exhibit heteroscedasticity problem.

Further to the above Lind *et al* (2006), showed that homescedasticity can be checked by the analysis of the residual of the regression model. For linear regression models residuals are normally distributed and should remain relative constant irrespective of the value of the predicted dependent variables. Normality of residuals can be determined by plotting histogram diagrams of residual distribution where as scatter diagram of residuals against the predicted values can be used to detect any presence of heteroscedasticity. In this study the SPSS tool was used to investigate the normality of residuals and the scatter diagram to detect the pattern plot of residuals against the predicted values. Figures 4.4 and 4.5 below shows the trend of the plots.

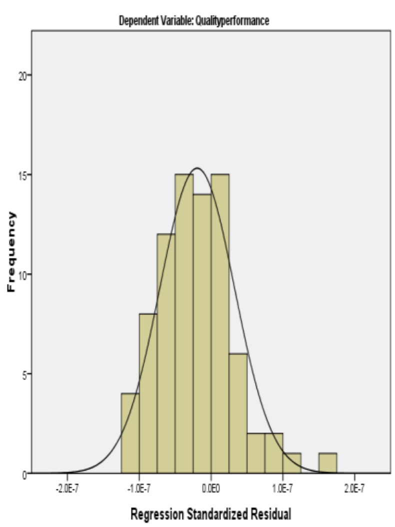


Figure 4.4: Histogram of Residuals

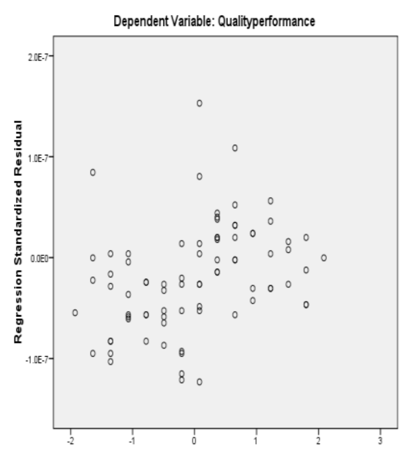


Figure 4.5: Scatter Diagram for Residual and Predicted Value

From figures 4.4 above the histogram of residuals depicts a normal distribution trend; hence there is no problem of heteroscedasticity in the study data. Similarly from fig 4.5 the scatter diagram of residuals against standardized predicted values do not show a specific pattern, a situation that also emphases lack of heteroscedasticity in the study data.

e) Test for data normality of data

The test for data normality is somehow related to the test for homescedasticity. The underlying principle on the test for normality is that most common statistical tests rely on the normality of a sample or population; hence it is often useful to test whether the underlying distribution is normal, or at least symmetric. The US Department of Commerce (2012) in the "*Handbook of Engineering Statistics*" shows that the common procedures for testing normality in data are the Kolmogorov – Sminorvo (K-S) test and the Shapiro – Wilk (S-W) test. The two procedures test the sample data if it comes from the normal distribution population. Under the K-S test the test statistic calculated are compared with the critical values that can be obtained from the K-S table. The decision rule is that where the calculated test statistics is greater than the critical value; reject the null hypothesis that sample data are normally distributed. Where the sample data is greater than 50, the critical values are given by $1.63/\sqrt{n}$ for 0.01 level of significant and $1.36/\sqrt{n}$ at 0.05 level of significant, "*n*" being the sample size. The other decision rule that applies to both normality test procedure discussed above, noted by Ghasemi and Zahedias (2012) is that where the calculated significant level is less than the test significant level (say 0.01 or 0.05), reject the null hypothesis that sample data are normally distributed.

The SPSS tool was used to determine the K-S and S-W for study data. Test results are presented in table 4.14 below

From table 4.14 below, all the calculated p-values (significant values) are greater than 0.01. Moreover the critical K-S values at 0.01 significant level is 0.182 (for n =80, $1.63/\sqrt{80} = 0.182$). In reference to table 4.14below only the calculated K-S values for Project financing processes, Project manager skills and Procurement system are slightly greater than 0.182. Hence in view of the above analysis there is adequate evidence that the study sample data are normally distributed.

Table 4.14: Tests of normality on Study Data

Tests of Normality

Independent variables	**Kolmogorov-Smirnova**			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Project financing processes	0.194	79	0.079*	0.935	79	0.185
Contractors experience	0.144	80	0.140	0.936	80	0.223
Project technology	0.181	80	0.118	0.914	80	0.263
Availability of plant & equipment	0.144	80	0.106	0.966	80	0.544
Procurement system	0.201	80	0.109	0.733	80	0.225
Project Manager skills	0.187	80	0.089	0.939	80	0.263

*. This is a lower bound of the true significance.

4.6.3 Regression of independent variables against dependent variable

a) The multiple linear regression model

In reference to section 3.7 of this study, analysis of observed data involved regression of independent variables (critical quality performance factors) and the dependent variable being the project quality performance. Having tested and confirmed the assumptions of multiple linear regression models under section 4.6.2 above, it now imperatively that the study data can be used to develop the multiple linear regression model of the following form;

$$PQP = \beta_0 + \beta_1 PF + \beta_2 CE + \beta_3 PT + \beta_4 PE + \beta_5 PS + \beta_6 + \varepsilon \quad 14$$

Whereby $\boldsymbol{\beta_0}$ is the constant term of the model, $\boldsymbol{\beta_1}$to $\boldsymbol{\beta_6}$are coefficients of independent variables and ε is the error term. The terms PQP refers to Project Quality Performance a dependent variable, where as independent variables are PF, CE, PT,PE and PS. The terms PF refers to Project Financing processing, CE refers to Contractors Experience in construction industry, PT means Project Technology requirements, PE refers to Availability of Plant and Equipment and PS means Procurement System and processes.

The multiple linear regression model shown as equation 14 above was analyzed by use of SPSS tool where by the project quality performance variable (PQP) was regressed against the project financing processes (PF), Contractors experience in construction industry (CE), Project technology requirements (PE), and Procurement system and processes (PS). The performance factor of Project manager skills and knowledge (PM) was considered as a dummy variable coded as 0 or 1. At planning stage of the project, needs for the project manager skills are relatively less important in comparison to the other factors. At this stage the project manager skills factor was coded as zero (0). During project implementation however, skills for the project manager are far important hence the project manager skills factor in the model was coded as one (1).

b) Explanation of the multiple linear regression model results

Results for the multiple linear regression model discussed above are presented in the tables 4.15a, 4.15b and 4.15c below;

Table 4.15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.962	0.926	0.921	0.983

a. Predictors: (Constant), Procurement system, Contractors experience, Availability of plant & equipment, Project Financing processes, Project technology

Included in model summary is the R value (0.962) being the coefficient of multiple correlations between the variables. It shows the strength of relationships between all independent (predictors) variables and the dependent variable. It is the number ranging from 0to 1.The higher the number close to 1, the relationship is stronger. The model summary table also has the R square value of 0.926. This number represents the portion of the variance of the dependent variable that is explained by all independent variables (Dallal 2012). Then there is an adjusted R square that measures the strength of the predictive model. Where the model is run stepwise the adjusted R square shows how much the added or removed independent variable is significant to the predictive model. Finally there is a standard error of estimated (0.983). Lind et al (2006) defines this number as a measure of variability in the estimates (predicted values). This number shows how much error is being made when a model is used to estimate the values of the dependent variable. Smaller values are better because it indicates that the observations are closer to the predicted values.

Table 4.15b indicates the regression sum of squares is 982.104; this is the error term showing the squared difference between the predicted values and the mean of observed values. It is the amount of uncertainty that will be present if one would predict the individual responses without other information. Included in this table is the error or residual sum of squares, being the squared differences between the observed data and the predicted data. Lower values of residual sum of square implies good predictive model.

Table 4.15b: Analysis of Variance Data (ANOVA)

ANOVAb

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	898.403	5	179.681	185.640	0.0000
	Residual	71.547	74	0.967		
	C Total	969.95	79			

a. Predictors: (Constant), Procurement system, Contractors experience, Availability of plant & equipment, Project Financing processes, Project technology

b. Dependent Variable: Quality performance

The table also contains degree of freedom (df) values. Regression df values (*k*)refers to the number of independent variable analysed while the residual degree of freedom (df) refers to the number of observations minus the number of independent variables minus 1, ie (n-k-1). The mean square is the ratio of the sum of the squares and the degree of freedom. The F value is the ratio of regression mean square and the residual mean square *(179.681/0.967 = 185.640)*. In accordance to Dallal (2012), the F ratio value follows the F statistical distribution and can be used to test statistical significant capability of the model. The null hypothesis is that the model has no statistical predictive capabilities meaning that all the population regression coefficients are all equal to zero (0). The critical F distribution is determined as;

$$Fcr = k/(n-k-1) = 5/(80-5-1) = 0.068 \qquad 15$$

The decision rule is that if the F ratio (185.640) is greater than the Fcr (0.068) reject the null hypothesis. The F ratio as per table 4.16b is far greater than the F distribution; hence the model has statistically significant predictive capability of the dependent variable. This statement is overemphasized by the Sig. value ($p < 0.000$) as shown by the last column of the ANOVA table.

Table 4.16: Regression Coefficient Value

Coefficients a Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	Beta	Std. Error	Beta		
(Constant)	(0.023)	0.815		(0.029)	0.977
Project Financing processes	0.990	0.177	0.202	5.587	0.000
Contractors experience in construction industry	1.258	0.161	0.277	7.813	0.000
Project technology	1.328	0.149	0.335	8.936	0.000
Availability of plant & equipment	1.162	0.139	0.299	8.357	0.000
Procurement system	1.236	0.125	0.346	9.916	0.000

a. Dependent Variable: Quality performance

Source Primary data

Table 4.15c above contains the regression coefficients values. Using the data in table 4.15c the project quality performance model can be presented as;

PQP = -0.023+0.99PF+1.258CE+1.328PT +1.162PE +1.236PS 16

Data presented in table 4.16c shows that model regression coefficients are indicated as un-standardized coefficients and the standardized coefficients. The first data for un-standardized coefficients is the multiple linear regression constant (-0.023) with an error of 0.815 and a p-value of 0.977. The regression coefficient is not statistically significant. The constant is the predicted value when all independent factors are set to zero. Jim Frost (2013) observed that this constant is clearly meaningless and one shouldn't even try to give it a meaning. There should be no project quality performance if all quality performance factors are zero or not considered at all. Moreover even if it's possible for all of the predictor variables to equal zero, that data point (-0.023) is outside the range of the observed data. As a rule of thumb one should never use a regression models to make a prediction for a point that is outside the range of data because the relationship between the variables might change.

The constant term is in part estimated by the omission of predictors from a regression analysis. In essence, it serves as a tool for any bias that is not accounted for by the terms in the model. The role of the regression model is to minimize residuals between the observed and predicted data. The model adjusts the constant up and down to a point where the mean of the residuals is zero, which is a key assumption for ANOVA test. The constant guarantees that the residuals don't have an overall positive or negative bias.The other un-standardized data are the coefficients to the regression model. The coefficient for Project Financing processes0.99 and the p-value of 0.000, coefficient for Contractors experience in construction industry1.258with a p–value of 0.000, coefficient for Project technology requirement is 1.328 with a p-value of 0.000 coefficient for Availability of plant & equipment is 1.162 with a p-value of 0.000, and the coefficient for Procurement system and processes is 1.236 with a p-value of 0.000. All coefficients are statistically significant. Furthermore as observed by Nathans *et al* (2012), no need of additional test is required to determine the significance of coefficients if the independent variables are not correlated (no multicollinearity effect). The model at this stage is considered to be statistically significant.

Table 4.16c also presents the Standardized beta Coefficients. The standardized beta coefficients provide a measure for relative strength of independent variables. Frost (2013) noted that the larger the absolute value of the standardized beta coefficient the stronger its contribution to the model. Hence project technology requirement; availability of plant and equipment project and procurement system and processes, quality performance factors presents a stronger contribution to the model. Where the multiple linear regression model is run stepwise, 82% of the model prediction is accounted by these three quality performance factors.

4.6 Relationship between critical performance factors and project quality performance

While it is appreciated that quality performance of projects depends on many factors, however as per this study and particularly in Morogoro municipality at MORUWASA quality performance of government financed construction projects depends mainly on the five factors ad discussed above. Linear relationships exist between the quality performance and the critical performance factors. The relationship implies that there is direct impact on the quality performance of the construction project one on the five factors or all of them somehow ignored. Since all the model coefficients are positive, it implies that adequate consideration of any of the factors at planning stage of the project would lead to significant increase in quality performance of the project. Any of the planners, financiers, employers or any other stakeholders involved in project planning who puts less consideration of the factors should be aware that the project being planned will end up in relatively poor quality results.

CHAPTER FIVE

DISCUSSION OF FINDINGS/RESULTS

5.1 Chapter overview

In the previous Chapter, the SPSS tool was used to analyse study data. The study data were analysed in terms of descriptive statistics and presented in terms of charts and tables. The descriptive statistics led to identification of type and quality of respondents returned the questionnaires. Ranking of the mean scores gave the critical quality performance factors as well as the quality assurance issues that have direct and major influence on the quality performance of government construction projects in Morogoro municipality at MORUWASA. The challenges faced by Contractors that deter quality performance of projects were also identified. Likewise, correlation analysis was done to test the strength of relationship between project quality performance and the critical quality performance factors**.** Using the regression analysis a multiple linear regression model was established that could predict the extent of project quality performance at a given set of critical quality performance factors. Chapter five presents the discussion based on study findings and various statistical methods that are used to verify the behaviour or pattern of findings. This chapter also presents interpretation of results in comparison with what other scholars have said in literature review. This discussion of findings was done based on specific objectives developed in Chapter one of this report as follows:-

5.2 Critical factors that hinder quality performance of government financed construction project in Morogoro municipality at MORUWASA

The first specific objective of this study was to identify critical factors that hinder quality performance of government financed construction project in Morogoro municipality at MORUWASA. Through literature review and face to face discussions with experienced professionals in construction industry a total of twenty (20) quality performance factors were identified. Closed end questionnaires were used to obtain responses from individuals involved in planning, supervision and execution of government financed construction projects. Based on their responses the study revealed that, there are six (6) critical factors that had a direct influence on the quality performance of government financed construction projects in Morogoro municipality. The identified six (6) critical factors are discussed hereunder as follows;

a) Project Financing Processes

The project financing processes was the highly ranked quality performance factor among all respondents involved in the study. The factor achieved the highest average weighted mean score (8.3), indicating that there was a general agreement on the importance of this factor on quality success / performance of the project. According to Corner (1996),project financing processes comprises of major independent capital investment arrangement that the sponsoring company segregates from its assets as well as the general purpose obligations. The processes involve generating finance on a limited recourse for the purposes of developing a large capital- intensive project. Generating finances for projects could be through the government, banks or other independent institutions with special interest on a particular public project.

Project financing processes is important in all stages of projects from initiation, planning, execution and commissioning. Projects whose financing processes were not cleared at the start of the project could hardly achieve quality performance. Lack of project financing arrangement could lead to compromise on quality, project delays, legal disputes due to delays of payments to the contractor, cost overruns, etc. Similar finding by Chan (2001), show that lack of sustained financing processes, led to project unit cost variations, time variation, project net present values variability, changes in project functionality and stakeholders dissatisfaction. Definitely this is failure to achieve the quality initially planned. Moreover Ramanathan *et al* (2012), in Australasia noted that lack of proper project financing processes lead to delays in project completion. Additional studies carried out by Aibimi (2006) in Nigeria and Frimpong (2003) in Ghana shows that project financing requirements was among of the reasons for project delays.

b) Contractors experience in construction industry

Contractors experience in construction industry was the second highly ranked quality performance factors for quality success of government financed construction project with an average weighted mean score of 5.8. Respondents observed that contractor's experience plays a very important role in achieving quality performance of the projects. Contractors experience combines both experience of its staff and outstanding involvement of the firm in construction projects.

Atout (2008) supports these findings in sense that the success of construction projects depended on the experience of the contractor as well as capability of the contractor's project manager. The project manager is supposed to manage and direct the project, based on a full understanding of the requirements and the vision; and he/she should have a strong experience and confidence to delegate responsibilities and to stand by decisions. It is therefore important to develop the right contracting strategy at the beginning of the project development phase. Contracting arrangement that includes selection of experienced contractors plays an important role in successful execution of a project. Study by Matiko (2007) as well show that elements of quality project output include; workmanship, teamwork (management and labour); cost control, timely project completion, proper resource management, availability of experienced and skilled personnel, competitive tendering and continuous improvement (learning and innovation). All these elements can be managed and properly controlled by experienced contractors.

The need of having experienced contractors in construction projects is also supported by the Tanzanian Construction Industry Policy (2003); lack of experienced contractors in the government construction projects is one of the challenges put forward by this policy. The policy directed the government to develop capacities of local contractors through training, allocating more work opportunities and resources in terms of finance.

c) Project Technology requirements,

Fathi (2012), defines Construction Project Technology as methods of construction to successfully achieve the structural design with recommended specifications. It includes study of construction equipments, and temporary works required to facilitate the construction process. It requires one to develop practical knowledge and skills in construction project planning, contract administration and sub-trade coordination, drawing interpretation, sketching of details and site surveying.

The project technology requirement is one of the factors that play an importance role in quality performance of construction projects. Respondents in the study ranked third this factor as one of the six critical project quality performance factors with an average weighted mean score of 4.9. The respondents' views emphasized on the need of having appropriate knowledge and skills on the work itself and the associated tools, equipment and materials. The recent construction technology variations particularly for materials required in building projects have become an important parameters for customer's satisfaction and hence quality performance of the project. High quality workmanship could prove useless only if the type of material specified for a particular project has gone astray. Modernization in laboratory and hospital tools and equipment requires critical review of building designed for that purposes. Lack of clear understanding of the technological requirement at early stage of the project may lead to variations hence increased project costs and delays.

The study finding is also in line with observation by Otim and Alinaitwe (2013); the project characteristics being complexity, size, construction design and material type seriously affected performance of road project constructions. These characteristics which form part of project technology requirements have influence on project quality performance.

Similarly Sadel *et al*, (2000); observed that the technological uncertainty dimension played significant role in project success. The project could be of Low Technology, Medium Technology, High Technology and the Super High Technology. Success performance of the project could depend on the level of technology involved during its execution. The level of technology involvement determines the risks contained the project and hence its success.

Further to the above the UK Commissioner for Employment and Skills (2013); supports the finding and observes the increase in the market of offsite construction products. The offsite construction products range from small fitting to large scale modules such as roofing system or bridge parts and can be assembled to complete a structure within a short time. Offsite construction products require skilled and experienced labour force. The technology uncertainty risk definitely can affect the quality performance of the project.

d) Availability of plant & equipment for construction projects

The fourth highly ranked (with average weighted mean score of 4.2) quality performance factor was the availability of plant and equipment for construction works. This factor was specifically ranked higher by respondents who are contractors. These are the one involved in actual execution of construction projects.

Most of government financed construction projects being executed in Morogoro municipality at MORUWASA region are on roads. No one envisages quality road works in the absence of specific plant and equipment. Other scholars (Odeh and Battainesh, 2002;Sambasivan and Soon 2007;) in Jordan and Malaysia noted that plant and equipment availability was the key cause of project delays. Availability of plant and equipment plays a major role in ensuring that projects are executed on schedule, at targeted budget and within an acceptable quality.

The Built Constructions ‘Forum (2016) supports these findings; plant and equipment had allowed construction workers to eliminate a lot of imperfect mechanisms in construction. Mastery over plant, tools and equipments has definitely increased man's overall productivity. The use of appropriate plant and equipment contributes to Economy, Quality, Safety, Speed and Timely completion of the project. This observation signifies the importance of plant and equipment in any part of construction process.

The current trend is that many small contractors have realized the importance of construction plant and equipment in Morogoro municipality at MORUWASA; hence are trying to acquire and own fleet of plant and equipment. It is not always desirable or possible for the Contractor to own each and every type of construction equipment required for the project. As observed by Chinchore and Khare (2014), contractors need training on factors that affect selection of appropriate plant and equipment for works. One has to realize that every plant and equipment has certain factors those are in common and which are taken into consideration while selecting equipment. Considering the various aspects of the utility of particular plant and equipment, the Contractor has to economically justify whether to purchase the equipment or to hire it. The amount invested in the purchase of equipment should be recovered during the useful period of such equipment.

e) Procurement Systems and Processes

The Public Procurement Act (2011), defines procurement as a process of buying, purchasing, renting, leasing or otherwise acquiring goods, works, or services by a procuring entity and includes or functions that pertain to the obtaining of any goods, works, or services including description of requirement, selection and invitation of tenderers, preparation and award of contracts.

Procurement system as a project quality performance factor ranked fifth in this study with average weighted mean score of 3.1. Respondent underscored that for quality performance of projects there is a need of having a well recognized procurement system from initiation and planning of the project to its completion. Policy makers, financiers, planners and designers should be aware of the procurement system to be used in acquiring an entity that will be responsible for execution of the project well from instigation of the project.

Study by Noor *et al* (2013), is in agreement with finding of this study as procurement category offers a lot of influence on successful infrastructure project outcome. The procurement category can be traditional that involve design, bid and build (DBB) while the non tradition ones are the Build Operate Own (BOO) and Build Operate and Transfer (BOT). The DBB is the common method of procurement in use for most construction projects in Morogoro municipality at MORUWASA. Employers, financiers or project owners can use their in-house experts or agents to design projects, invite and select bidders for execution of the project. The DBB has the advantages of being easy to use, least cost, provides fair amount of competition, provides adequate time to review design, has higher degree of quality certainty and promotes transparence. It can be concluded that procurement has direct impact on project success. Procurement involves project documentation and identification of who suites for the execution of the project. The findings support this study and enhance the need of having a clear procurement system at the start of the project.

Other scholars (Rashid *et al* 2006; Ali *et al* 2011; Ogunsanmi 2013); support the importance of procurement system for quality performance of projects. Procurement method influence project time performance and cost overrun. Selection of procurement method depends on risk allocation, resource availability and nature of project. Employers should be aware that incomplete documentation at tender stage posse difficulties for contractors to price the works accurately a situation that may lead to disputes, delays, cost overrun and poor quality of works and damage to the integrity of the designer and employer.

Apart from realizing that procurement system is a critical factors for quality performance of construction projects, the study provides an opportunity for added knowledge to various stakeholders involved in construction projects that for success of projects; procurement systems should be clear at start of project, independent, transparent, free from corruptions, and should enable selection of a well suited contractors for execution of projects.

f) Project manager knowledge and skills (head of supervision team)

The quality performance factor "Project manager knowledge and skills"; ranked six in the study (average weighted mean score 2.8). In the closed end questionnaires, it was made clear that the project manager was refereed as the head of the project supervision team. The study guided the respondents that the project manager would be mainly involved in ongoing construction works. He is the person in-charge of all activities at construction site. Respondents considered that it is imperatively such person should have adequate knowledge, skills and experience in project. Project Manager manages project data and people. Hence apart from having appropriate knowledge the role requires management and leadership skills. Being project leaders must be able to establish direction for the future, communicate the project data and forge an aligned team work spirit. Moreover being managers has to provide short term plans, measures project performance and solve problems that hinders progress of projects.

Study by Le Hoal *et al* (2007) and Faridi (2006), in Vietnam and United Arab Emirates respectively noted that poor site management and supervision which are the key role of the Project Manager were the major reasons for delays. Poor site management and supervision could be attributed by lack of leadership skills or managerial capability of the project manager. Moreover Bantley (2007) support the need of having a knowledgeable and skilled project manager. The scholar urged that Project managers are notorious for having outstanding technical skills. But while their technical skills are highly developed, often their interpersonal skills are not. This is often the reason for many a project failure. This observation by Bantley (2007) is quite clear and can be seen in many projects carried out in Morogoro municipality at MORUWASA. Most of the project managers do not have the necessary human resource skills, do not posses leadership abilities and managerial techniques. The finding is also in agreement with Mallewo (2014), who noted that project managers were sole responsible for provision of adequate communications of project data, establishing norms for using standardized project management processes and other factors. All these had huge impact on the success of building projects in Tanzania.

5.3 Key issues that deem to be important in quality assurance of government financed construction projects

The second research objective was to, *"Identify key issues that deem to be important in quality assurance of Government financed construction projects in* Morogoro municipality at MORUWASA*"?*

On commencement of this study a total of eight (8) key issues that deem to be important in quality assurance were identified. These key issues were considered to be performance measures that need to be in place for quality assurance of projects. Takim *et al* (2002) described performance measurement as a systematic way of evaluating the inputs and outputs in manufacturing operations or construction activity and acts as a tool for continuous improvements. It is a system of operation put in place to ensure projects are executed to the specified quality and goals.

Closed-end questionnaires were used to obtain responses from respondents involved in planning, supervision and execution of government projects. Based on their responses the study revealed that, there are four (4) key issues that can assure and influence the quality performance of government financed construction projects in Shinyanga. The identified four (4) key performance measures are discussed hereunder as follows;

(i) Supervised construction operations i.e no construction operations to be done in absence of supervisors

The highly ranked key issue or performance measurement was the need of having supervision in various construction activities (weighted mean score 5.5). The respondent's observation could appear to be obvious as no project operation could be successive in the absence of supervision. The respondents emphasize here was that project planners, financiers, employers and clients should forecast and include costs associated with project supervision at early stage of project planning.

The findings is in agreement with Alwi *et al* (2001) who observed that inadequate supervision lead to increased rework of various site operations that lead to increased execution period, poor quality and cost overrun and costumers dissatisfaction of project goals.

(ii) Selection of the sources of materials (cement, quarries or borrow areas)

Selection of the sources of materials (weighted mean score 4.6) was the second highly ranked performance measure that is required to be observed for assurance of quality performance of the projects. Respondents noted that for quality performance of projects the need of having assurance on quality materials is important. For building projects most of materials selection can be made off-shelf. The world currently is facing various offsite and industry products for building works. Under such circumstances selection of quality materials calls for strong commitment and experience of the working team. Working teams with less experience can be easily cheated with advertising posts and agents involved for distribution of these products. On road works however there are established procedures for testing the quality of materials. One only needs to be familiar with the type of tests to particular materials. Lack of appropriate knowledge in selection of materials definitely leads to poor quality of works and may be cause of the short life span of the built infrastructure. Indeed there could be cost overrun, delays in completion due to rework and customer dissatisfaction.

Cunningham (2013), support this finding by showing that ;material specifications and construction details will have an important bearing on the quality and cost of the projects. Projects which incorporate high quality and/or innovative features are invariably more expensive than those which are purely functional. The choice depends on what the client is willing to pay and customer satisfaction. The materials, nevertheless, should be appropriate for their use; over – specification is wasteful. The choice of the material sources, and hence the cost, may be influenced by factors such as; aesthetic qualities, source that keeps low transport costs; availability as delivery lead-in times may cause project hold-ups; initial cost of purchase and life cycle of materials, costs for maintenance, replacement, demolition and disposal.

(iii) Institutions for monitoring integrity of constructors and works supervisors

Respondents ranked third the measures on institutions for monitoring integrity of people involved in construction works with a weighted mean score of 2.7. Respondent's views were based on the facts that quality of works could only be attained if people involved in execution of projects adhere to their professional ethics. The get-rich-quick attitude, adoration of status, and the business malpractices have alerted certain quarters of society, such that it have prompted the emergence of ethics as an area of concern. The need of having Institutions that monitor ethical behaviors of organizations and individual professionals that participate in planning, procurement, execution, maintenance and supervision of construction works is very important.

Suen *et al* (2007) supports the respondents views and show that individual factors and organization factors plays significant impact on ethical behavior of employee. Project managers cannot rely on integrity of employee only, but they need also to restructure the organization culture such that it promotes ethical behaviour. Similarly Adnan *et al* (2011) noted that the most common unethical conduct evidenced in construction industry embrace; cover pricing, bid cutting, poor documentation, late and short payments, subcontractors' lack of safety ethics, unfair treatment of contractors in tender/final account negotiations, competitors' overstatement of capacity and qualifications to secure work, competitors' falsification of experience and qualifications and bureaucratic, government policy. Unethical conduct can be minimized through training, change of organisation cultures and enhancement of institutions for monitoring unethical trends among professionals.

(iv) Explicit technical specifications

The fourth ranked (weighted mean score of 2.6) key issue that deem to be important in quality assurance of government financed construction projects in Morogoro municipality at MORUWASA was explicit technical specifications.

Respondents view is that more comprehensive, clarified and detailed technical specifications show clearly how the work is to be executed, measured and accomplished. Flawed technical specifications cannot guarantee the quality of work and can lead to disputes, variation on the quality and scope of work, temptation for bribery, reworking, cost overrun, delays of works etc. Explicit specification measures should be considered earlier at planning of projects for assurance of projects' quality performance. Inadequate technical specifications could be referred as unethical behaviour as discussed above.

The findings are in agreement with Laryea, S. (2011); poor specification writing, disparities between bill of quantities and drawings and specifications, and poorly prepared tender documents are common problems associated with tender documents. The impact of poor specifications and tender documents can lead to inaccurate estimates, higher margins in bids, claims and disputes as well as poor quality of work.

5.4 Challenges faced by contractors that determine quality performance of construction projects in Morogoro municipality at MORUWASA context

The third specific objective of the study was to explore set of challenges faced by contractors that determine quality performance of construction projects in Morogoro municipality at MORUWASA context. Similar to objective number one a set of twenty (20) challenges faced by contractors were identified and through use of questionnaires only five (5) of these were found to be critical an accepted by all respondents. The explored challenges were; availability of plant and equipment for works, project funding (timely availability), inadequate learning opportunities for continuous improvement, Contractors experience in construction projects and lack of qualified technical personnel on the contractor's team. Most of these challenges were similar to the quality performance factors identified under section 5.2 above with the exception of the inadequate learning opportunities for continuous improvement.

Availability of plant and equipment for works was the highly ranked challenge that deters quality performance of contractors in Morogoro municipality at MORUWASA (weighted mean score of 5.048). This prerequisite for availability of plant and equipment was also discussed under section 5.2 of this report. Contracting firms working on government financed construction projects in Morogoro municipality at MORUWASA mostly are small to medium sized ones. Such firms faces problem of inadequate capital for investment in plant and equipment. The lack of capital for investments had been experienced by other scholars in South Africa, Swaziland and Zambia (Thwala and Phahadi, 2009; Thwala and Mvubu 2009; Malongane, 2014 ;). Having realized this challenge of plant and equipment the Government of Tanzania in the 1990's formed a Government owned hire company (PEHCOL) to support the small and medium size construction firms. However due to mismanagement the firm collapsed and contractors were left on their own.

Project funding (timely availability) as challenge to contractors, was ranked second with a weighted mean score of 3.8. The challenge is similar to the project financing processes, a quality performance factor as discussed in the previous section. Unplanned and / or delays in payment to small and medium sized contractors is a huge burden, and has led to bankruptcy of the firms. The respondents view here is to ensure that adequate funding arrangements are in place before commencement of projects. The respondents 'views are supported by Amoako (2011); that the rippling effects of delay in paying contractors were enormous. This includes; creation of cash flow problems, difficulty in procuring materials and services and creation of enormous stress on contractors.

Inadequate learning opportunities for continuous improvement in this study emerged as a third challenge that deters quality performance of contractors. The challenge had a weighted mean score of 3.7. Practitioners in this field realize that there is a need for continuous training to improve quality performance in construction projects. Moreover, an increase technological change and intense competition due to globalization, calls for continuous professional development and constant innovation as the only way to remain competitive. Similar observation by Hassan *et al* (2010) in Malaysia; show that with the exception of a few large constructions' based companies who provide in-house training, construction and supervision training at the industry level are mostly offered by the a few government agencies. Small and medium contractors do not engage in the training activity at all. In construction, training can be effectively conducted on-the-job or through self-directed models, manual or curriculum. This could be part of the Continued Development Program (CDP) by which members of professional associations maintain, improve and broaden their knowledge and skills.

In support of this study the Tanzanian Contractors Registration Board (CRB) (2016) has developed a Sustainable Structured Training Programme (SSTP) for contractors. The program is designed to accommodate all types of contractors at three different levels depending on the class of registration namely small, medium and large contractors. The main objective of SSTP is to equip contractors with necessary technical and management skills so as to improve performance and make them more competitive in the local and regional markets. This training focuses on contractor needs, encompasses all contractors and takes into consideration lessons learnt from previous training programmes. Unfortunately only few contractors are taking up this opportunity. In future possibly the Contractors Registration Board (CRB) should look on introducing training annual scores (being evidence for attending training) that a firm must achieve before allowed to renew their license. Indeed there is a need to conduct a research on how training and learning opportunities for continuous improvement will have positive impact on performance of construction projects in the country.

The fourth and fifth ranked challenges faced by contractors that deter there quality performance were Contractors experience in construction projects (weighted mean score of 3.01) and Lack of qualified technical personnel on the contractor's team (weighted mean score of 2.53). These challenges are similar to observation made while discussing critical factors that hinder quality performance of projects in Morogoro municipality at MORUWASA. Moreover lack of qualified technical personnel on the contractor's work force could be addressed and discussed simultaneously while analyzing improvement in workers skill and quality of works due to training and learning opportunities for continuous improvement.

5.5 Relationship between quality performance and the critical factors that affects performance of government financed construction project in Morogoro municipality at MORUWASA.

The fourth specific objective of this study was to examine the relationship between quality performance and the critical quality performance factors that affects performance of government financed construction project in Morogoro municipality at MORUWASA. Examination on the relationship between the quality performance (dependent variable) and the list of critical quality performance factors (independent variable) aimed at developing a model was done by use of the SPSS package. It was observed that there is a positive linear relationship between the independent variable and the dependent variable of the form given as per equation 15 under section 4.6.3 of this report which is reproduced hereunder;

$$PQP = -0.023+0.99PF+1.258CE+1.328PT +1.162PE +1.236PS$$

The terms PQP refers to Project Quality Performance a dependent variable, where as independent variables are PF refers to Project Financing processing, CE refers to Contractors Experience in construction industry, PT means Project Technology requirements, PE refers to Availability of Plant and Equipment and PS means Procurement System and processes.

The positive linear relationship in the model above implies that agencies overseeing government construction projects in Morogoro municipality at MORUWASA should put in place strategies for ensuring the critical performance factors are well thought-out at project planning stage. Quality successfulness of government construction projects could be assured once these factors are made to be the focal points by all financiers, employers, planners and all other stakeholders involved in project planning, execution, commissioning and maintenance. The project financing processing, contractors experience in construction industry, project technology requirements, availability of plant and equipment and procurement system and processes as discussed in this study are the major attributes for quality performance of government financed construction projects in Morogoro municipality at MORUWASA.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Chapter overview

Chapter six is the last chapter of this study. The Chapter presents summary, conclusion and policy recommendations based on findings of the study. In addition this chapter also includes areas for further research. It is organized as follows; Summary, Conclusion, Policy recommendations and areas for further research.

6.2 Summary

The main objective of this study was an assessment of critical factors affecting quality performance of government financed construction projects: a case of Morogoro municipality. To conduct this study effectively four specific objectives were developed. The specific objectives were; first to identify critical factors that hinder quality performance of government financed construction project in Morogoro municipality at MORUWASA; secondly it was to identify key issues that deem important in quality assurance of Government financed construction projects in Morogoro municipality at MORUWASA; thirdly was to explore set of challenges faced by contractors that deter quality performance of construction projects in Morogoro municipality at MORUWASA context and finally to examine the relationship between quality performance and the critical factors that affects performance of government financed construction project in Morogoro municipality at MORUWASA.

In line with the specific objectives above corresponding questions were created to guide the research and the related findings. The questions created were, what are the critical factors that hinder quality performance of government financed project in Morogoro municipality at MORUWASA? What are the key issues that deem to be important in quality assurance of Government financed construction projects in Morogoro municipality at MORUWASA; What are the challenges faced by contractors that deter quality performance of projects in Morogoro municipality context and finally; What is the relationship between quality performance and the critical factors which affect quality performance of government financed construction project in Morogoro municipality at MORUWASA context?

The research paradigm was to use both positivist views and interpretive views based on the fact there is a set of factors that have influence on the quality performance of government financed construction projects. On the other side, interpretive views was used believing that there is an unlimited number of factors that could have effects on project quality performance but few are critical and relevant to Morogoro municipality at MORUWASA conditions. The additional inquiry was to investigate the relationship between quality performance and the critical factors. The finding in preceding chapters shows that all the research objectives have been met and research questions were adequately answered.

6.3 Conclusion

The study findings have established that quality performance of government financed construction projects in Morogoro municipality at MORUWASA is influenced by six critical quality performance factors namely; project financing processes, experience of contractors in construction industry, project technology, availability of plant and equipment, procurement system and processes as well as the project manager knowledge and skills. These six critical factors need to be well thought-out at planning stage of projects.

Moreover during execution of projects; key measures need to be put in place for quality assurance of projects were identified as; supervised construction operations i.e no construction operations to be done in absence of supervisors; selection of the sources of materials (cement, quarries or borrow areas); institutions for monitoring integrity of constructors and works supervisors and explicit technical specifications. The key measures provides a response to the study by the Tanzanian National Audit (URT 2010), which showed that failure to achieve quality performance of road projects was due to lack of system for ensuring quality performance.

Finally challenges facing contractors in Morogoro municipality explored were as follow; availability of plant and equipment for works, project funding (timely availability), inadequate learning opportunities for continuous improvement, contractors experience in construction projects and lack of qualified technical personnel on the contractor's team. Interestingly; most of these challenges were similar to the quality performance factors identified in response to the first specific objective, with the exception of the inadequate learning opportunities for continuous improvement.

Further to the above it was also established that there is a positive linear relationship between critical quality performance factor and the quality performance of government financed construction projects in Morogoro municipality at MORUWASA.

6.4 Policy recommendations

The study findings indicate that quality performance of construction projects could be achieved if issues discussed in the study are well thought at the project initiation. Ignoring these issues renders difficulties in attaining targeted quality of construction works. The study has provided a tool to policymakers and planners who wish to engage into new construction projects. The critical factors for quality performance, the quality assurance measures and challenges being faced by the contractors forms an important knowledge base for achieving quality performance in construction projects. The traditional project success factors of time, cost and schedule can no longer stand alone; they strongly need to be amplified by the findings discussed in this report.

6.5 Areas for further research

This study mainly based on the assessment of factors affecting quality performance of government financed construction projects. However during discussions of the study findings the following areas were noted that they need further studies;

i) Assessment of economical and social factors that hinders women participation in construction relation activities

ii) Assessment of the effects of experience in construction industry while analyzing quality performance of projects. This need for additional study was noted while analyzing the critical performance factors as per this study; the level of disparity in opinions of respondent with different experience was higher in comparison to when analysis was made based on the occupation of respondents.

APPENDINCIES

Appendix 1: Study References

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Appendix 2: Table for Individual group ranking of the quality performance factors

S/No	Factors affecting quality performance of government construction projects	Engineer's only		Contractor's only		Employer's only	
		Mean score	**Std Deviation**	**Mean score**	**Std Deviation**	**Mean score**	**Std Deviation**
1	Project financing processes	4.260	0.723	4.588	0.507	4.167	0.835
2	Contractor's experiences in construction industry	3.804	0.775	4.294	0.588	3.750	0.866
3	Availability of construction equipment and spare parts	3.706	0.879	4.412	0.712	3.667	0.985
4	Project's technology requirements	3.333	0.864	4.353	0.493	3.500	0.798
5	Procurement system and processes	3.373	1.019	4.125	0.719	3.417	0.900
6	Availability of construction materials	3.373	1.095	4.176	0.809	3.250	0.866
7	Project managers skills and knowledge, (head of supervision team)	3.373	1.183	4.188	0.655	3.250	0.965
8	Explicit project planning and design	3.529	1.084	3.529	0.717	3.250	0.965
9	Explicit technical specifications	3.431	1.188	3.706	0.849	3.167	1.267
10	Supervision team skills and knowledge	3.275	1.185	3.941	0.899	3.083	1.311

11	Project team members' performance	3.373	1.076	3.706	0.772	2.833	0.835
12	Environment protection	3.039	1.326	3.706	1.359	2.818	1.168
13	Contractor's profitability	3.188	1.032	3.588	1.121	3.167	1.030
14	Decision making process by clients	3.000	1.264	3.625	0.957	2.750	1.055
15	Explicit contract documentation	2.920	1.259	3.353	0.862	3.250	1.505
16	Health and safety issues	2.902	1.315	3.588	1.294	2.500	1.000
17	Variation in climate conditions	2.767	1.106	3.471	1.068	3.083	1.443
18	Local community involvement	2.863	1.217	2.882	1.219	3.417	1.443

Source: Primary data

Appendix 3: Most 10 critical quality performance factors in each group of respondents

S/No	All respondents	Engineers only	Contractors only	Employers only
1	Project financing processes (4.317)	Project financing processes (4.260)	Project financing processes (4.588)	Project financing processes (4.167)
2	Contractor's experiences in construction industry (3.90)	Contractor's experiences in construction industry (3.804)	Availability of construction equipment and spare parts (4.412)	Contractor's experiences in construction industry (3.750)
3	Availability of construction equipment and spare parts (3.85)	Availability of construction equipment and spare parts (3.706)	Project's technology requirements (4.353)	Availability of construction equipment and spare parts (3.667)
4	Project's technology requirements (3.575)	Explicit project planning and design (3.529)	Contractor's experiences in construction industry (4.294)	Project's technology requirements (3.500)
5	Procurement system and processes (3.532)	Explicit technical specifications (3.431)	Project managers skills and knowledge, (head of supervision team) (4.188)	Procurement system and processes (3.417)
6	Availability of construction materials (3.525)	Availability of construction materials (3.373)	Availability of construction materials (4.176)	Local community involvement (3.417)
7	Project managers skills and knowledge, (head of	Project managers skills and knowledge, (head of supervision	Procurement system and processes (4.125)	Availability of construction materials (3.250)

	supervision team) (3.519)	team) (3.373)		
8	Explicit project planning and design (3.490)	Procurement system and processes (3.373)	Supervision team skills and knowledge (3.941)	Project managers skills and knowledge, (head of supervision team) (3.250)
9	Explicit technical specifications (3.45)	Project team members' performance (3.373)	Explicit technical specification s (3.706)	Explicit project planning and design (3.250)
10	Supervision team skills and knowledge (3.40)	Project's technology requirements (3.333)	Project team members' performance (3.706)	Explicit technical specifications (3.167)

Source: Primary data

Appendix 4: Weighted Mean score for various performance factors

S/No	Factors affecting quality performance of government construction projects	Mean score for all respondents	Weighting factor	Weighted Mean score for all respondents
1	Project financing processes	4.317	2.132	9.205
2	Contractor's experiences in construction industry	3.900	1.584	6.176
3	Availability of construction equipment and spare parts	3.850	1.152	4.435
4	Project's technology requirements	3.575	1.858	6.643
5	Procurement system and processes	3.532	1.030	3.637
6	Availability of construction materials	3.525	0.902	3.179
7	Project managers skills and knowledge, (head of supervision team)	3.519	1.044	3.674
8	Explicit project planning and design	3.490	0.891	3.108
9	Explicit technical specifications	3.450	0.636	2.195
10	Supervision team skills and knowledge	3.388	0.600	2.033
11	Project team members' performance	3.363	0.880	2.958
12	Environment protection	3.160	0.387	1.222
13	Contractor's profitability	3.138	0.577	1.810
14	Decision making process by clients	3.090	0.554	1.711
15	Explicit contract documentation	3.083	0.519	1.601
16	Health and safety issues	2.988	0.421	1.259
17	Variation in climate conditions	2.963	0.452	1.340
18	Local community involvement	2.950	0.368	1.084

Source: Primary data

Appendix 5: The Respondents views on quality assurance performance factors

S/N	Quality assurance performance factors	All respondent	Engineers only	Contractors only	Employers only	Weighted mean scores
1	Supervised construction operations i.e.; no construction operation to be done in absence of supervisors	4.113	4.118	4.176	4.000	5.506
2	Selection of the sources of materials (cement, quarries or borrow areas)	3.988	3.961	3.941	4.083	4.602
3	Explicit technical specifications	3.625	3.451	4.000	3.833	2.620
4	Carrying out various tests on the quality of construction materials	3.550	3.529	3.824	3.250	1.425
5	Carrying out tests on completed construction operations to check compliance with specifications	3.513	3.451	3.588	3.667	1.867
6	Inspection of completed construction operations by a group of experts	3.413	3.294	3.176	3.250	2.188
7	Retention of constructors for a specific period to oversee the completed construction operations and undertake remedies where deemed necessary	3.325	3.255	3.177	3.583	1.883
8	Institutions for monitoring integrity of constructors and works supervisors	3.238	3.134	3.988	3.167	2.741

Source: Primary data

Appendix 6: Respondents views on challenges faced by contractors that determine in quality performance of government financed construction projects

S/No	Key challenges to contractors	Mean score all respondents	Mean scores engineers only	Mean scores contractors only	Mean scores employers only	Weighted mean scores
1	Project funding (timely availability)	3.863	3.769	4.056	4.000	3.786
2	Lack of qualified technical personnel on the contractor's team	3.825	3.885	3.944	3.300	2.529
3	Availability of plant and equipment for works	3.823	3.588	4.611	3.600	5.048
4	Lack of management skills by contractor's team	3.646	3.745	3.333	3.700	2.307
5	Contractors experience in construction projects	3.575	3.442	4.111	4.200	3.009
6	Explicit project design	3.088	2.904	3.556	3.200	1.312
7	Explicit project documentation	2.962	2.667	3.722	3.111	1.586
8	Procurement systems	3.304	3.135	3.941	3.100	1.869
9	Resources availability	3.410	3.157	3.941	3.800	2.402
10	Access to loans through financial institutions	3.385	3.196	4.000	3.222	1.925

11	Lack of strong institution to provide support for access to loans or equipment	3.338	3.192	3.778	3.300	2.080
12	Government taxation system	3.313	3.058	2.611	3.600	1.986
13	Inadequate learning opportunities for continuous improvement	3.138	3.038	3.556	2.900	3.742
14	Ethical behavior of contractors staff	3.050	2.923	3.500	2.900	2.185
15	Contracts' sizes	3.000	2.788	3.667	2.900	1.837
16	Fluctuations on availability of works	2.987	3.600	3.588	3.300	1.797
17	Ethical behavior of employers and supervising team	2.825	2.673	3.278	2.800	1.337
18	Contracts' locations	2.635	2.563	2.875	2.600	1.048

RESEARCH QUESTIONNAIRE

THE OPEN UNIVERSITY OF TANZANIA

FACULT OF BUSINESS MANGEMENT

RESEARCH METHODOLOGY AND DISSERTATION

FORM NO: ______

QUESTIONNAIRE ON ASSESSMENT OF FACTORS AFFECTING QUALITY PERFORMANCE OF GOVERNMENT FINANCED CONSTRUCTION PROJECTS: A CASE OF MOROGORO MUNICIPALITY AT MORUWASA:

Dear Sir / Madam

This questionnaire has been prepared and formulated by Mr. **George Zakaria Masuha** a student at the Open University of Tanzania in the Faculty of Business Management. The questionnaire is all about the study on "***an assessment of factors affecting quality performance of government financed construction projects: a case*** **of Morogoro municipality*"***. The expected output of this study is a dissertation report that forms a partial fulfillment for the award of a Masters Degree in Project Management at the Open University of Tanzania. The survey is meant to investigate and avail information about failures of government financed construction projects.

The purpose of the survey is therefore to gather data from different stakeholders involved either in planning, supervision and execution of government financed construction projects in Morogoro municipality.

You have been selected because the student is aware that to some extent you are involved in implementation of such projects. Hence kindly you are requested to provide information that will lead to accomplishment of this study. The data collected shall be treated with utmost confidentiality and anonymity. Moreover the information provided shall be used for academic purposes only.

Thank you for your cooperation

George Zakaria Masuha

Section A: Background Information of the Respondents

Please tick in one of the boxes per each request

1. Gender; Male ☐, Female ☐
2. Age; (Years) 20-30 ☐ 31 – 40 ☐ above 40 ☐
3. Formal education; Secondary education ☐ Diploma or first degree ☐

   Over first degree ☐
4. Experience in construction projects (yrs); 0 – 10 ☐ , 11 - 2☐ , Over ☐

20

5. Current occupation; projects supervising engineer ☐ , contractor ☐

   contractor's employer (client) ☐

Section B: Critical Factors Affecting Quality Performance *(Positive Performance)* of Government Financed Construction Projects in Morogoro municipality

6. The factors that are considered to *Affect Quality Performance of Government Financed Construction Projects in* Morogoro municipality are as shown in the following table. Please basing on your experience and knowledge, in each area tic only one item among the items ranked 1,2,3,4 and k 5*(Ni kigezo kipi kina athari au mhimu katika ufanisi wa miradi)*

No	Critical Factors Affecting Quality Performance of Government Financed Construction Projects in Morogoro municipality	Not critical *(si mhimu)*	Somehow critical *(kidogo mhimu)*	Critical *(mhimu)*	Very critical *(mhimu sana)*	Extremely critical*(mhimu kweli kweli)*
		1	**2**	**3**	**4**	**5**
i	Explicit project planning and design					
ii	Explicit technical specifications					
iii	Explicit contract documentation					
iv	Procurement system and processes					
v	Political interference					
vi	Political support					
vii	Project managers skills and knowledge, (head of supervision team)					
viii	Supervision team skills and knowledge					
ix	Decision making					

	process by clients					
x	Project team members' performance					
xi	Project financing processes					
xii	Contractor's experiences construction industry					
xiii	Contractor's profitability					
xiv	Local community involvement					
xv	Availability of construction equipment and spare parts					
xvi	Availability of construction materials					
xvii	Health and safety issues					
xviii	Environment protection					
xix	Project's technology requirements					
xx	Variation in climate conditions					

7. Quality Assurance on Government construction works is among of the key issues for project success. Basing on your experience rank the following activities that deem to be important in quality assurance by ticking only one item among the items ranked 1, 2, 3, 4 and 5. *(Ni kigezo kipi kina umhimu katika kuongeza ubora na ufanisi wa miradi)*

No	Set of activities that deem to be important in quality assurance of construction	**Not critical** *(si*	**Somehow critical** *(kidogo*	**Critical** *(mhim*	**Very critical** *(mhi*	**Extremely critical** *(mhimu*

	projects.	*mhimu)*	*mhimu)*	*u)*	*mu sana)*	*kweli kweli)*
		1	**2**	**3**	**4**	**5**
i	Explicit technical specifications					
ii	Selection of the sources of materials (cement, quarries or borrow areas)					
iii	Carrying out various tests on the quality of construction materials					
iv	Supervised construction operations (No construction operation to be done in absence of supervisors)					
v	Carrying out tests on completed construction operations to check compliance with specifications					
vi	Inspection of completed construction operations by a group of experts					
vii	Retention of constructors for a specific period to oversee the completed construction operations and undertake remedies where deemed necessary					
vii	Institutions for monitoring integrity of constructors and works supervisors					

8. The success performance of government financed construction projects depends also on efficiency and effectiveness of the Contractors. Hereunder are some of the challenges being faced by the Contractors while executing government financed construction projects in Morogoro municipality. For every items in a row, put only one tick labeled 1,2,3,4, and 5, indicating the importance of the said challenge. *(Ni kigezo kipi kina umhimu katika kuimarisha ufanisi wa makandarasi)*

No	**Set of Challenges being faced by contractors while executing government financed construction projects**	**Not critical** *(si mhimu)*	**Somehow critical** *(kidogo mhimu)*	**Critical** *(mhimu)*	**Very critical** *(mhimu sana)*	**Extremely critical** *(mhimu kweli kweli)*
		1	**2**	**3**	**4**	**5**
i	Explicit project design					
ii	Explicit project documentation					
iii	Procurement system					
iv	Lack of management skills by contractor’s team					
v	Lack of qualified technical personnel on the contractor’s team					
vi	Contractors experience in construction projects					
vii	Availability of plant and equipment for works					
viii	Access to loans through financial					

	institutions					
ix	Project funding (timely availability)					
x	Resources availability					
xi	Fluctuations on availability of works					
xii	Political interference					
xiii	Political support					
xiv	Ethical behavior of employers and supervising team					
xv	Ethical behavior of contractors staff					
xvi	Contracts' sizes					
xvii	Contracts' locations					
xviii	Inadequate learning opportunities for continuous improvement					
xviii	Lack of strong institution to provide support for access to loans or equipment					
xix	Government taxation system					

Thanks for your time and GOD bless you

Prepared and signed by;

Mr. **George Zakaria Masuha**

APPENDIX IV: BUDGET

S/ N	DETAILS OF ITEMS	AMOUNT TSHS
1	Stationa**ry**	280,000
2	Transport	250,000.
3.	Meals while collecting data and visiting research area.	250,000.
4	Internet services	150,000
5	Prove reading	100,000
6	Data analysis software	250,000
Total		**1,280,000/=**

Source: Researcher field(2019)

APPENDIX V: TIME SCHEDULE

Activities	**MAY**	**JUNE**	**JULY**	**AUGUST**	**SEPTEMBER**
Problem conceptualization					
Literature review					
Proposal Development					
Submission of Proposal and Presentation					
Data collection, analysis, and writing the report					
Submission of the report					

Source: Researcher field(2019)

MOROGORO URBAN WATER SUPPLY AND SANITATION AUTHORITY

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MORUWASA

Managing Director,
Morogoro Urban Water
Supply and Sanitation
Authority,
P.O.BOX 5476,
MOROGORO.

Kumb.NaUWSA-MG.30/59/01/VOL I/159 **12 September, 2019**

Director of Morogoro Regional Centre,
The Open University of Tanzania,
P.O.BOX 2062
MOROGORO.

RE: INTRODUCTION OF MR. GEORGE MASUHA REG. NO. PG2017992107 (MPM) STUDENT.

Please kindly refer to the heading above and your letter of 05th September, 2019 with a reference number OUT/MOR/R/P/I/Vol.1/95.

I take this opportunity to inform you that your request for an opportunity for a student named as Mr George Masuha to conduct a research program was well received and accepted as you requested. Your student who is pursuing a Master of Project Management (MPM) course at your institute will conduct a research programme titled as **"An Assessment of factors Affecting Quality performance of Government Financed Construction Projects: The case study: MORUWASA Morogoro Municipality"**. An Authority will provide sufficient cooperation that will legally being required for an effective outcome of this research program.

Your Sincerely,

David O. Adamson
For: MANAGING DIRECTOR

The Open University of Tanzania
Morogoro Regional Centre
Plot 680 Block J
Barakuda - Mazimbu

P.O. Box 2062
Tel.No: 023 2613303
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Simu Na. 023 2613303
MOROGORO, TANZANIA

05 September 2019

Ref. No. OUT/MOR/R/P/I/Vol.1/95

Director
MORUWASA
P.O. Box 5476
Morogoro

RE: Introduction of Mr. George Masuha Reg. No. PG2017992107 (MPM) Student

The individual named above is a student in the Master of Project Management (MPM) of the Open University of Tanzania studying at Morogoro Regional Centre.

The student is interested in conducting Research titled "An Assessment of factors Affecting Quality performance of Government Financed Construction Projects: The case study: MORUWASA Morogoro Municipality" for the fulfillment of the requirements of the programme of study.

I would appreciate if you could allow and provide the necessary environment for the students to carry out the exercise satisfactorily within the region.

We thank you in advance for your cooperation and continued support.

Yours sincerely,

Ms. Divine Mwaluli
For Director of Morogoro Regional Centre

CC. George Masuha