ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

FACTORS AFFECTING THE PERFORMANCE OF ROAD CONSTRUCTION PROJECTS: THE CASE OF ADDIS ABABA CITY ROADS AUTHORITY.

BY

SAMSON TESFYAE WOLDEGIORGIS

ID: SGS/0325/2014A

JUNE 2023

ADDIS ABABA, ETHIOPIA

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

FACTORS AFFECTING THE PERFORMANCE OF ROAD CONSTRUCTION PROJECTS: THECASE OF ADDIS ABABA CITY ROADS AUTHORITY

BY

SAMSON TESFAYE WOLDEGIORGIS

THESIS ADVISOR

MELAKU GIRMA (Ph.D)

A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY SCHOOL OF GRADUATE STUDENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN PROJECT MANAGEMENT.

JUNE, 2023

ADDIS ABABA, ETHIOPIA

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

I hereby certify that the thesis titled "Factors Affecting the Performance of Road Construction Projects in Addis Ababa City Roads Authority," prepared and submitted by Samson Tesfaye Woldegiorgis in partial fulfillment of the requirements for the Degree of Master of Arts in Project Management adheres to the guidelines and regulations of the university. The thesis meets the expected criteria in terms of originality and quality.

Approved by:-

_____	_____	_____
Dean, Graduate Studies	**Signature**	**Date**
_____	_____	_____
Advisor	**Signature**	**Date**
_____	_____	_____
Internal Examiner	**Signature**	**Date**
_____	_____	_____
External Examiner	**Signature**	**Date**

DECLARATION

I certify that this research paper, entitled "Factors Affecting the Performance of Road Construction Projects in Addis Ababa City Roads Authority," is the product of my own intellectual effort and inquiry. All cited sources of information have been properly acknowledged. This work has not been previously submitted for academic credit at any institution.

Name: Samson Tesfaye Woldegiorgis Signature Date

ST. MARY'S UNIVERSITY
ADDIS ABABA
JUNE 2023

ENDORSEMENT

This thesis has been submitted to St. Mary's University College, School of Graduate Studies for examination with my approval as a university advisor.

Melaku Girma (Ph.D) _____

University Advisor Signature

ST. MARY'S UNIVERSITY

ADDIS ABABA

JUNE 2023

ACKNOWLEDGEMENTS

With all sincerity and heart, I give thanks to the Almighty for granting me the fortitude and confidence to accomplish this research. I extend my sincere appreciation to my knowledgeable advisor, Melaku Girma (Ph.D.), for dedicating his invaluable time to meticulously reviewing and enhancing this thesis.

Additionally, my heartfelt gratitude goes out to the AACRA staff, managers, and friends, whose direct and indirect contributions, as well as the provision of necessary materials and support, were instrumental in the realization of this work.

My profound appreciation is likewise extended to my beloved wife, Haymanot Tekelewoled, and children, Nathanium and Betsinat, whose unwavering patience and love provided the inspiration and motivation needed to complete this task.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND/OR ABBREVIATIONS

AACRA:	Addis Ababa City Roads Authority
ADB:	African Development Bank
ANOVA:	Analysis of Variance
BRT:	Bus Rapid Transit
KPI:	Key Performance Indicator
PCMRP:	Project Cost Management Related Practices
PMBOK:	Project Management Body of Knowledge
P-P:	Probability – Probability
PQMA:	Project Quality Management activities
PSCMA:	Project Scope Management activities
PSKTMA:	Project Stakeholder Management activities
PTMA:	Project Time Management activities
Q-Q:	Quantile - Quantile
Sig:	Significant
SPSS:	Statistical Package for the Social Sciences
VIF:	Variance Inflation Factors

ABSTRACT

The aim of this research is to identify the factors that affect the performance of road construction projects in the Addis Ababa City Roads Authority. The study specifically focuses on the relationship between project time management activities, project cost management activities, project quality management activities, project scope management activities, project stakeholder management activities, and performance of road construction projects. A causal research design was adopted, and a mixed research approach was used with a sample population of 157. The study used purposive sampling. The quantitative data were analyzed using IBM SPSS and consisted of a structured survey with 157 closed-ended questions distributed to the AACRA, as well as interviews to triangulate the results. The study employed descriptive and multiple regression statistical tools to examine the relationship between the factors affecting road construction project performance and project performance indicators such as cost, time ,quality, scope, and stakeholder satisfaction. The results of the regression analysis indicate that project time management activities, project cost management activities, project quality management activities, project scope management activities and project stakeholder management activities significantly affect the performance of road construction projects in the Addis Ababa City Roads Authority. As a result, the research recommends that AACRA improve project management processes and ensure efficient and effective project delivery through the adoption of comprehensive cost management plans, prioritization of resource planning, emphasis on stakeholder engagement and communication, and prioritization of quality control and procurement procedures. These measures will have a positive impact on the performance of road construction projects in the Addis Ababa City Roads Authority and contribute to the overall success of the road construction industry.

Keywords: *project time, cost, scope, quality, stakeholder management activities, road project performance, Addis Ababa City Roads Authority.*

CHAPTER ONE

INTRODUCTION

1.1. Description of the Study Context

This chapter presents a comprehensive overview of the research study. It begins by presenting the background of the study, which outlines the context and motivation for conducting the research. Then, it states the problem the study aims to address and the basic research questions that will guide the study. The objectives of the study include both general and specific objectives. The significance of the study in terms of its potential benefits to the field of research is discussed. The scope and limitations of the study are outlined, defining the parameters within which the study was carried out. The operational definitions of key terms used throughout the study are provided to ensure clarity and consistency of terminology. Finally, the organization of the study is explained, providing a roadmap for readers to navigate through the various sections of the report.

1.2. Background of the Study

Construction plays a significant role in developing countries. It is a crucial component of economic growth and job creation (Dutta, 2019). Developing countries often have a shortage of infrastructure and housing, which limits their ability to attract foreign investments and expand their economies. Thus, construction projects such as building roads, bridges, and buildings create job opportunities, drive economic growth, and improve the living standards of citizens (Abdulai & Banful, 2020). Overall, the construction sector is essential for the overall development of developing countries as it provides socio-economic benefits and facilitates the transition towards industrialization and modernization (Dutta, 2019).

The development of a construction project requires various partners, different methods, different times and phases of work, and a great deal of input from both the public and private sectors, with the primary goal of finishing the project (Navon, 2005).

In developing countries like Ethiopia, a well-developed road transportation sector will accelerate economic development. The road transportation system influences both the production and consumption choices made by every household in their activities. It also facilitates trade both domestically and internationally. Road transport services are essential to improving public and private service needs and expanding education and health care (Yosef et al., 2017).

The following categories of project management knowledge are adopted as the primary determinants of project performance in the PMBOK handbook by the Project Management Institute: project integration

management, project scope management, project time management, project cost management, project quality management, project human resources management, project communications management, project risk management, project procurement management, and stakeholder management.

In developing countries, road transportation is critical for accelerating economic development. However, Ethiopia has the weakest infrastructure as compared to sub-Saharan Africa, despite recent good results. To bridge this gap and accommodate a growing population, Ethiopia needs a well-developed infrastructure that can meet modernization objectives (ADB, 2018). The road transportation sector influences both production and a consumption choice made by households, facilitates trade, and improves public and private service needs. Performance measurement can be achieved by setting KPIs that provide criteria and objectives to assess project success. (Thoor and Ogunlana, 2010) noted that KPIs can measure the performance of project operations and are typically used in construction projects.

The construction industry plays a vital role in the economies of developed countries, and road transportation is critical to accelerating economic development in developing countries like Ethiopia. KPIs are essential to measuring project success criteria and improving project management procedures and processes. Addis Ababa is the capital city of Ethiopia, and it has a complex road network. According to a study conducted by Arifin et al. (2018), Addis Ababa has a total road network of 3,054 km. The city's rapidly growing population and economy have put pressure on its road infrastructure, resulting in high levels of traffic congestion and poor road conditions.

Identifying the variables that affect construction project performance is crucial to aligning project goals and objectives with industry objectives. This helps improve project management procedures and processes. (Penny, 2002) stated that it is essential to examine project performance at both project and industry levels using appropriate procedures and methodologies. Thus, this study focused on identifying problems found in Addis Ababa City Road Authority road construction projects, aiming to improve project management procedures and enhance construction project performance.

The Addis Ababa City Roads Authority (AACRA) is a government agency responsible for the planning, construction, and maintenance of roads, bridges, and related infrastructure in Addis Ababa, Ethiopia. It was established in 2009 to improve the transportation network within the city. In recent years, the Addis Ababa City Administration has been investing in upgrading the city's road network. The city has been implementing a bus rapid transit (BRT) system since 2015 to alleviate traffic congestion and improve public transportation (Desta, 2018). In general, the road network in Addis Ababa is a crucial component of the city's development and requires continued investment and attention from policymakers and stakeholders. Therefore, This study

focused on identifying the factors affecting the performance of road construction projects in Addis Ababa city implemented by AACRA and suggesting ways to improve the road construction projects in AACRA.

1.3. Statement of the Problem

The main purpose of this study is to remedy the existing gaps in the performance of road construction projects in Addis Ababa that have not been pointed out in previous studies. The construction sector is one of the most important economic sectors and the main driving force of the country's economic development (Mehamud, 2013). Ethiopia has several road construction projects by both governmental and non-governmental organizations. Several road projects are currently underway, many in Addis Ababa, where performance problems have been observed and reported (Albert et al., 2016). The AACRA is responsible for the construction of urban roads and their performance. Hence, this study will investigate the factors affecting the performance of road construction in the AACRA.

There are similar studies done in the USA on factors influencing UAS performance on highway construction projects (Kim and Irizarry, 2015), in Colombia on the identification of factors affecting the performance of rural road projects in Colombia (Adriana et al., 2020), in India on the study of factors affecting the performance of construction projects (Saraf, 2013), in the Gaza Strip on the performance of construction projects (Enshassi, 2009), and in Kenya on factors affecting the performance of road construction projects in arid and semi-arid areas in Kenya (Atieno & Muturi, 2016). In Nigeria on Factors Affecting Time and Cost Performance of Road Construction Projects in Nigeria (Oluwajana et al., 2022); in Uganda on Assessment of the Factors Influencing Performance of Road Construction Projects in Uganda (Seninde et al., 2021).

However, the contexts of the USA, Colombia, India, Gaza, Kenya, Nigeria, and Uganda are different from Ethiopia in terms of the factors affecting the performance of road construction. On top of this, (Maerege,2019) studied factors affecting the performance of commercial building projects in Addis Ababa, but this study is on road construction.

The study was done on the assessment of time and cost performance in road construction (Henock, 2020). While this study focuses on factors affecting the performance of road construction in addition to time and cost parameters, it also includes scope, quality, and stakeholder management, which implies there is an omitted variable.

The study was done on factors affecting the success of road projects using a descriptive research design (Henock, 2021). This study adopts a causal research design. Therefore, there is a methodology difference, and thus this study fills the knowledge gap that exists due to the conceptual breadth and methodology.

Additionally, studies were done on the cause and effect of cost and time management in AACRA (Ellene,

2022). delays in road construction concerning time, cost, and quality in AACRA (Semira, 2021); factors affecting cost and time overruns in construction projects in AACRA (Fantaye, 2017); the cause of time overruns in building and road construction projects in Addis Ababa (Adamu, 2022); and factors contributing to time overruns on road construction projects under Addis Ababa City Administration (Sraw, 2014). But all these studies exclude variables such as scope management, and stakeholder management as potential factors and their effects. Hence, the current study improves the existing knowledge gap by including the omitted variables in past studies.

In project management, time, cost, and scope are the iron triangle for the performance of any project. That is, performing one factor has an effect on the other. In past studies, stakeholder management factors together with those have not been studied yet.

Therefore, the main purpose of the current study is to identify factors affecting the performance of road construction projects in AACRA with respect to time, cost, scope, quality, and stakeholder management activities.

1.4. Basic Research Questions

1. What are the most significant factor affecting the performance of road construction projects in AACRA?

2. What is time management activities implemented in road construction projects in AACRA?

3. What are cost management activities implemented in road construction projects in AACRA?

4. What are scope management activities implemented in road construction projects in AACRA?

5. What are quality management activities implemented in road construction projects in AACRA?

6. What are stakeholder management activities implemented in road construction projects in AACRA?

1.5. Objective of the Study

The objectives of the research study are categorized into two groups: general objectives and specific objectives.

1.5.1. General Objective

The general objec**t**ive of this study is to identify the factors affecting the performance of road construction projects in the AACRA

1.5.2. Specific Objectives

1. To identify which project time management activities determine the performance of road projects in AACRA.
2. To assess which project cost management activities determine the performance of road projects in AACRA.

3. To identify which project scope management activities determine the performance of road projects in AACRA.
4. To identify which project quality management activities determine the performance of road projects in AACRA.
5. To examine which project stakeholder management activities determine the performance of road projects in AACRA.
6. To identify the most significant factors affecting the performance of road construction projects in AACRA.

1.6. Significance of the Study

It helps inform AACRA on how to improve the performance of road construction projects and provides suggestions for existing problems and gaps in road construction projects' performance for AACRA. Therefore, based on the evidence gathered, the researcher is highly confident in the findings of this study:

1. Provide valuable information to the AACRA towards achieving the project within the specified time budget, the required quality standards, within scope, and stakeholder satisfaction.
2. Serves as a stepping stone for those wishing to do further research in this area.
3. Provides policymakers and senior officials with a clearer insight into the realities of the road construction Projects performance by AACRA

1.7. Scope of the Study

Although many factors affect the performance of road construction projects, this study was delimited to time management activities, cost management activities, quality management activities, scope management activities, and stakeholder management activities from the perspective of the project management knowledge area for the performance of road construction projects in AACRA.

The scope of the study was limited to the road construction projects carried out between 2017 and 2023 E.C. in Addis Ababa, including the ongoing projects. The primary focus of the study was to gather insights from key stakeholders, including project owners, contractors, and consultants who participated in these road construction projects within the specified timeframe and geographical boundaries. The paper was limited to asphalt road projects implemented by AACRA.

1.8. Limitation of the Study

The study relied on the data collected from the three main participants. Namely: clients, consultants, and contractors in AACRA Thus, the study reflects the views of the three main participants in road construction

in AACRA. The researcher faced a problem related to data collection due to the respondent's busy schedule and inability to return the questionnaires on time.

1.9. Operational Definition of Terms

Performance is defined as the achievement of specific tasks measured against predetermined or identified standards of accuracy, completeness, cost, and speed (Ashenafi et al., 2012).

Contractor: is a person or company that provides services or goods to another entity under a written or implied agreement. Contractors may be hired for a specific project or on a continuous basis (Singh & Smith, 2019).

Consultant: is a professional who provides expert advice and guidance to individuals or organizations in a particular field.

Performance: The accomplishment of a given building construction project against the contractual cost, time, and quality standards.

Owner: individual and organization entity for whom the construction project is being undertaken.

Stakeholders: are individuals or organizations that have an interest or concern in the success or failure of a business or project.

1.10. Organization of the Study

This paper is divided into five chapters, each with its distinct purpose. Chapter one provides an introduction to the study and includes a background overview, a statement of the problem, a research question, research objectives, a research hypothesis, the significance of the study, scope, and limitations, and an operational definition of terms. Chapter two presents a review of related literature on the performance of road construction projects. The third chapter outlines the research methodology utilized, including the research approach and design, data collection, population, sample size, sampling procedure, data source, data collection method, and analysis methods. The empirical findings of the study are presented in Chapter Four. Finally, chapter five summarizes the results and draws conclusions and recommendations for future research. The paper concludes with a reference list, and appendices.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1. Introduction

This chapter presents theoretical and empirical information from various publications on study-related topics. It investigates what different scholars and authors have discovered about the concept of performance in the construction industry in terms of project management. A theoretical review of construction project performance, problems, and factors influencing construction industry performance is also emphasized.

2.2. Project

A project is a one-time event with a defined beginning and end point as well as a set of goals to be met (PMI, 2013). In comparison to operational work, projects have distinct characteristics and rules. (Turner, 2004) states that a project accomplishes specific goals through a series of activities and tasks; it consumes resources and adheres to a set of predefined specifications (Munns & Bjeirmi, 1996).

2.3. Types of Construction Project

There are four types of construction projects: building construction, infrastructure construction, industrial construction, and special-purpose construction (Chitkara, 2009). There are four types of construction projects: building construction, infrastructure construction, industrial construction, and special-purpose construction (Chitkara, 2009).

Building Construction Projects: Residential and commercial complexes, educational and recreational facilities, hospitals and hotels, warehouses, and marketing facilities are all examples of construction projects. The largest segment of the construction industry is buildings. The construction industry benefits humanity by providing shelter and services for its habitation, educational, recreational, social, and commercial needs. Architects and engineering firms design the majority of the building projects, which are funded by the public and private sectors as well as individuals.

Infrastructure Projects: These are highly capital-intensive and heavily reliant on heavy equipment and machinery. It entails the transportation of large quantities of bulk materials such as natural and crushed earth, steel, concrete, and so on. Dams and canals, highways, roads, railways, airport terminals, hydroelectric stations, water treatment and supply lines, sewage disposal networks, telephone and electric line laying, dumps, and any construction activities that build infrastructure that will be the backbone for a country's economic growth are examples of these projects. These projects are designed by specialized engineering firms and are mostly funded by the government or public sector.

Industrial projects: the construction of manufacturing, processing, and industrial plants such as steel mills, petroleum refineries, and consumer goods factories are among these projects. These projects are expensive and highly specialized. Government, public, and private entities fund industrial construction.

Special Purpose Projects: These construction projects include environmental projects, emergencies, remedial work, equipment installation and commissioning, and complex key operations.

2.4. Participants of Construction Project

Because of the numerous participants who contribute to the achievement of project objectives in construction, performance has been defined in one sense as a participant's (client, consultant, or contractor) contribution to the execution of the task required to complete the project (Mullins, 1993).

Owner/Client: An owner is a person, government, organization, ministry, department, society, cooperative, etc. who owns the project and has complete control over it. He is primarily involved in the process of supporting the financial aspect of the construction project so that it can proceed smoothly. He must pay for all work-related charges, as well as materials and equipment, and he will be the project's owner once completed.

Consultant: A consultant is a person or organization hired by the project's owner or client to oversee the project and assess building costs and contracts for construction projects. Consultant tasks include developing and supporting the development of the design, working with project management tasks, contract administration, inspecting the work of construction contractors, advising on sustainability, and giving advice and helping develop the project. This may include providing general technical and business assistance, working with contractors to decide and implement the building design, noting any environmental issues at the site, ensuring worker safety, keeping a project on budget, and dealing with any problems that may arise.

Contractor: It is an organization hired by the owner or client to complete the project and is responsible for the execution of all work activities required to complete the project. The contractor will also appoint subcontractors with specialized knowledge to complete parts of the project that the contractor cannot build.

Designer: It is the party in charge of turning the owner's vision into a reality (the blueprint). It is in charge of carrying out the project's original concept. The design incorporates all of the project's architectural, structural, sanitary, and electrical elements.

2.5. The Theory of Performance

The Theory of Performance builds on and connects six fundamental notions to form a framework. (Elger , 2008) defines and integrates six core principles to construct a framework that may be utilized to explain performance as well as performance improvements. To perform is to generate valuable results. A performer can be a single person or a group of people who collaborate to create something. Performance development is

a journey, and your performance level defines where you are on that journey. Six aspects influence current performance: context, amount of knowledge, level of skills, level of identity, personal factors, and fixed factors. Three axioms are proposed for effective performance enhancements. As the author stated, performing is a "journey, not a destination." The journey's stage is referred to as the "level of performance." Each level represents the effectiveness or quality of performance.

2.5.1. Performance Measures

Performance measurement is a method of systematically evaluating the inputs and outputs of manufacturing operations or construction activities, and it serves as a tool for continuous improvement and Performance indicators define the measurable evidence required to demonstrate that a planned effort yielded the desired result. In other words, indicators are called measures when they can be measured precisely and without ambiguity (Mbugua, 1999).

2.5.2. The Goal of Performance Measurement

Performance measures can serve different purposes. Furthermore, other people have different meanings (Robert, 2003). Legislators have different purposes than journalists. Stakeholders have different purposes than public managers. Generally, the goal of performance measurement is to evaluate, control, budget, motivate, promote, celebrate, learn, and improve.

2.5.3. Performance Measurement Process

The Municipal Technical Advisory Service states that there are three stages to the performance measurement process. If you are measuring a complex program, you will follow all of the steps outlined below. You may not use all of the steps when measuring a discrete, narrowly defined program. There's no specific order in which the steps need to be taken.

- The pre-performance measurement phase involves determining the program or service. Determine your vision, mission, and goals. Identify program activities and program objectives.
- The Performance Measures Phase involves determining program inputs and outputs, as well as program efficiency measures.
- The Performance Measures Reporting Phase This section provides an explanation to assist the reader in analyzing and comprehending the results.

2.6. Performance and Construction Projects

The work accomplishment structure, feedback effects on productivity and work quality, and effects from upstream to downstream phases are three important structures underlying the dynamic of project performance (Reichelt & Lyneis, 1999).

Construction time is becoming increasingly important because it frequently serves as a critical benchmark for assessing project performance and project organization efficiency (Chan & Kumaraswamy, 2002).Seven project performance indicators were discovered, namely construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product, and client satisfaction with the service, as well as three company performance indicators (Akintoye &Takim, 1999).Cheung et al. (2004) identified People, cost, time, quality, safety and health, the environment, stakeholder satisfaction, and communication are all project performance categories. A control system is essential for identifying factors influencing construction project efforts. One or more project performance indicators are required for each of the project goals (Navon, 2005).

There are numerous potential performance measures for determining the success of a construction project (Alvarado et al., 2004).Controlling the quality of the contract document, the quality of response to perceived variations, and the extent of contract changes are the most important scope management practices (Ling *et al*., 2007).To perform is to carry out a complex series of actions that combine skills and knowledge to produce a valuable outcome (Elger, 2008).The degree of achievement of a specific effort or undertaking in relation to the prescribed goals or objectives that form the project parameters has been defined as project performance (Ahmad *et al*., 2009).

2.7. Performance in Construction Industry

Low productivity, delays, cost overruns, poor quality, and so on is various aspects of low productivity (Navon, 2005). Poor project performance has been identified as the bane of several countries' construction industries, particularly in developing countries.

Because they are unfamiliar with the new operating environment, architectural, engineering, and construction firms may struggle to manage the performance of construction projects in China (Ling et al., 2007). International construction projects are subject to more complex and dynamic factors than domestic projects, and they are frequently subject to serious external uncertainties such as political, economic, social, and Cultural risks, as well as internal project risks, which must be considered.

Proper health and safety factors in the organization, the unavailability of competent staff, proper training of the available staff and the environment are important factors affecting the performance of the organization or

project, which also resulted in the poor performance of the construction projects (Momeet et al., 2022).

Quality is defined as the conformance to establish the requirements, the requirements being the characteristics of the product, process, or service specified by the contracts (Ledbetter, 1994).

The focus of quality-based performance measurements is on factors like the number of defects created and the cost of quality (Neely, 1999). The effectiveness of a project is evaluated based on its timeline, adherence to quality standards, and cost control (Costello, 2008).

2.7.1 Construction performance in Ethiopia

In Ethiopia, construction cost overruns are often attributable to a myriad of factors, including inflation or an uptick in the cost of construction materials, inadequate planning, and coordination, lags in decision-making processes, change orders resulting from client-requested enhancements, and excessive quantities of material required during the construction phase (Fetene, 2008).

The study conducted on the road construction projects at Lideta sub-city has revealed that various factors including project cost management, project time management, project quality management, project scope management, and project risk management have significant impacts on the overall performance of building construction projects in the area. The findings provide valuable insights into how these key factors can affect the success of road construction projects and can guide future efforts toward achieving improved outcomes in this field (Maerege, 2019).

Incomplete design, lack of quality control, complicated specifications, lack of experience of the contractor, poor construction methodologies followed by the contractor, poor site management practices, and using low-quality materials were causes of time delays in road construction projects in AACRA (Henock, 2020).

Time Overruns in Building and Road Construction Projects are the dynamics of the factors' nature and influence that change over time due to technological advancements and the emergence of new factors (Adamu, 2022).

2.8. Project Performance and Project Management

Project management is the process of planning, organizing, directing, and controlling the resources of an organization to achieve specific goals and objectives. Furthermore, project management applies a systems-based management strategy by assigning functional staff (the vertical hierarchy) to a specific project (the horizontal hierarchy) (Kerzner, 2017).

The achievement of a continuous stream of project objectives within time, within budget, at the desired performance or technology level, while utilizing the assigned resources effectively and efficiently, and having the results accepted by the customer or stakeholders, is then defined as successful project

management.

Adequate performance understanding and knowledge are desirable for achieving managerial goals such as improving institutional transformations and making efficient decisions in design, specification, and construction at various project-level interfaces using appropriate decision-support tools (Ugwu & Haupt, 2007).

In Singaporean construction firms' project management practices, it was determined that the performance level of their projects in China identified project management practices that led to improved performance and recommended key project management practices that foreign firms could adopt (Ling et al., 2007).

Project management is only one of many criteria on which project performance is dependent; it is arguably the most important because it is people who develop the processes and systems that deliver the projects (Kuprenas, 2003).

2.9. Factors Affecting Construction Projects Performance

To measure and evaluate project performance, a variety of performance indicators, including those related to time, cost, quality, client satisfaction, client changes, business performance, health, and safety, can be used (Cheung *et al*., 2004).

The factors affecting the performance of construction projects are the availability of personnel with high experience and qualifications, the availability of resources as planned through the project duration, Average delay because of closures and material shortages, Conformance to specification and leadership skills for project managers are the top-ranked indicators that affect the performance of construction projects in this study area, and emphasis should be given to them (Ashenafi & Ashebir, 2021).

2.10. Project Performance and Project Success

How engineers evaluate project success and how key project stakeholders' performance correlates with project success. It has been discovered that project owners play the most important role in determining project success, and the performance of project management organizations as the single point of contact for the project has significant correlations with project success criteria (Wang &Huang, 2006).

The success of construction projects is determined by technology, process, people, procurement, legal issues, and knowledge management (Nitithamyong, 2004).

The success of any project is related to two important factors: the quality of construction services provided by contractors and the project owner's expectations. Managing the construction so that all participants perceive an equitable distribution of benefits can be critical to project success. It is discovered that a complete lack of attention devoted to owner satisfaction contributes to poor performance. (Al-Momani, 2000),

Project success is defined as the completion of a project within acceptable time, cost, and quality while achieving client satisfaction. Good performance of project indicators can lead to project success (Pheng &Chuan, 2006).

2.11. Determinants of Projects Success and Performance

Many factors influence project success. Project management knowledge areas are among those that influence project success. These knowledge areas determine or influence project performance in a variety of ways. The project management knowledge areas must be used to complete construction projects on time, on budget, on quality, on scope, and on other performance indicators.

Project success and performance are crucial factors that determine the outcome and effectiveness of a project. Understanding the determinants of project success is essential for project managers and stakeholders to ensure the smooth execution and accomplishment of project objectives.

The determinants of project success and performance in the context of project management can be influenced by various factors, including project planning, stakeholder engagement, team dynamics, and risk management. Understanding these determinants is crucial for project managers to ensure successful outcomes (Pinto & Slevin, 2017).

Project Planning: Effective project planning, encompassing activities such as defining project scope, setting objectives, and creating a detailed project schedule, is a significant determinant of project success (Kerzner, 2017). This enables project managers to establish clear goals and expectations, facilitating effective resource allocation and risk management.

Stakeholder Engagement: Engaging stakeholders throughout the project lifecycle is crucial for project success. Stakeholders can influence project outcomes through their communication, support, and decision-making (Cleland & Ireland, 2006). Effective stakeholder management ensures alignment of project goals with stakeholder interests, ultimately enhancing project success.

Team Dynamics: The composition and dynamics of the project team play a vital role in project success. A cohesive and motivated team, with complementary skills and clear roles, fosters effective collaboration and problem-solving (Belassi & Tukel, 1996). Additionally, team cohesion contributes to increased productivity and better overall project performance.

Risk Management: Proactive risk management is essential for project success (Hillson & Simon, 2012). Project managers must identify, analyze, and mitigate potential risks to avoid project delays, cost overruns, and quality issues. Implementing risk response strategies improves the project's ability to achieve its objectives.

Communication: Effective communication is a fundamental factor in project success. It facilitates understanding, collaboration, and coordination among project team members and stakeholders (Bourne et al., 2017). Clear and timely communication ensures everyone is well-informed and aligned, reducing miscommunications and promoting project performance.

Leadership: Strong leadership is a crucial determinant of project success. Project managers must provide direction, motivate team members, and facilitate decision-making (Müller et al., 2013). Effective leadership promotes stakeholder engagement, manages conflicts, and drives the project towards successful completion.

Quality Management: Ensuring high-quality project deliverables is essential for project success (PMI, 2017). Implementing quality management processes, such as quality planning, quality assurance, and quality control, helps meet stakeholder expectations and enhances overall project performance.

Change Management: Project success can be influenced by how well change is managed throughout the project lifecycle (Cameron & Green, 2015). A structured change management approach helps mitigate resistance to change, ensuring smooth transitions and minimizing the negative impact on project outcomes.

Lessons Learned: Learning from past projects and incorporating lessons learned into future projects is a crucial factor in project success (Project Management Institute, 2017). Continuous improvement and knowledge transfer enable project managers to avoid repeating past mistakes and leverage best practices for enhanced project performance.

2.11.1. The Ten Project Management knowledge Areas

1. Project Time Management

The duration of the jobs in this expertise area is estimated by the project managers. Here, he or she decides how to organize the tasks and how many resources will be needed to accomplish the project's goal. This department oversees and manages the timetable to keep the project on track. The time management knowledge area consists of eight different procedures. Activities include definition, sequencing, calculation of time, schedule development, schedule control, the definition of activity weight, development of the progress curve, and progress monitoring (PMBOK Guide, 2013).

Project Time Management is one of the critical factors is proper project scheduling and coordination. According to Kerzner (2013), effective scheduling entails breaking down the project into manageable tasks, estimating the duration of each task, and creating a realistic timeline. This ensures that project managers can track progress and adjust the schedule whenever necessary. Coordination among team members and stakeholders is also a crucial factor in managing and maintaining the project schedule.

Project leadership and management support are also critical factors in project time management. Pinto (2016)

emphasizes that strong leadership ensures clear communication, well-defined roles, and effective decision-making processes. This helps to mitigate delays and ensure timely project completion. Stakeholder involvement and engagement are also critical practice-related factors in project time management. Engaging stakeholders early on in the project planning phase allows for realistic expectations, prioritization, and identification of potential risks or constraints (Shenhar et al., 2001). Involving stakeholders throughout the project life cycle supports effective time management through efficient resource allocation and timely decision-making (Liu & Walker, 2006).

In conclusion, project time management requires project managers to consider several practice-related factors, including proper scheduling and coordination, strong leadership and management support, and stakeholder involvement and engagement. By considering and implementing these factors, project managers can enhance their ability to manage time effectively and increase the chances of project success.

2. Project Cost Management

In this management knowledge area, expenditures are projected and a baseline budget is produced. The knowledge area for cost management also includes a category for the cost management strategy. The knowledge domain for cost management consists of four different procedures. These include cost estimates, cost budgeting, and resource planning (PMBOK Guide, 2013).

Effective project cost management is crucial for ensuring that projects are completed within their budget. Project managers need to ensure that the allocated resources are utilized efficiently and effectively to deliver the project scope. This literature review explores some of the practice-related factors that project managers need to consider when managing project costs.

One of the critical factors in project cost management is accurate cost estimating. According to Fleming and Koppelman (2016), accurate estimating involves identifying all the necessary resources required for the project, including labor, materials, equipment, and overheads, and determining their costs. Project managers need to incorporate these costs into a comprehensive budget to ensure that the project's overall cost is managed effectively.

Another important factor is effective cost control, which involves monitoring the progress of the project against its budget and taking corrective action whenever necessary. In their study, El-Sayegh and Abdul-Aziz (2005) found that effective cost control practices include regular monitoring of project expenses, implementing cost reduction measures, and establishing a change control process to manage scope creep. Effective communication between project stakeholders is also an essential practice-related factor in project cost management. According to Chinyio and Olomolaiye (2010), clear communication channels among

stakeholders enable them to understand project objectives, budgets, and timelines. This ensures that they can collaborate effectively to achieve cost-effective outcomes.

In conclusion, project cost management requires project managers to consider several practice-related factors, including accurate cost estimating, effective cost control, and clear communication among stakeholders. By considering and implementing these factors, project managers can enhance their ability to manage costs effectively and increase the chances of project success.

3. Project Scope Management

Knowledge areas deal with defining project scope, project requirements scope, and project work, creating project structure, setting scope baselines, and managing project scope. This is the point of planning how to keep the project within the limits set. There are five different processes in the Scope Management Knowledge Area (PMBOK Guide, 2013).

Initiation: - is the process of formally approving that a new project exists or that an existing project should move to the next phase. Typical reasons for starting a project are market demands, business needs, customer demands, technological advances or legal requirements, social needs, etc.

Scope planning: - Scope planning is the process of step-by-step elaboration and documentation of the project work that produces the project's product (the project scope). Planning the project scope includes the product overview, initial entry of the project charter, and initial definition of constraints and assumptions.

A successful construction project requires the participation of key stakeholders at all levels, including owners, consultants, general contractors, subcontractors, and suppliers, in scoping.

Scope definition: - When defining the scope, the most important project results are broken down. Increase the precision of cost, duration, and resource estimates. Define baselines for performance measurement and control. Facilitate clear assignment of responsibilities.

Scope verification is the process of securing official acceptance of the project scope from stakeholders.

Scope change control: - The scope change control is concerned with influencing the causes that cause scope changes to ensure that changes are agreed upon, assessing whether or not a scope change has occurred, and managing actual changes when and if they occur.

Project Scope Management refers to the various aspects that influence how a project's scope is defined, planned, monitored, and controlled. These factors may include the project team's skills and experience, the complexity of the project, the stakeholder's involvement, and the availability of resources, among others (PMBOK ,2013)

According to Kwak and Anbari (2015), project scope management is typically influenced by several factors,

including the project's organizational context, the project manager's leadership style and skills, and the project team's communication and collaboration capabilities. These factors can significantly impact the success or failure of a project, and as such, project managers should carefully evaluate them and develop appropriate strategies to manage them effectively.

4. Project Quality Management

In project quality management, the knowledge area where the quality criteria for project outputs are defined and tracked, there are three procedures. Quality planning, Quality assurance, and Quality control are the processes involved (PMBOK Guide, 2013).

Project quality management is the set of principles, methodologies, and techniques used to ensure that the quality of deliverables meets stakeholders' expectations and requirements. According to Hossain and Barua (2018), these factors include project planning, control, monitoring, evaluation, and continuous improvement.

Effective project planning involves defining quality objectives, establishing quality criteria, and developing a quality management plan that outlines procedures and processes for ensuring that quality is maintained throughout the project lifecycle. Control factors, on the other hand, involve implementing quality control procedures to prevent defects and non-conformities, while monitoring focuses on continuous monitoring of project activities to identify deviations and take corrective actions promptly.

Moreover, evaluation factors involve assessing project outcomes against quality metrics and performance indicators while continuous improvement focuses on identifying opportunities for enhancing project quality and implementing changes. These factors play a vital role in implementing effective project quality management practices that deliver high-quality project outcomes and enhance customer satisfaction.

5. Project Risk Management

Identifying risks, planning risk management, completing risk assessments, and controlling risks are all part of project risk management. This knowledge area contains six procedures. The field focuses on recognizing, analyzing, and preparing responses to both threat (negative) and opportunity (positive) risks. These include risk management planning, risk identification, qualitative and quantitative risk analysis, risk response planning, and risk monitoring and control (PMBOK Guide, 2013).

6. Project Human Resources Management

This knowledge area, which is the project's HR management, includes the processes that specify how human resources will be used, developed, acquired, and managed. There are four processes in project human resource management. Organizational planning, personnel acquisition, team development, and project completion are examples of these (PMBOK Guide, 2013).

7. Project Communications Management

This knowledge area, which is the project's HR management, includes the processes that specify how human resources will be used, developed, acquired, and managed. There are four processes in project human resource management. Organizational planning, personnel acquisition, team development, and project completion are examples of these (PMBOK Guide, 2013).

8. Project Procurement Management

This knowledge area is concerned with the procedures that project managers often use to obtain the materials needed for the project's effective completion. Project managers in this expertise area develop plans for conducting procurements, controlling procurements, and closing out procurements. This knowledge area contains six procedures. Procurement planning, Solicitation planning (documenting product needs and identifying potential suppliers), Solicitation, Source selection, Contract administration, and Contract closeout are the steps involved (PMBOK Guide, 2013).

9. Project Stakeholder Management

The project stakeholder management area includes all of the methods used by a project manager to identify and satisfy the areas affected by the project. Internal or external parties can be affected. Stakeholder management consists of four processes. These are identified stakeholders, stakeholder engagement plans, stakeholder engagement management, and stakeholder engagement monitoring (PMBOK Guide, 2013).

The strategies and techniques used by project managers to identify, engage, and communicate with stakeholders throughout the project lifecycle. According to Karim and Som (2016), effective stakeholder management is critical for project success and is influenced by a variety of factors such as stakeholder expectations, power and influence, interests, and communication preferences.

One of the key factors that influence stakeholder management is the project's complexity. As projects become more complex, the number of stakeholders and their diverse interests and needs increase, making stakeholder management more challenging (The Standish Group International, 2015). Moreover, the stakeholder's capability to influence the project outcome also increases with complexity.

10. Project Integration Management

Project integration management is the knowledge area dedicated to identifying and defining the activities in the project. The knowledge area also addresses the efficient integration of modifications in the project. In the integration management knowledge field, there are three major processes. These are project planning, project execution, and integrated change management (PMBOK Guide, 2013).

Creating a consistent, unified document necessitates the integration and coordination of all project plans.

Project plan execution: carrying out the project plan by carrying out the actions outlined in it.

Change management that is integrated: coordinating changes across the entire project. All of these apply to construction projects with minor additions or adjustments. The requirement for all pieces to be connected and to work together

2.12. Key Performance Indicators in Construction Projects

Time, cost, quality, client satisfaction, client changes, business performance, and safety and health are the seven key performance metrics (Cheung *et al*., 2004).

Time performance is a critical factor for road construction projects as it can have significant impacts on the project's budget, quality, and public acceptance. Sharma and Kumar (2015) state that "the time overruns of road construction projects can escalate the project cost and causes unnecessary delay in service delivery" (p. 283). Moreover, delays in project completion can lead to frustration among the users and stakeholders, which can result in reputational damage.

To ensure the time performance of road construction projects, several best practices need to be considered. According to Li and Wu (2019), a robust project schedule that considers all aspects of the construction project, including design, procurement, construction, and commissioning, is crucial to achieve time performance objectives. Additionally, adequate resource allocation, effective communication, and monitoring of project progress can enable the project team to intervene early and prevent any possible delays.

Furthermore, technology can also play a vital role in enhancing the time performance of road construction projects. For instance, the use of Building Information Modeling (BIM), Global Positioning System (GPS), and other advanced technologies can enable the project team to plan and execute the construction activities more efficiently, leading to timely completion of the project.

In conclusion, the time performance of road construction projects is essential to ensure successful project delivery. Proper planning, adequate resource allocation, effective communication, and monitoring of project progress can enable the project team to achieve the desired time performance objectives. The adoption of advanced technologies can also help optimize the construction processes and enhance the efficiency of the project delivery.

The cost performance of road construction projects has been a topic of concern in recent years due to the increasing cost overruns and delays that are often associated with these projects. According to a study by Zou et al. (2018), many factors contribute to the cost performance of road construction projects, including project complexity, design changes, and unforeseen events.

One of the key factors affecting cost performance is project complexity. As road construction projects

become more complex, there is a higher likelihood of cost overruns and delays. This is because complex projects often require more resources and expertise, which can increase the cost of the project. In addition, complex projects are more likely to experience design changes and unforeseen events, which can also contribute to cost overruns and delays.

Another factor that can impact cost performance is design changes. When design changes occur, it can lead to additional costs as the project team needs to redesign and rework existing plans. In addition, design changes can also lead to delays as the project team works to incorporate the new design into the existing project schedule.

Finally, unforeseen events such as weather or labor strikes can also impact cost performance. These events can lead to delays and increased costs, as the project team needs to account for the additional time and resources needed to overcome these challenges.

In conclusion, the cost performance of road construction projects is affected by a variety of factors including project complexity, design changes, and unforeseen events. It is important for project teams to carefully consider these factors and develop strategies to manage and mitigate these risks to ensure successful project delivery.

Scope performance is a vital aspect of road construction projects because it determines whether the project was completed within the defined objectives, timeline, and budget. According to Koppelman and Kim (2016), scope performance refers to "the degree to which project deliverables have been produced and successfully meet all planned specifications" (p. 2). Therefore, evaluating scope performance involves measuring the extent to which the project's actual outcomes match the initial goals, objectives, and requirements.

One critical factor that affects scope performance in road construction projects is the accuracy of the initial project scope definition. As suggested by Chang and Ibbs (2003), "an accurately defined project scope should identify all the work that will be required to complete the project within the prescribed cost and time constraints" (p. 190). Furthermore, the scope should also consider all the necessary stakeholder requirements, such as environmental regulations, safety protocols, and quality standards. Failure to have a well-defined scope can lead to scope creep, which occurs when the project's initial scope expands beyond its intended boundaries, leading to delays, cost overruns, and dissatisfaction among stakeholders.

Another crucial factor that influences scope performance in road construction projects is effective project monitoring and control. According to O'Brien and Fischer (2010), project monitoring involves "systematic observation and measurement of project performance with the objective of identifying and correcting

deviations from the plan" (p. 609). Ensuring that the project remains within the defined scope requires consistent monitoring of the project activities against the established baselines such as schedule, budget, and quality standards. Timely corrective actions can prevent small deviations from turning into significant issues that might affect the project's overall performance.

In conclusion, scope performance is critical to the success of road construction projects. A well-defined scope, proper project monitoring, and control are essential to ensure that the project's actual outcomes match the initial goals, objectives, and requirements. Stakeholders should carry out regular evaluations of the project's performance against the established baselines to identify any deviations that require corrective action.

The quality performance of road construction projects is an essential aspect that needs to be considered in every road construction project. According to the Construction Industry Institute (CII) (2019), quality performance refers to the degree to which the road construction project satisfies the customer's requirements and expectations. Therefore, evaluating quality performance involves measuring the extent to which the project's actual outcomes match the initial goals, objectives, and requirements for quality.

One critical factor that affects quality performance in road construction projects is the selection of high-quality materials. The quality of the materials used in road construction significantly affects the durability and safety of the road. As suggested by Ozer and Vasanthakumar (2018), "using low-quality materials can lead to premature failure of the road, increased repair costs, and reduced safety standards" (p. 1). Therefore, it is essential to use high-quality materials to ensure the road is durable, safe, and has a long life span.

Another crucial factor that influences quality performance in road construction projects is effective construction management. According to Saito, Shimaoka, and Takeda (2013), effective construction management involves implementing quality control procedures at all stages of the road construction process, including planning, design, construction, inspection, and maintenance. Proper construction management ensures that the road construction project complies with industry standards, building codes, and statutory regulations.

Moreover, ensuring quality performance in road construction projects requires the involvement of all stakeholders, including the project owners, engineers, contractors, and suppliers. According to Fasihuddin and Kassim (2019), every stakeholder has a role to play in ensuring quality performance throughout the entire project life cycle. Effective collaboration among stakeholders helps to identify potential quality issues early on and take corrective measures to prevent them from escalating into significant problems that may affect the project's overall quality performance.

In conclusion, quality performance is critical to the success of road construction projects. The use of high-quality materials, effective construction management, and the involvement of all stakeholders are essential to ensure that the project's actual outcomes match the initial goals, objectives, and requirements for quality.

Stakeholder satisfaction is a crucial performance indicator in road construction projects as it reflects the level of contentment among the various individuals and organizations involved. According to Liu and Teng (2018), stakeholder satisfaction refers to the extent to which the expectations, needs, and requirements of stakeholders are met throughout the project lifecycle. It serves as a measure of the project's success in meeting the stakeholders' interests and ensuring their continued support and involvement.

One important stakeholder group whose satisfaction is vital in road construction projects is the local community. The Construction Industry Research and Information Association (CIRIA) (2014) suggests that community satisfaction can be assessed by evaluating factors such as minimized disruption during construction, effective communication with residents, and providing alternative routes to minimize traffic congestion. Meeting these criteria can enhance the overall satisfaction of the community by minimizing inconveniences and maximizing the benefits of the road construction project.

Another significant stakeholder group in road construction projects is the project owner or client. A study conducted by Leite and Salvador (2017) emphasizes the importance of meeting the client's expectations and requirements to ensure their satisfaction. This can be achieved through efficient project management, adherence to agreed-upon timelines, and delivering the desired quality of the road construction project. Client satisfaction is crucial as it can lead to repeat business, positive references, and fostering long-term relationships.

Furthermore, the satisfaction of contractors and suppliers also plays a vital role in road construction projects. These stakeholders contribute directly to the project's success through their expertise, resources, and materials. As noted by Ahmed et al. (2021), contractor satisfaction can be measured by evaluating factors such as timely payment, clear scope of work, effective communication, and fair contract terms. Ensuring the satisfaction of contractors and suppliers can result in greater collaboration, improved performance, and the delivery of high-quality road construction projects.

In conclusion, stakeholder satisfaction is an important performance indicator for road construction projects. The satisfaction levels of stakeholders, such as the local community, project owners, contractors, and suppliers, directly impact the success and long-term viability of the project. By effectively managing stakeholder expectations and addressing their needs throughout the project lifecycle, road construction projects can achieve higher levels of satisfaction among all stakeholders.

Construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product, and client satisfaction with the service are the seven main project performance indicators (Takim &Akintoye, 2002).

A performance measuring system is essential to represent the needs and expectations of all stakeholders. Stakeholder performance must be measured and assessed throughout the project stages to guarantee that there are no major conflicts, disputes, or blaming syndromes by the end of the project (Pillai et al., 2002).

A wide range of performance indicators linked to a variety of dimensions (groups) such as time, cost, quality, client satisfaction, client changes, business performance, health, and safety can be used to monitor and assess project performance (Cheung et al., 2004).

Effective project time management is essential for ensuring project success. Project managers need to ensure that the project is completed within its set schedule. To achieve this, there are several practice-related factors that project managers need to put into consideration when managing time. This literature review explores some of these practice-related factors.

2.13. Empirical Review

According to the findings of a study conducted in Colombia on the identification of factors affecting the performance of rural road projects in Colombia, time and cost are major enablers that lead to project success and are critical factors in the early stages of the project life cycle (Adriana *et al*., 2020).

The analysis revealed that the most influential factors agreed upon by owners, contractors, and engineers as the main factors affecting the performance of construction projects are improper planning, improper designing, site management, decision-making, construction methods, and shortage of labor, technical personnel, quality, and scarcity of materials, construction mistakes, defective work, and product quality.

Factors affecting the performance of construction projects in the Gaza Strip found that the most influential factors agreed upon by the owners, consultants, and contractors as the main factors affecting the performance of construction projects in the Gaza Strip were: escalation of material prices; availability of resources as planned through project duration; average delay because of closures leading to material shortages; availability of personnel with high experience and qualifications; quality of equipment and raw materials in the project; and leadership skills for project managers (Enshassi, 2009).

Factors affecting construction cost performance in Nigerian construction sites are contractor inexperience, inadequate planning, inflation, incessant variation, and change in project design. These factors were critical to causing cost overruns, while project complexity, project period shortening, and fraudulent practices were also

responsible (Amusan, 2011).

Factors affecting the performance of road construction projects in arid and semi-arid areas in Kenya are the contractor's competency, the contractor's decision-making capabilities, the contractor's experience, and also inter-community and inter-clan conflicts, compensation, resettlement legal disputes, insecurity (armed robbery and terrorism), and a lack of goodwill by local communities, which have led to poor project performance to a large extent (Atieno & Muturi, 2016).

Factors affecting cost and time overruns in construction projects in Ethiopia: the most common causes of cost overruns are Design change, fluctuation in the cost of materials, inadequate review of drawings, and contract documents are the most common effects of time overruns in the construction industry, as are disputes and arbitration (Fantaye, 2017).

Time and Cost Performance Evaluation of Ethiopian Construction indicates that the most influential factors for the delay to deliver to site (right of way problem), award to list bidder, change in scope of the project, delay to payment and finance problem, lack of experience, spent time for approval of test and inspection, poor design at the time of tender, lack of quality control, complicated specification, lack of related work experience, poor construction methodologies, poor site management, low-quality materials, and environmental factors (Henock, 2020)

Factors affecting the performance of building construction projects in the Lideta sub-city are project cost management factors, project time management factors, project quality management factors, project scope management factors, and project risk management factors, which are responsible for 56.7% of the variance in performance indicators (Maerege, 2019).

2.14. Critique of the Existing Literature Related to Study

(Atieno & Muturi, 2016) investigated the factors influencing the performance of road development projects in Kenya's arid and semi-arid regions. Factors Affecting the Performance of Rural Road Projects in Colombia (Adriana et al., 2020) Factors affecting cost and time overruns in construction projects under the Addis Ababa City Administration of Ethiopia were studied (Fantaye, 2017). Factors affecting the performance of construction projects in the Defense Construction Enterprise in Ethiopia were studied (Gebremedhin, 2019). Hence, past studies failed to include the study of stakeholder management as one factor and also missed relating to the iron triangle constraints of a project from the project management knowledge areas.

2.15. Research gap

Road construction delays concerning time, cost, and quality in AACRA were studied (Semira, 2021). The factors affecting the success of road construction projects concerning the availability of capital, management

skills, organizational, culture, technical skills, cost, quality, and their impact on AACRA were studied (Henock, 2021). The time and cost performance evaluation of Ethiopian construction projects was studied (Henock, 2020). But, many past studies in this field have failed to investigate the impact of the iron triangle and project stakeholder management factors on project performance. As a result, this study focused on the key performance indicators of road construction projects in Addis Ababa City Road Authority in five project management knowledge areas related to the owner, consultants, and contractors.

2.16. Summary

According to previous research, performance measurement is a process that includes factors such as time, cost, scope, and quality to measure current construction project performance and achieve significant performance improvements for future projects.

It was discovered that there are numerous fields and topics related to performance, such as construction management, information technology, factors affecting manager performance, project performance measurement, key performance indicators, and benchmarking. The key performance indicators are used to assess the success of construction projects. These indicators can be used for benchmarking purposes and are critical to any organization's efforts to achieve best practices and overcome the road construction performance problem in Addis Ababa City.

Given the above issues, the paper examined the factors affecting the performance of road construction regarding the iron triangle of project management practice and project stakeholder management practice as well as from the three perspectives (owner, contractor, and consultant) about road construction performance.

2.17. Conceptual Framework

In an experiment, the independent variables are the parameters that we adjust to achieve clear observations and measurements. The name dependent is given to Dependent variables are affected by the degree and intensity of the independent variables (Deribsa, 2018).

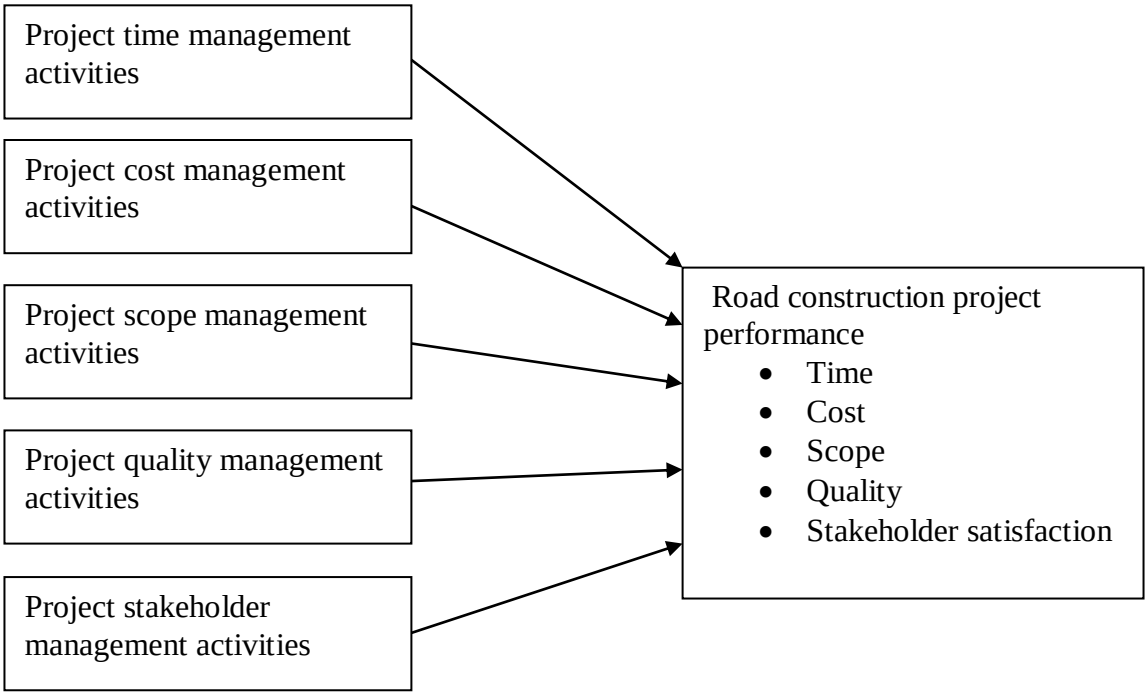


Figure 1: Conceptual Framework

Source: Self developed from the above literature.

Figure 1 shown above indicates that project time, cost, scope, quality, and stakeholder management practices-related factors are directly related to the project's performance (cost, time, quality, scope, and stakeholder). Poor project time, cost, scope, quality, and stakeholder management practices will result in time delays, cost overruns, poor quality, under scope, and stakeholders' dissatisfaction. This implies that the performance of the construction projects depends on the time, cost, quality, scope, and management practices of the stakeholders.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Description of the Study Area

In this chapter, the details of all information regarding the methods that were used to carry out the research, the type of research design used, the target population, the sample size, sampling techniques, the procedure that is used to obtain samples, and the research instrument and method of data collection from the study population through office and field sources are discussed. The study identified a causal relationship between the independent variables of project cost management, project time management, project scope management, project quality management, and stakeholder management and the dependent variable of construction performance. These variables are selected from past studies of both theoretical and empirical findings. The study checked the validity and reliability of the instrument. It also takes into account the ethical considerations recommended.

3.2. Research Approach

Sabrine and Brian (2004) discuss the importance of using both qualitative and quantitative methods in research to increase overall strength, address objectives, and ensure validity and reliable results. The researcher utilized a sequential mixed-methods approach to gather data. As per Creswell's (2009) definition, such a technique involves employing additional methods to supplement or enhance the results of the initial method. As explained by Creswell (2009), the researcher commence with qualitative interviews to explore a topic in depth and subsequently proceed with a quantitative survey utilizing a sizable sample to generalize the findings to a larger population. This researcher used a structured two-phase procedure to ensure an organized research process. The first phase involved the use of quantitative methods to gain insight into the phenomenon under investigation from the perspectives of various stakeholders, including AACRA employees, road project managers, consultants, contractors, and supervisors across different sites. The second phase consisted of conducting semi-structured interviews with the purposely selected owners, consultants, and contractors. This is because the researcher believes these can provide adequate information regarding the area of the study. In this study, the variables were evaluated through questionnaires incorporating five Likert scales (ranging from strongly agree (SA) to strongly disagree (SD)). Respondents completed these questionnaires themselves, detailing their experiences. Based on the responses collected, the variables in the study were classified as ordinal scales.

3.3. Research Design

According to (Vaus, 2001), a proper choice of study design ensures that the evidence obtained answers the initial question as clearly as possible.

A causal research design was adopted in this study. The main aim of causal research is to explain why a phenomenon occurs and to predict future occurrences. Close-ended structured Standard questionnaires were developed to identify the factors affecting the performance of road construction projects in the Addis Ababa City Roads Authority.

3.4. Target Population

Population contains those group or individuals who are in a position to answer the questions and to whom survey results apply. The target population was from the three stakeholders (Client/owner (AACRA), contractors, and consultant) who have been Participating in twelve selected different road construction in Addis Ababa city both completed road construction projects and under construction road projects implemented by AACRA and financed by federal capital budget and aid by foreign government as shown below in table 1.

Table 1: Selected road projects in Addis Ababa city

No	Name of the project	Size of the project	Contract amount(birr)	Contract period(day)
1	Arabsa condominium to Hayat condominium	3.3 km long and 30m width	178,235,214.32	455
2	CMC to Hayat	2.1 km long and 20m width	115,436,657.54	485
3	Gerji to ethio parent school	2.4 km long and 15m width	136,167,653.89	389
4	Djibouti embassy to sumit	1.9 km long and 18m width	98,654,321.43	240
5	Haile garment to jemmo3	4.5 km long and 12m width	573,896,365,74	365
6	Kalitigumruk to total	6.5 km long and 20m width	794,874213.21	605
7	Askoadissefer to birchiko condominium	3.7 km long and 15 m width	176,874,216.36	545
8	Medhanialem square to rufael church	2.9 km long and 18 m width	135,673,984.21	605
9	Bole mickael ring road to bulbulacabe district	5.5 km long and 30m width	1,210,547,87.3	730
10	Autobistera to kolfe sub city	3.4 km long and 40mwidth	748,976,432,13	365
11	Tilahungesese square to gazebo square	1.1 km long and 10m width	242,876,145.54	365
12	Pushkin adababay to gotera	3.8 km long and 40 width	847,894.231.37	365

3.5. Sampling and Sampling Technique

In order to minimize biases that might occur, the researcher obliged to be undertaken considering purposive sampling, which may best represent roads in the city.

3.5.1. Sampling Frame

The sampling frame was the actual set of sampling units. Therefore, as can be seen from the Table1below, the total number of population of managers, contractors, contract administration, consultants, team leaders, supervisors and engineers employed at AACRA is 259.

Table 2: Sample Frame for AACRA

Occupation	Population Distribution	Proportion in the population (%)
Manager	15	5.8
Contract administrator	22	8.5
Team leader	34	13.1
Supervisors	29	11.2
Engineer	99	38.23
Consultants	22	8.5
Contractors	38	14.67
Total	259	100

Source: Addis Ababa City Road Authority Human Resource Department.

3.5.2. Sample Size Determination

The sample size for a population sampling frame for Addis Ababa City Road Authority, the researcher took the sample from the three main groups in the project from the owners, contractors, and consultants who had worked on the road construction projects in Addis Ababa City Road Authority.

According to (Taro, 1967), the sampling size of the study was determined by using the simplified formula that considers a 95% confidence level and ±5% level of precision.

The formula is:

$$n = \frac{N}{1 + \mathrm{N(e)2}}$$

Where n = the sample size

N = population size/total number of managers, contractors, contract administrators, consultants in AACR

e = is the level of precision or error margin

1 = constant

n~ 157 The number of sampling

The researcher distributed questionnaires to Addis Ababa City Road Authority.

3.5.3. Sampling Procedure

According to (Saunder & Lewis, 2009), there are two major types of sampling designs. In probability sampling, elements of the population have a known chance or probability of being picked as sample subjects, whereas, in non-probability sampling, the components have no known or predefined chance of being selected. Thus, this study used purposive sampling. This is because, in order to identify the cases, individuals, or communities best suited to helping to answer the research question.

3.6. Data Type and Source

Any information collected, observed, generated, or created to validate original research findings is considered research data.

3.6.1. Data Type

Primary and secondary data are two types of data that researchers use to collect and analyze information for a study. Primary data refers to original data collected by the researcher through surveys, interviews, or experiments, while secondary data refers to data that has been previously collected by others and is available through sources such as books, journals, or online databases.

According to Yin (2018), primary data is often seen as the most reliable source of information, as it is collected specifically for the research project at hand and is therefore tailored to meet the researcher's needs. The researcher has full control over the data collection process and can ensure its accuracy and relevance to their research goals.

Secondary data, on the other hand, has already been collected by others and may not be specifically tailored to the researcher's needs. However, it can still be a valuable source of information, especially when access to primary data is limited or impossible. Secondary data can also provide historical context or additional insights into a particular topic.

In this paper a combination of both types of data were used to triangulate the findings and ensure the validity and reliability of their conclusions.

3.6.2. Data Source

This study employed both primary and secondary data sources. Primary data are created by the researcher for the explicit aim of addressing the subject at hand (Malhotra, 2005). There are number of ways to collect primary data .some of them are through questionnaires, interview, and checklists, as deemed necessary per

the research design undertaken. For this particular research primary data was obtained by structured questionnaires and interviews. The primary data were collected from managers in the main office, contractors, consultants, and employees using structured questionnaires and interviews. The interview was conducted with professionals who possess extensive knowledge and experience in the field.

The research endeavor involved the prudent collection of secondary data from diverse sources, such as relevant research studies, scholarly journals, official company guidelines, and pertinent corporate reports. The objective behind this approach was to enhance the reliability of the research findings by supplementing the data gaps that might have been present in the questionnaire survey.

3.7. Data Gathering Instruments

The researcher used a close-ended structured questionnaire for the study to collect primary data sources. The questionnaire was adopted from the different previous studies. The questionnaire was distributed across AACRA.

The kind of language used in the questionnaire was English. This is because all the respondents in the sampling frame were English-literate. To measure respondents' attitudes by asking to what extent they agree or disagree with a particular question about the factors that affect the performance of road construction projects in AACRA, the researcher used an instrument scaled with a five-point Likert scale.

3.8. Data Collection Procedures

Two types of data-gathering tools were used for data collection from AACRA. One was using a questionnaire, and the other was key informants' interviews. The questionnaire was distributed randomly to the appropriate number of samples. This researcher followed two-phase data collection procedures. These are primary and secondary data sources.

The questionnaire was distributed randomly to the predetermined sample size to identify factors affecting the performance of road construction projects in the Addis Ababa City Roads Authority. Then, after a couple of days, their responses were collected. Then the researcher started collecting data by interviewing key informants in the Addis Ababa City Roads Authority.

3.9. Data Analysis

The analysis part combined all groups of respondents. The questionnaire-based survey is applied, and the data is manipulated to convert it into a format suitable for analysis (Pallant, 2011). The collected data was manipulated and analyzed using IBM SPSS Statistics version 20 software and Microsoft Excel. The analysis of data consists of calculating the Relative Importance Index (RII) and ranking factors in each category based on the RII. The mean and standard deviation of each attribute are not suitable measures to assess overall

rankings because they do not reflect any relationship between them. Huang and Li (2019), and hence the Relative Importance Index (RII), is best suited for the study. For participants' replies, a five-point scale ranging from 1 (very low) to 5 (very high) was used and translated into a relative importance index (RII).

The relative important index is computed as;

$$\boldsymbol{RII}=\Sigma \boldsymbol{WA}*\boldsymbol{N} \text{ or } \boldsymbol{RII}= \frac{\mathbf{1}\boldsymbol{n_1}+\mathbf{2}\boldsymbol{n_2}+\mathbf{3}\boldsymbol{n_3}+\mathbf{4}\boldsymbol{n_4}+\mathbf{5}\boldsymbol{n_5}}{\boldsymbol{A}*\boldsymbol{N}}$$

Where:

RII = Relative Importance Index

W = Weight assigned to each factor by the respondents

A = Highest Wight

N = Total Number of Respondents

n_1, n_2, n_3, n_4, n_5 = Number of respondents answer with a particular level of measurement

1, 2, 3, 4, 5 = weight given for each practices (ranging from 1 to 5)

Table 3: Classification of Relativity Important Index

Scale	Level of Contribution	RII
1	Very Low	$0.0 \leq RII \leq 0.199$
2	Low	$0.2 < RII \leq 0.399$
3	Average	$0.4 < RII \leq 0.599$
4	High	$0.6 < RII \leq 0.799$
5	Very High	$0.8 < RII \leq 0.999$

Source: (Ashraf & Ghanim, 2016)

To provide a simplified picture of the data, descriptive statistics such as tables, frequency distributions, and percentages were used to summarize it. The significance level used is 0.05 (5%) to test for significance, where any P-value less than 0.05 indicates a significant relationship.

Regression analysis was also performed on the data to determine the strength of the association between each independent variable and dependent variable. The model according to the identified dependent and independent variables from the conceptual model is simplified into multiple linear regression models.

3.10. Pilot Study

According to (Connelly, 2009), the sample size for a pilot study should be greater than 10% of the sample project for the main study. This researcher conducted a pilot test using 15 questionnaires. These questionnaires were distributed to office engineers in Addis Ababa City Road Authority.

3.10.1. Validity Test

Validity refers to the degree to which an instrument measures what is supposed to measure (Pilot and Hunger, 1985).The researcher conducted the instrument validity using IBM SPSS version 20 with construct and structure-related tests using Pearson correlation.

In this study, the first step in testing the instrument was using criterion- related validity test (Pearson test) which measures the correlation coefficient between each paragraph in one field and the whole field. As demonstrated in the appendix provided at the back, the p-values (sig.) are less than 0.05 for all results, so the correlation coefficients of each field are significant at α=0.05, so it can be said that the paragraphs of each field are consistent and valid to measure what they were set for.

The second step was using structure - related validity test which measures the correlation coefficients of each field of the questionnaire and the whole of the questionnaire. The p values (sig.) are less than 0.05, so the correlation coefficients of all the fields are significant at α=0.01, so it can be said that the fields are valid to measured what it was set for to achieve the main aim of the study. This paper tested the validity of the instrument and was found valid.

3.10.2. Reliability Analysis

The instrument is reliable when it is robust and able to perform well at all times under different conditions. The researcher conducted a pilot test to check the reliability using IBM SPSS version 20. The Coefficients were evaluated using the guidelines suggested by (George & Mallery, 2003).As the study stated that, values 0.9 or higher indicate excellent reliability, values ranging from 0.8 to 0.89 indicate good reliability, values ranging from 0.7 to 0.79 indicate acceptable reliability, values ranging from 0.6 to 0.69 indicate questionable reliability, values ranging from 0.5 to 0.59 indicate poor reliability and values less than 0.5 indicate unacceptable reliability. From the Cronbach's Alpha result which is 0.945.itis concluded that the instrument has excellent reliability.

3.11. Ethical Considerations

Prior to requesting respondents to complete the questionnaire, they were provided with comprehensive information regarding the intended purpose of the data they were contributing, and their participation was entirely voluntary. The researcher operated in compliance with appropriate research ethics, guaranteeing the confidentiality of participants as an integral aspect of the study. The research was conducted with a high degree of integrity, avoiding any misrepresentations or distortions. Based on the collected data, the researcher presented insightful recommendations.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter discusses the presentation, analysis, and discussion of findings from a population of 259 employees at the Addis Ababa City Road Authority. From a population of 259 employees at the Addis Ababa City Road Authority, 157 employees were chosen as samples, and questionnaires were delivered. Among the 143 questionnaires obtained from the field, this constitutes a 91% return rate.

The method used for distributing the questionnaire and collecting their responses was on-hand delivery. The information was gathered using a self-administered questionnaire, and the main informant was interviewed. Analysis and discussions are offered. First, quantitative data was provided, followed by qualitative data organized by topic. The paper included the results of the findings from the two methodologies.

4.2. Reliability Analysis of the Questionnaire

This statistic is usually used to measure the internal consistency of respondents to a set of questions that are combined as a scale to measure a particular concept. It consists of a value ranging from 0 to 1, where a higher value indicates greater internal consistency and a lower value illustrates lower consistency. The result of the reliability analysis for the group factors affecting the performance of the road construction project in AACRA is presented in Table 4. From the table, it can be said that Cronbach's alpha value for each group factor affecting the performance of the road construction project is above 0.7. This implies that the reliability of these factors has better internal consistency. Moreover, the overall Cronbach's alpha value for the entire data for the factors affecting the performance of the road construction project is 0.892, which is considered excellent.

Table 4: Reliability Analysis of Independent Variables

Factors	Cronbach's Alpha	N of Items
Project time management	0.740	5
Project cost management	0.773	5
Project scope management	0.795	5
Project quality management	0.743	5
Project stakeholder management	0.763	5
Total	0.892	25

Source: survey result, 2023

4.3. General Information of Respondents

Table 5 displays data about responders in six groups. Their gender, age, level of education, years of work experience, professional background, and employment category (company) this was done to verify that respondents had the necessary information, comprehension, and expertise to respond accurately to the survey.

In terms of gender, the majority of respondents (91) are male (63.64%), while the remaining 52 are female (36.36%). This indicates that the male population in AACRA is greater than the female population.

In terms of age, 62% of the participants were between the ages of 25 and 34, accounting for 43.36% of the overall participants. Following closely, 65% of the participants were between the ages of 35 and 44, which accounts for 45.45% of all participants. Lastly, the age group category was 45–54 years, accounting for 11.19% of all participants. This implies that almost all AACRA participants were in the productive age range.

In terms of education level, 117 (81.82%) of the respondents were first-degree holders. Respondents with a master's degree accounted for 26 (18.18%) of all respondents. The statistical data shows that all of the respondents in the sample taken from AACRA were at higher levels of education.

In terms of work experience, the results show that 37 (25.87%) of respondents have below 5 years of work experience, 82 (57.34%) of respondents have 5 to 10 years of work experience, and 24 (16.78%) have 11–15 years of work experience. This means that the majority of respondents have more than five years of work experience.

In terms of the respondent's designation, 3 (2.098%) of respondents were resident engineers, 95 (66.43%) of respondents were site engineers, 4 (2.797%) respondents were project managers, 20 (13.99%) of respondents were contract administrators, and 21 (14.69%) respondents were in another field of study that was not stated in this educational background category. This indicates that the majority of the AACRA respondents were site engineers.

In terms of company category, 44% of owner respondents were female, and 70% of owner respondents were male. 1% of consultant respondents were female, and 9% of consultant respondents were male. 7% of contractor respondents were female, and 12% of contractor respondents were male. This shows that the majority of the respondents from all categories were male.

54% of the owner participants were between the ages of 25 and 34. 49% of the owner participants were aged 35–44, and 49% of the owner participants were 45–54 years old. 1% were between the ages of 25 and 34, 8% were between the ages of 35 and 44, and 1% were between the ages of 45 and 54. 7% of the contractor participants were between the ages of 25 and 34, 8% were between the ages of 35 and 44, and 4% were between the ages of 45 and 54. All the company category respondents do not have an age range of 55–64, 65,

or above.

97% of the owner participants hold a first degree, and 17% of the owner participants hold a master's degree. 7% of the consultant participants hold a first degree, and 3% of the consultant participants hold a master's degree. 13% of the contractor participants hold a first degree, and 6% of the contractor participants hold a master's degree. The entire company category of respondents does not have a diploma, Ph.D., or above.

27% of the owner participants have below 5 years of work experience, 73% have 5 to 10 years of work experience, and 14% have 11–15 years of experience. All the company category respondents do not have more than 15 years of work experience. 6% of the consultant participants have less than five years of work experience, 2% have five to ten years of work experience, and 2% have eleven to fifteen years of experience. 4% of contractor participants have less than five years of work experience, 7% have five to ten years of work experience, and 8% have eleven to fifteen years of work experience. All the company category respondents do not have more than 15 years of work experience.

3% of owner respondents were resident engineers, 78% of owner respondents were site engineers, 2% of owner respondents were project managers, 15% of owner respondents were contract administrators, and 16% of owner respondents had other professional backgrounds.

None of the consultant respondents were resident engineers. 6% of the consultant respondents were site engineers; none of the consultant respondents were project managers. 1% of the consultant respondents were contract administrators, and 3% of the consultant respondents had other professional backgrounds.

None of the contractor respondents were resident engineers. 11% of the contractor respondents were site engineers; 2% of the contractor respondents were project managers; 4% of the contractor respondents were contract administrators, and 2% of the contractor respondents had other professional backgrounds.

Therefore, as can be seen in Table 5 it is understood that the respondents are credible for the variables analyzed.6% of consultant respondents were site engineers, 95% of consultant respondents were site engineers, 4% of consultant respondents were project managers, 20% of consultant respondents were contract administrators, and 21% of consultant respondents were from other professional backgrounds. None of the contractors and consultants who participated was resident engineers. Moreover, none of the consultant participants were project managers. This demonstrates that the AACRA participants have a good educational base for road construction projects. Therefore, as can be seen in Table 5, it is understood that the respondents are credible for the variables analyzed.

Table 5: Summary of Demographic Data of the Respondents

Variables	Category	Company			Total Respondents	
		Owner	Consultant	Contractor		
		Frequency	Frequency	Frequency	Frequency (%)	
Gender	Female	44	1	7	52	36.36
	Male	70	9	12	91	63.64
	Total	114	10	19	143	100
Age of respondents (years)	25-34	54	1	7	62	43.36
	35-44	49	8	8	65	45.45
	45-54	11	1	4	16	11.19
	55-64	0	0	0	0	0
	65 and above	0	0	0	0	0
	Total	114	10	19	143	100
Level of Education	Diploma	0	0	0	0	0
	First degree	97	7	13	117	81.82
	Master's degree	17	3	6	26	18.18
	PhD and above	0	0	0	0	0
	Total	114	10	19	143	100
Years of working Experience	Below 5 years	27	6	4	37	25.87
	5-10years	73	2	7	82	57.34
	11-15years	14	2	8	24	16.78
	16-20years	0	0	0	0	0
	Above 20years	0	0	0	0	0
	Total	114	10	19	143	100
respondents designation	Resident Engineer	3	0	0	3	2.098
	Site Engineer	78	6	11	95	66.43
	Project manager	2	0	2	4	2.797
	Contract administrator	15	1	4	20	13.99
	Other	16	3	2	21	14.69
	Total	114	10	19	143	100

Source: survey result, 2023

4.4. Information of the Interview

The interview was conducted using a semi-structured interview. The goal is to dig deeper into the topics raised by the questionnaire and the participants' experiences. The researcher used purposive sampling to conduct the interview. This is because the researcher aimed to gather qualitative responses, which leads to better insights and more precise research results. Table 6 below shows that four professionals—two site engineers from the client, one resident engineer from the consultant, and one project manager from the contractor—were interviewed on factors affecting the performance of road construction projects in AACRA. The interview respondents had 10 to 15 years of experience in the road construction industry. According to all the interviewees, poor performance in road construction projects is one of the main issues that need to be improved.

Table 6: Information of Interviewee

Company	Number	Professional Background Category	Relevant Work Experience(Years)
Client	2	Site Engineer	10
Consultant	1	Resident Engineer	14
Contractor	1	Project Manager	15

Source: survey result, 2023

4.5. The Relative Importance of Each Activities within Each Predictor

In this study, the factors affecting the performance of road construction projects in AACRA were with respect to project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities. The researcher used Relative importance index to prioritize the activities in each of these factors.

Table 7 shows the activities that are ranked sequentially for the project time management activities. That is, Project duration estimated accurately (RII = 0.76), project activities defined clearly (RII = 0.62), Activity sequenced in an appropriate order (RII = 0.58), the schedule developed promptly (RII = 0.56), and the project scope defined clearly (RII = 0.53) were activities ranked sequentially for project time management activities. This indicates that the Project duration estimated accurately explains 76% of the variation in the project time performance, project activities defined clearly explains 62% of the variation in the project time performance, Activity sequenced in an appropriate order explains 58% of the variation in the project time performance, the schedule developed promptly explains 56% of the variation in the project time performance, and the project scope defined clearly explains 53% of the variation in the project time performance.

Therefore the most significant factor affecting time performance is accurately estimating the Project duration.

Table 7: Project Time Management Activities

No.	Project Time Management	RII	Rank	Level of Contribution
1	The schedule developed promptly	0.56	4	Average
2	Activity sequenced in an appropriate order	0.58	3	Average
3	Project duration estimated accurately	0.76	1	High
4	The project scope defined clearly	0.53	5	Average
5	project activities defined clearly	0.62	2	High

Source: survey result, 2023

Table 8 shows the activities that are ranked sequentially for the project cost management activities. That is, Project cost controlled effectively (RII = 0.79), Cost allocation done accurately (RII = 0.78), Project budget estimated accurately (RII = 0.72), Project documentation done accurately (RII = 0.67), and the resource planning done effectively (RII = 0.57).

This indicates that Project cost controlled effectively explains 79% of the variation in the project cost performance, Cost allocation done accurately explains 78% of the variation in the project cost performance, Project budget estimated accurately explains 72% of the variation in the project cost performance, Project documentation done accurately explains 67% of the variation in the project cost performance, and the resource planning done effectively explains 53% of the variation in the project cost performance.

Therefore the most significant factor affecting cost performance is controlling Project cost effectively.

Table 8: Project Cost Management Activities

No.	Project Cost Management	RII	Rank	Level of Contribution
1	Cost allocation done accurately	0.78	2	High
2	The resource planning done effectively	0.57	5	Average
3	Project cost controlled effectively	0.79	1	High
4	Project budget estimated accurately	0.72	3	High
5	Project documentation done accurately	0.67	4	High

Source: survey result, 2023

Table 9 shows the activities that are ranked sequentially for the project scope management activities. That is, Procurement done effectively (RII = 0.65), Work breakdown structure done accurately (RII = 0.64), Project scope defined clearly (RII = 0.53), Communication in a project done effectively (RII = 0.51), and Project scope controlled effectively (RII = 0.48).

This indicates that Procurement done effectively explains 65% of the variation in the project scope performance, Work breakdown structure done accurately explains 64% of the variation in the project scope performance, Project scope defined clearly explains 53% of the variation in the project scope performance, Communication in a project done effectively explains 51% of the variation in the project scope performance, and Project scope controlled effectively explains 48% of the variation in the project scope performance.

Therefore the most significant factor affecting scope performance is effectiveness of Procurement.

.

Table 9: Project Scope Management Activities

No.	Project Scope Management	RII	Rank	Level of Contribution
1	Project scope controlled effectively	0.48	5	Average
2	Communication in a project done effectively	0.51	4	Average
3	Project scope defined clearly	0.53	3	Average
4	Work breakdown structure done accurately	0.64	2	High
5	Procurement done effectively	0.65	1	High

Source: survey result, 2023

Table 10 shows the activities that are ranked sequentially for the project quality management activities. That is, Project completed according to specifications (RII = 0.68), Quality controlled effectively (RII = 0.61), Quality planning done effectively (RII = 0.60), Quality audit done effectively (RII = 0.58), and the materials used up to Standard (RII = 0.56).

This indicates that Project completed according to specifications explains 68% of the variation in the project quality performance, Quality controlled effectively explains 61% of the variation in the project quality performance, Quality planning done effectively explains 60% of the variation in the project quality performance, Quality audit done effectively explains 58% of the variation in the project quality performance, and the materials used up to Standard explains 56% of the variation in the project quality performance.

Therefore the most significant factor affecting quality performance is Project completion according to specifications .

.

Table 10: Project Quality Management Activities

No.	Project Quality Management	RII	Rank	Level of Contribution
1	Project completed according to specifications	0.68	1	High
2	Quality planning done effectively	0.60	3	High
3	Quality controlled effectively	0.61	2	High
4	Quality audit done effectively	0.58	4	Average
5	the materials used up to Standard	0.56	5	Average

Source: survey result, 2023

Table 11 shows the activities that are ranked sequentially for the project stakeholder management activities. That is, Stakeholders involved in the decision-making process effectively (RII = 0.60), Stakeholder engagement done effectively (RII = 0.59), Stakeholders identified effectively (RII = 0.56), Conflict resolution method with stakeholders done effectively (RII = 0.53), and Stakeholders prioritized effectively (RII = 0.42). This indicates that Stakeholders involved in the decision-making process effectively explains 60% of the variation in the project Stakeholder satisfaction, Stakeholder engagement done effectively explains 59% of the variation in the project Stakeholder satisfaction, Stakeholders identified effectively explains 56% of the variation in the project Stakeholder satisfaction, Conflict resolution method with stakeholders done effectively explains 53% of the variation in the project Stakeholder satisfaction, and Stakeholders prioritized effectively explains 43% of the variation in the project Stakeholder satisfaction.

Therefore the most significant factor affecting Stakeholder satisfaction is Stakeholders involved in the decision-making process effectively.

Table 11: Project Stakeholder Management Activities

No.	Project Stakeholder Management	RII	Rank	Level of Contribution
1	Stakeholders prioritized effectively	0.42	5	Average
2	Stakeholders involved in the decision-making process effectively	0.60	1	High
3	Conflict resolution method with stakeholders done effectively	0.53	4	Average
4	Stakeholder engagement done effectively	0.59	2	Average
5	Stakeholders identified effectively	0.56	3	Average

Source: survey result, 2023

4.6. The Relative Importance of Performance Indicators

A total of five performance indicators were identified. Regarding this, respondents were asked to rank the most important performance indicator of road construction projects in Addis Ababa City Roads Authority. Table 13 below presents the ranking order of performance indicators in road construction projects in AACRA using relative importance index. Hence, cost (RII = 0.891), time (RII = 0.852), stakeholders satisfaction (RII = 0.824), quality (RII = 0.782), and scope (RII = 0.682) are ranked consecutively.

Table 12: Ranking of Performance Indicators

No.	Performance Indicators	RII	Rank	Level of Contribution
1	Time	0.852	2	High
2	Cost	0.891	1	High
3	Scope	0.682	5	High
4	Quality	0.782	4	High
5	Stakeholder satisfaction	0.824	3	High

Source: survey result, 2023

4.7. Results of Regression Analysis

4.7.1. Assumptions of the Regression Analysis

According to (Hair *et al*., 1998), meeting the assumptions of regression analysis is necessary to confirm that the obtained data truly represents the sample and that the researcher has obtained the best results. For each variable, three assumptions for regression analysis were discussed. These are multicollinearity, linearity, normality, and autocorrelation. Each of these assumptions is described in detail below:

4.7.1.1 Test for Multicollinearity

According to (Hill et al., 2003), multicollinearity is not a violation of regression assumptions, but it might cause major problems. Those problems are parameter estimate variances that are unnecessarily big, parameter estimates that are not significant, and parameter estimates with a sign different from what is anticipated.

The researcher conducted correlation coefficient and variance inflation factor analyses to detect the multicollinearity. The reason for conducting correlation analysis was to establish whether there was any relationship between the study variables. The sample correlation coefficient between -1 and +1 shows the direction and strength of the association between the two variables (Deribsa, 2018).

Collinearity is expected if the absolute value of the Pearson correlation coefficient is close to 0.8 (Belinda &Peat, 2014). As can be seen from the Table in the appendix attached at the back, the correlation between

each of the independent and dependent variables found that the absolute value of the Pearson correlation coefficient is below 0.8. This implies that there is no evidence for multicollinearity.

The Pearson correlation in the first column shows the correlation of the variable with itself, which was 1, which was a perfect positive correlation. The following column's result of the correlation analysis shows that an increase in the independent variables could affect the performance of road construction projects in AACRA positively.

The researcher examined the variance inflation factor, which is used to calculate how much the variance of the estimated regression coefficient is inflated if the independent variables are associated. In regression analysis, VIF evaluates the strength of the correlation between the independent variables. The lower the tolerance, the more likely the variables are to be multicollinear (Belsley, 1991).

As indicated in the table located in the appendix at the end shows the tolerance and variance inflation factors (VIF). The VIF of all variables was less than 5, and tolerance scores were greater than 0.1. Hence, there was no multicollinearity. Therefore, based on the results, there is no evidence for the existence of multicollinearity.

4.7.1.2. Test for Linearity

(Hair et al., 1998) The linearity of the relationship between dependent and independent variables describes how well changes in the dependent variable are associated with changes in the independent variables.

To determine the relationship between the dependent variable and the independent variables are linear, plots of the regression, using SPSS software was used.

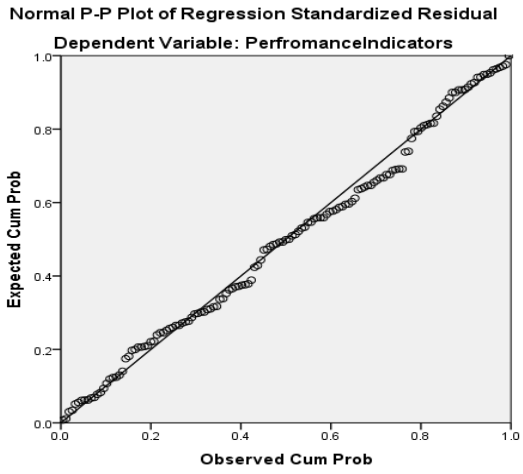


Figure 2: Linearity Test of Performance

Figure 2 above shows the model follows the assumption of linearity, or there is linearity between a dependent variable and independent variables. Refer to the appendix attached at the back regarding the linearity of each

dependent and independent variable.

4.71.3. Normality Test

The researcher employed the frequency distribution (histogram), P-P plot, and Q-Q plot to visually check for normality.

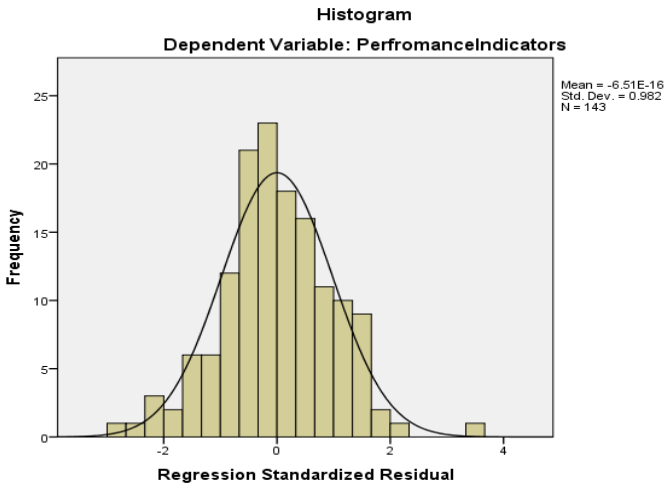


Figure 3: Normality Test of Performance

Figure 3 above shows the normality test plots and distribution (histogram) between the dependent and all independent variables. The frequency distribution of the standardized residuals is compared to a normal distribution. Although some residuals are relatively far away from the curve, many of the residuals are fairly close. Furthermore, the histogram is bell-shaped, which implies that the residuals are normally distributed. Refer to the appendix attached at the back regarding the normality test plots and distribution (histogram) between each dependent and independent variable.

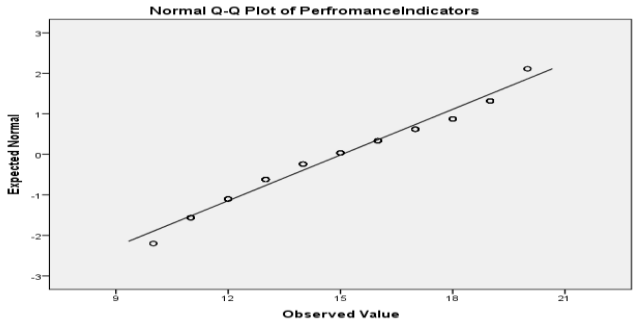


Figure 4: Q-Q Plot of Performance

A normal probability plot and a (Q-Q) plot show the distribution of the data against the expected normal distribution. Observations for properly distributed data should be roughly in a straight line. The P-P plot is more effective at detecting deviations from normalcy in the center of the distribution, while the normal Q-Q

plot is more effective at detecting deviations in the tails. The plot differs from the residual plot in that the standardized residuals are compared to a normal distribution (Hair et al., 1998).As shown by (Hair et al., 1998), the normal offers a straight diagonal line, and the plotted residuals are compared to the diagonal line. The residual line will closely follow the diagonal if the distribution is normal. Figure 4 above shows that the Q-Q plots were approximately a straight line instead of a curve. As a result, the residuals were determined to have a rather normal distribution.

(Tabachnick & Fidell, 2001) the skewness value reflects the distribution's symmetry, whereas the kurtosis value indicates the distribution's peak. A positive skewness value implies right skew, while a negative value suggests left skew.The larger the skewness, the higher the magnitude of its absolute value.

As evident from the appendix provided at the end, the performance indicators are a little bit kurtotic for project scope management activities, project quality management activities, and project stakeholder management activities since there are values above -1. But, according to (Gujarati, 2003), "Using the central limit theorem, we can say that the data distribution is normal. It states that, no matter what the distribution is, the sampling distribution tends to be normal if the sample size is larger than 30." Hence, the researcher assumed that the data were approximately normally distributed.

Therefore, from three tests conducted to check for any violation of linear regression assumptions, the researcher observed those test results and concluded that the assumptions of linear regression were not violated.

4.7.1.4. Auto-correlation /Durbin-Watson Test/

Durbin-Watson was used to test for serial correlation between errors. According to (Ott & Longnecker, 2015), there is no serial correlation if the expected value of Durbin-Watson test statistics is approximately 2.00. According to (Gujarati & Porter ,2009), a positive serial correlation can be suspected if the value of Durbin-Watson is greater than 2.00, but values less than 1.5 or greater than 2.5 should also be considered suspect. If serial correlation is suspected, it may indicate that the proposed multiple linear regression models are inappropriate. The Durbin-Watson statistic test can range from 0 to 4, with a value greater than 2 indicating a negative correlation between adjacent residuals and a value below 2 indicating a positive correlation.

The appendix provided at the end shows that the Durbin-Watson value of this study falls between 1.5 and 2.5. Thus, the researcher concludes that the model is free of serial correlation.

4.7.2. Regression Analysis Results for Independent Variables and Dependent Variables

In this section, the researcher showed the regression analysis between each dependent variable and the independent variable.

4.7.2.1. Independent Variables and Time Performance

As shown in the appendix attached at the back, the overall model 1statistics of the dependent variable time performance, R =.756, indicate that there is a positive correlation between the dependent variables and the adjusted R square value of 0.556. This indicates that the independent variables included in the model explained 55.6% of the variance (0.556 × 100%) in the dependent variable time performance, and the remaining 44.4% variance of the dependent variable time performance is due to other factors that are not included in this model. Hence, the overall model statistic (adjusted R square = 0.556) supported the view that project time management activities , project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities have a positive influence on the road construction project time performance.

Table 13 below the regression model shows the effect of the project time management activities on the dependent variables. Among the project time management activities, Project duration estimated accurately (T13) had a significant influence on the time performance of road projects in AACRA (B =.297, p = 0.000). The relationship is positive. The project scope defined clearly (T14) had a significant influence on the time performance of road projects in AACRA (B =.349, p = 0.000). The relationship is positive. Project activities defined clearly (T15) had a significant influence on the time performance of road projects in AACRA (B =.166, p = 0.008).

Table 13: Coefficient Statistics of Independent Variables and Time Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	.144	.249		.576	.565		
1	TI1	.040	.082	.040	.485	.629	.467	2.142
	TI2	.128	.073	.140	1.759	.081	.497	2.010
	TI3	.297	.068	.328	4.373	.000	.556	1.799
	TI4	.349	.079	.324	4.395	.000	.576	1.737
	TI5	.166	.062	.182	2.699	.008	.689	1.450

Source: Researcher's survey data and SPSS V20 output (2023)

4.7.2.2. Independent Variables and Cost Performance

The study assumed that project time management activities, project cost management activities, and project scope management activities, project quality management activities, and project stakeholder management activities have a positive and significant effect on the road construction cost performance.

As shown in appendix attached at the back, the overall model 2 statistics of the dependent variable cost performance, R =.892 indicate that there is a positive correlation between the dependent variables and the adjusted R square value of 0.789. This indicates that the independent variables included in the model explained 78.9% of the variance (0.789 × 100%) in the dependent variable, cost performance; the remaining 21.1% variance of the dependent variable, cost performance, is due to other factors that are not included in this model. Hence, the overall model statistic (adjusted R square = 0.789) supported the view that project time management activities, project cost management activities,, project scope management activities,, project quality management activities, and project stakeholder management activities have a positive influence on the road construction project cost performance .

Table 14 below the regression model shows the effect of the project cost management activities on the cost performance. Among the project cost management activities, Cost allocation done accurately (CO1) had a significant influence on the cost performance of road projects in AACRA (B = 0.118, p = 0.016). The relationship is positive. The resource planning done effectively (CO2) had a significant influence on the cost performance of road projects in AACRA (B = 0.219, p = 0.000). The relationship is positive. Project cost controlled effectively had a significant influence on the cost performance of road projects in AACRA (B = 0.168, p = 0.000). The relationship is positive. Project budget estimated accurately (CO4) had a significant influence on the cost performance of road projects in AACRA (B = 0.565, p = 0.000). The relationship is positive. Project documentation done accurately (CO5) had a significant influence on the cost performance of road projects in AACRA (B = 0.159, p = 0.001).

Table 14: Coefficient Statistics of Independent Variables and Cost Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	-.638	.165		-3.871	.000		
2	CO1	.118	.048	.111	2.442	.016	.717	1.395
	CO2	.219	.049	.206	4.499	.000	.706	1.416
	CO3	.168	.046	.190	3.632	.000	.541	1.848
	CO4	.565	.054	.507	10.503	.000	.638	1.568
	CO5	.159	.047	.157	3.369	.001	.688	1.453

Source: Researcher's survey data and SPSS V20 output (2023)

4.7.2.3. Independent Variables and Construction Scope Performance Indicator

As shown in appendix attached at the back, the overall model 3 statistics of the dependent variable scope performance, R =.740, indicate that there is a positive correlation between the dependent variables project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities and the adjusted R square value of .530. This indicates that the independent variables included in the model explained 53.0% of the variance (0.530 × 100%) in the dependent variable construction scope performance and the remaining 47.0% variance of the dependent variable scope performance indicator is due to other factors that are not included in this model. Hence, the overall model statistic (adjusted R square = 0.530) supported the view that project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities have a positive influence on the road construction project scope performance.

Table 15 below the regression model shows the effect of project scope management activities variables on the dependent variables (cost, time, scope, quality, and stakeholder satisfaction). Among the project scope management activities, Communication in a project done effectively (SC2) had a significant influence on the scope performance of road projects in AACRA (B = 0.502, p = 0.000). The relationship is positive Procurement done effectively (SC5) had a significant influence on the scope performance of road projects in AACRA (B = 0.262, p = 0.000). The relationship is positive.

Table 15: Coefficient Statistics of Independent Variables and Scope Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	.227	.252		.900	.369		
3	SC1	.055	.074	.050	.740	.460	.713	1.402
	SC2	.502	.091	.485	5.532	.000	.429	2.329
	SC3	.131	.071	.142	1.853	.066	.560	1.785
	SC4	-.064	.076	-.063	-.844	.400	.597	1.675
	SC5	.262	.067	.264	3.902	.000	.722	1.385

Source: Researcher's survey data and SPSS V20 output (2023)

4.7.2.4. Independent Variables and Quality Performance

As shown in appendix attached at the back, the overall model 4 statistics of the dependent variable quality performance, R =.848 indicate that there is a positive correlation between the dependent variables project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities and the adjusted R square value of 0.708. This indicates that the independent variables included in the model explained 70.8% of the variance (0.708 ×100%) in the dependent variable, quality performance; the remaining 29.2% variance of the dependent variable, the construction quality performance, is due to other factors that are not included in this model. Hence, the overall model statistic (adjusted R square = 0.708) supported the view that project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities have a positive influence on the road construction project quality performance.

Table 16 below the regression model shows the effect of project quality management activities on the dependent variables (cost, time, scope, quality, and stakeholder satisfaction). Among the project quality management activities, Project completed according to specifications (QT1) had a significant influence on the quality performance of road projects in AACRA (B = 0.209, p = 0.000). The relationship is positive. Quality planning done effectively (QT2) had a significant influence on the quality performance of road projects in AACRA (B = 0.194, p = 0.000). The relationship is positive. Quality controlled effectively (QT3) had a significant influence on the quality performance of road projects in AACRA (B = 0.116, p = 0.026).

The relationship is positive.

Quality audit done effectively (QT4) had a significant influence on the quality performance of road projects in AACRA (B = 0.464, p = 0.000). The relationship is positive. The materials used up to Standard (QT5) had a significant influence on the quality performance of road projects in AACRA (B = 0.160, p = 0.002). The relationship is positive.

Table 16: Coefficient Statistics of Independent Variables and Quality Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	-.509	.195		-2.610	.010		
4	QT1	.209	.058	.217	3.586	.000	.562	1.779
	QT2	.194	.053	.183	3.682	.000	.831	1.203
	QT3	.116	.052	.115	2.245	.026	.788	1.269
	QT4	.464	.061	.458	7.662	.000	.574	1.742
	QT5	.160	.050	.169	3.176	.002	.722	1.384

Source: Researcher's survey data and SPSS V20 output (2023)

4.7.2.5. Independent Variables and Stakeholder Satisfaction

As shown in appendix attached at the back, the overall model 5 statistics of the dependent variable, stakeholder management satisfaction. R =.736 indicates that there is a positive correlation between the dependent variables project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities and the adjusted R square value of 0.525. This indicates that the independent variables included in the model explained 52.5% of the variance (0.525 × 100%) in the dependent variable, project stakeholder management satisfaction; the remaining 47.5% variance of the dependent variable, the time performance, is due to other factors that are not included in this model. Hence, the overall model statistic (adjusted R square = 0.525) supported the view that project time management activities, project cost management activities, project scope management activities, project quality management activities, and project stakeholder management activities have a positive influence on the road construction project stakeholder satisfaction.

Table 17 below the regression model shows the effect of project stakeholder management activities on the dependent variables (cost, time, scope, quality, and stakeholder satisfaction). Among the project stakeholder management activities, Stakeholders involved in the decision-making process effectively (STK2) had a

significant influence on the stakeholder satisfaction of road projects in AACRA (B = 0.286, p = 0.000). The relationship is positive. Conflict resolution method with stakeholders done effectively (STK3) had a significant influence on the stakeholder performance of road projects in AACRA (B = 0.256, p = 0.001). The relationship is positive. Stakeholder engagement (STK4) had a significant influence on the stakeholder performance of road projects in AACRA (B = 0.384, p = 0.000). The relationship is positive.

Table 17: Coefficient Statistics of Independent Variables and Stakeholder Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	.252	.267		.944	.347		
5	STK1	-.102	.092	-.077	-1.111	.268	.703	1.423
	STK2	.286	.072	.272	3.983	.000	.717	1.394
	STK3	.256	.077	.249	3.325	.001	.599	1.670
	STK4	.384	.078	.376	4.937	.000	.578	1.730
	STK5	.115	.074	.113	1.554	.122	.631	1.584

Source: Researcher's survey data and SPSS V20 output (2023)

4.7.2.6. Regression Analysis Results for Independent Variables and Performance Indicators

As shown in appendix attached at the back, the coefficient of the adjusted R square was found to be 0.851. This indicates 85.1% of the variability of performance was explained by the five independent variables. Other variables not considered in this study contribute about 14.9% of the variability of performance.

As shown in the appendix attached at the back of model 6, when performance was regressed on the five independent variables, the independent variables were statistically significant at a level p-value of 0.000.

Table 18 below the regression model shows the effect of each independent variable on the overall dependent variables (cost, time, scope, quality, and stakeholder satisfaction). All the independent had a significant influence on the overall dependent variables of road projects in AACRA (B = 0.304, p = 0.000, B = 0.357, p = 0.000, B = 0.243, p = 0.000, B = 0.215, p = 0.000, B = 0.190, p = 0.000), respectively.

Each of the independent variables has a positive relationship with the overall dependent variables.

Table 18: Coefficient Statistics of Independent Variables and Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	-4.395	.707		-6.213	.000		
6	PTMA	.304	.039	.280	7.716	.000	.801	1.248
	PCMA	.357	.047	.337	7.592	.000	.533	1.877
	PSCMA	.243	.041	.254	5.905	.000	.567	1.765
	PQMA	.215	.043	.205	5.015	.000	.628	1.593
	PSKTMA	.190	.046	.177	4.090	.000	.561	1.783

Source: Researcher's survey data and SPSS V20 output (2023)

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION ANDRECOMMENDATION

5.1. Introduction

This section highlights the research's main findings. Recommendations are also suggested based on the research findings and suggested for further studies.

5.2. Summary of Findings

The specific objectives of the study were to identify how project time management activities, project cost management activities, project scope management activities, project quality management activities, project stakeholder management activities, and the most significant project management activities that affect the performance of road construction projects administered by AACRA.

In order to achieve its objective, the study adopted a causal research design, which is used to identify the most causal factor affecting the performance of road construction projects in the Addis Ababa City Roads Authority.

The descriptive statistics findings of the study indicated that, with regard to the demographic characteristics of the respondents, the majority of them were male (91%). The age category 35–44 (45.45%) has covered the majority of the respondents, followed by 25–34 (43.36%). In terms of level of education, 81.82% of the respondents were degree holders, and 18.18% of the respondents had a master's degree. The majority of the respondents are from the site engineers' position (66.43%). The majority of the respondents have 5–10 years of experience (57.34%), followed by less than five years of experience (25.87%).

The multiple regression analysis reveals that about 55.6% of the determinants of project time performance, 78.9% of the determinants of project cost performance, 53.0% of the determinants of project scope performance, 70.8% of the determinants of project quality performance, and 52.5% of the determinants of project stakeholder satisfaction are explained by the independent variables.

The remaining 44.4%, 21.1%, 47%, 29.2, and 47.5% are explained by other factors put in place in order to enhance project time, cost, scope, quality, and stakeholder satisfaction, respectively. In other words, there are other additional variables that are important in explaining project time, cost, scope, quality, and stakeholder satisfaction that have not been considered in this research.

Moreover, multiple regression analysis was conducted to establish the effect of project time management activities on the dependent variables.

The relationship between all the significant independent variables and dependent variables is positive.

An ANOVA (F-test) was used to examine the significance of these regression analysis results for

independent variables and dependent variables. The result shows that the model as a whole has a statistically significant relationship at the 5% level of significance.

Finally, the most significant project management activities affecting the performance of road construction projects in the Addis Ababa City Road Authority were identified from relative importance index.

5.3. Conclusion

The factors affecting the performance of road construction projects in AACRA have been thoroughly reviewed in this study. The study found that the factors affecting the performance of road construction projects had a statistically significant relationship with the project time, cost, scope, and quality, as well as stakeholder satisfaction in road construction projects in AACRA.

From the regression results, it is indicated that the independent variables had statistically significant and positive relationships at a 5% level of significance with road construction performance.

By improving the Project duration estimated accurately, AACRA can ensure that realistic timelines are set for each project, allowing for better planning and resource allocation. This can help prevent delays and disruptions. By defining the project scope clearly, AACRA can avoid scope creep and ensure that all stakeholders are aware of what the project entails. This can help prevent misunderstandings and disagreements between stakeholders, which can cause delays and add unnecessary costs to the project. By increasing project quality audits, AACRA can ensure that resources are used efficiently and effectively, without compromising on quality. This can help speed up the project delivery time while maintaining a high level of quality output. Overall, these improvements will not only lead to time performance enhancement but also help to ensure that road construction projects in AACRA are delivered on time, within budget, and with high-quality results.

Hence, the study concluded that the performance of road projects is greatly affected by time management activities.

Concerning project cost management activities, this study found that it had statistically significant and positive relationships at a 5% level of significance with time, cost, scope, quality, and stakeholder satisfaction.

Improving cost allocation involves identifying all the costs associated with a road construction project and allocating them to specific tasks and activities. This will enable AACRA to accurately track costs and identify areas where savings can be made. Effective resource planning involves ensuring that the right resources are available at the right time, in the right place, and in the right quantity. This will help avoid delays and cost overruns and ensure projects are completed within budget. Project cost control involves

monitoring project costs and ensuring they are kept in line with the budget. This will involve keeping a close eye on costs such as labor, materials, equipment, and subcontractors. Proper project documentation will help AACRA keep track of project progress and make informed decisions. This includes maintaining accurate records of project timelines, budgets, and milestones. Quality control is critical to ensuring that road construction projects meet the required standards and are delivered to specifications. This involves monitoring and controlling all aspects of the project, from design to delivery, to ensure that quality is maintained. Conformance to specifications ensures that the road construction project meets the client's requirements and complies with all relevant regulations and standards. This will help avoid costly rework and delays. Effective project budget estimation involves accurately estimating the costs of a road construction project. This will ensure that the project is properly funded from the outset and that any risks are identified early on. Overall, focusing on these key areas will help AACRA enhance cost performance in their road construction projects, leading to better outcomes for all stakeholders involved.

Therefore, the study concluded that the performance of road projects is greatly affected by cost management activities.

Pertaining to project scope management activities, this study found that it had statistically significant and positive relationships at a 5% level of significance with time, cost, scope, quality, and stakeholder satisfaction.

Effective communication within the project team is also necessary to ensure that everyone is on the same page and working towards the same goals. Stakeholder engagement refers to involving all interested parties in the project, including local communities, government authorities, and environmental groups. Engaging stakeholders early in the project and listening to their concerns and needs can help prevent conflicts and reduce delays. Reducing stakeholder involvement in decision-making processes can also help improve scope performance. By clearly defining roles and responsibilities and delegating decision-making appropriately, the project team can stay focused on completing tasks and meeting goals without unnecessary delays. Overall, by improving in these areas and focusing on enhancing scope performance, AACRA can successfully complete road construction projects that meet or exceed quality standards, are completed on time, and satisfy all stakeholders involved in the project.

Hence, the study concluded that the performance of road projects is greatly affected by scope management activities.

In regard to project quality management practice-related factors, this study found that it had statistically significant relationships at a 5% level of significance with time, cost, scope, quality, and stakeholder

satisfaction. Stakeholder identification has a positive relationship with the performance of road projects.

Implementing measures for project cost control, the AACRA can help prevent excessive spending and cost overruns, which can lead to project delays or even failure. Similarly, by focusing on conformance to specifications, AACRA can ensure that all work done on the project is done according to agreed-upon plans and standards, which can increase efficiency and reduce waste. Quality control and quality auditing are also important factors in any construction project, and AACRA shall ensure that these processes are carried out effectively in road construction projects. This will help to identify any defects or issues early on in the process, allowing for faster and more effective corrective action to be taken. One of the critical components of successful road construction projects is the use of high-quality materials. AACRA shall work to ensure that only quality materials are used in the construction process, which can help prolong the lifespan of the road in addition to improving overall quality. Finally, by identifying stakeholders early in the process and involving them throughout the project, AACRA can avoid potential issues or conflicts that can arise later on. This can result in a smoother and more successful project. Generally, the successful implementation and control of these can lead to improved quality performance in road construction projects.

Therefore, the study concluded that the performance of road projects is greatly affected by quality management activities.

On project stakeholder management activities, this study found that it had statistically significant and positive relationships at a 5% level of significance with time, cost, scope, quality, and stakeholder satisfaction.

Improved estimation of project duration will help ensure that projects are completed within the expected timeframe, while enhanced quality of procurement procedures will guarantee that the necessary materials and services are acquired in a timely and cost-effective manner. The promotion of better standards for materials used in road construction will lead to more durable roads that require fewer repairs over time, resulting in significant cost savings. Additionally, involving stakeholders in the decision-making process will help increase their sense of ownership and investment in the project, while improving stakeholder engagement will help build stronger relationships between project stakeholders, leading to better collaboration and communication throughout the project's lifespan. Ultimately, AACRA can achieve improved stakeholder performance in road construction projects by implementing measures that will increase efficiency, reduce costs, and establish better working relationships between project stakeholders.

To sum up, this research demonstrated that effective time management activities, cost management activities, scope management activities, quality management activities, and stakeholder management activities have a significant impact on road construction project performance.

5.4. Recommendations

Based on the findings of this study, a number of recommendations can be made that might help improve road construction projects. The following points can be recommended for AACRA:

- It is recommended to properly utilize project management software that includes features for estimating project duration, defining project scope, and conducting quality audits. AACRA can streamline their project management processes, identify potential issues early on, and make more informed decisions about resource allocation. Additionally, utilizing project management software can help ensure that all stakeholders have access to the same information, reducing the risk of misunderstandings and disagreements. Ultimately, this can lead to more efficient and effective project delivery, with improved time performance and higher-quality results.
- It is advisable to implement a comprehensive cost management plan that includes all the recommended practices identified in the study. This will ensure that all costs associated with road construction projects are accurately tracked and allocated to specific tasks and activities, resources are effectively planned, project costs are monitored and controlled, and project documentation is maintained.
- It is recommended to train and educate staff on effective cost management activities. This will ensure that all project staff understand the importance of cost management and are equipped with the necessary knowledge and skills to implement and maintain effective cost management activities throughout the project lifecycle. This will also help ensure that cost management practices are consistent across all road construction projects.
- It is advisable to ensure that all necessary resources are available when needed, and it's important to prioritize resource planning throughout the project lifecycle. This could involve creating a detailed inventory of required resources and developing contingency plans for unexpected delays or shortages. By having a clear understanding of the resources needed to complete the project, the project team can minimize delays and improve overall project performance.
- It is recommended that engaging stakeholders early in the project and involving them throughout the decision-making process can help to prevent conflicts and reduce delays. This could involve holding regular stakeholder meetings, collecting feedback from stakeholders, and incorporating their concerns and needs into project design and planning. By fostering a culture of stakeholder engagement and collaboration, the project team can improve the quality of the final product and enhance overall project performance.

- It is advisable to emphasize stakeholder engagement and communication. This will help ensure their needs and expectations are met, potential issues are identified and addressed, and conflicts are avoided. AACRA should focus on effective stakeholder engagement and communication as a critical component of project quality management.
- It is recommended that AACRA prioritize quality control and materials standards aspects of project quality management by developing robust quality assurance plans, implementing effective quality control processes, and establishing clear standards for materials used in road construction projects. By ensuring that only quality materials are used and defects or issues are identified early on, AACRA can increase efficiency, reduce waste, and ensure that the resulting infrastructure has a longer lifespan.
- It is advisable that AACRA implement effective stakeholder management activities to improve road project performance. This could involve involving stakeholders in the decision-making process, promoting stakeholder engagement, and building stronger relationships between stakeholders. By doing so, AACRA can increase efficiency and reduce costs while establishing better working relationships between project stakeholders.
- It is recommended that AACRA improve its estimation and procurement procedures to ensure that projects are completed within the expected timeframe and within budget. This could involve enhancing the quality of procurement procedures to guarantee that necessary materials and services are acquired in a timely and cost-effective manner. In addition, promoting better standards for materials used in road construction will lead to more durable roads that require fewer repairs over time, resulting in significant cost savings.

5.5. Recommendations for Future Study

This research concentrated on the factors affecting the performance of road construction projects in the case of the Addis Ababa City Roads Authority. For future studies, this researcher recommends similar studies on other cities' road authorities. Moreover, further studies can focus on project management knowledge areas that were not covered by this study.

References

Abdulai, R.T. & Banful, A.B. (2020).Infrastructure and economic development in Sub-Saharan Africa: A dynamic panel data approach. *Journal of African Business*, *21*(2), 215-229. DOI:10.1080/15228916.2019.1592484

Abebe, B., & Garza-Reyes, J. A.(2020).Stakeholder engagement in public infrastructure projects: The case of road construction in Ethiopia. *Journal of Cleaner Production*.

Abera, A., Kebere, H. N., & Asnake, M. T. (2020). Assessment of Time Performance of Road Construction Projects: A Case of Addis Ababa City Road Authority. *Journal of Construction Engineering, Project and Facilities Management*, *11*(1), 29-38. DOI: 10.5005/jp-journals-10036-1264.

Adamu, B.(2022).Assessing the Causes of Time Overrun in Building and Road Construction Projects: The Case of Addis Ababa City, Ethiopia. *Journal of Engineering*.

Adriana ,G.C., Benlloc, A.S., Domingo, L. M., Tienda ,J. L. , and Pellicer, E.(2020). Identification of Factors Affecting the Performance of Rural Road Projects in Colombia.J*ournal of sustainability*, 12(18).

Adugna,D.,Fentaw,A., & Seid,M.(2020).Analysis of Factors Affecting Scope Performance of Road Construction Projects in Addis Ababa City Road Authority, Ethiopia. *Journal of Construction Engineering and Management*, 146(8).

Ahmad,B.W., smail,M.T. Nasid,A.,Rosli, A. R., Wan, N. A. and Zainab, M. Z.(2009).Effects of procurement systems on the performance of construction projects.University Technology, Malaysia.

Ahmed, S., Liu, X. K., Thaheem, M. J., & Ahmad, A. (2021).Measuring contractor satisfaction in construction projects: A quantitative approach. Arabian Journal for Science and Engineering, 46(1), 755-768.

Aibinu,A.A.,Jagboro,G.O.(2002).The effects of construction delays on project delivery in Nigeria construction industry. *International Journal of Project Management*, *20*(8), 593-99.

Alemayehu, D., & Mekonnen, K. (2018). Factors Affecting Cost Performance in Road Construction Projects: A Case Study of Ethiopia. *Journal of Construction Engineering and Project Management*, *8*(1), 1-11.

Alemu, M., & Mekonnen, Y. (2019). Factors affecting time performance of road construction projects in the Addis Ababa City Road Authority, Ethiopia. *Journal of Construction Engineering and Management, 145*(8), 04019046.

Al-Momani,A.H.(2000). Construction delay: a quantitative analysis, *International Journal of Project Management*, *18*, 51-59.

Alvarado,C.M., Silverman, R. P., & Wilson, D. S.(2004). Assessing the Performance of construction projects: Implementing earned value management. *Journal of Facilities Management, 3* (1), 92 – 105.

Amare,G.M., & Addisie,Y.M.(2019). Assessing the relationship between stakeholder management and project success in road construction projects: case of Addis Ababa City Road Authority. *Journal of Engineering, Design and Technology*, *17*(1), 166-183.

Amusan,L.M.(2011). Study of factors affecting construction cost performance in Nigerian construction sites. Covenant University, Nigeria.

Arifin, B., Chang, C. H., & Gebretsadik, Y. (2018). Analysis of road network characteristics and crash patterns in Addis Ababa. *Journal of Transportation Safety & Security*, *10*(4), 437-449.

Ashenafi,R. and Ashebir,A.(2021).Determining the Effects of awarding lowest bid price system on the Construction projects of Ethiopian Southern Nation.*Journal of University of Shanghai for Science and Technology*,*24* (1).

Ashraf,R., & Ghanim, M.(2016).Exploring the Impact of Social Media on Brand Attitudes and Purchase Intentions: A Study of Pakistani Youth. *Journal of Business and Economics*, *7*(1), 215-230.

Assaf ,SA. & Al-Hejji S.(2006). Causes of delay in large construction project. Int J Project Management. *24* (4): 349-57.

Atieno,S. and Muturi,W.(2016). Factors affecting performance of road construction projects in arid and semi-arid areas in Kenya. *International journal of social science and information technology,2*(8).

Atkinson, R.(1999). Project Management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. *International Journal of Project Management*, *17(*6), 337-342.

Bamisile , A. (2004). Engineering Management in Production and Services: Building production management practice in the construction industry in Nigeria, *12*(2), 56- 73.

Belassi, W., & Tukel, O. I. (1996). A new framework for determining critical success/failure factors in projects. International Journal of Project Management, 14(3), 141-151.

Belinda,B. and Peat, J.(2014). Medical statistics: a guide to SPSS, data analysis, and critical appraisal ,2ed, Wiley, UK.

Belout, A., & Gauvreau, C. (2004). Factors influencing project success: The impact of human resource management. International Journal of Project Management, 22(1), 1-11.

Belsley,D.A.(1991).Conditioning diagnostics: Collinearity and weak data in regression, John Wiley & Sons, Inc., New York.

Birhanu, D. T., Beshah, M. A., & Kifle, W. (2020).Factors affecting quality performance of road construction projects in the Addis Ababa City Road Authority, Ethiopia. *Journal of Construction Engineering and Management,146*(1). DOI: 10.1061/(ASCE)CO.1943-7862.0001766

Bourne, L., Walker, D.H., Wilcox, M., & Zielinski, S. (2017). A typology of project stakeholder relationships. International Journal of Project Management, 35(2), 153-166.

Cameron, E., & Green, M. (2015). Making sense of change management: A complete guide to the models, tools, and techniques of organizational change. Kogan Page Publishers.

Chan,D.W.,Kumaraswamy, M. M.(2002). Compressing construction durations: lessons learned from Hong Kong building projects. I*nternational Journal of Project Management,* 20, 23-35.

Chang, A. S., & Ibbs, C. W. (2003). Change management and control process in engineering design and construction. Journal of Management in Engineering, 19(4), 180-188.

Chen, Q., Zhang, R., & Hu, Y. (2017). Determinants of project success: An exploratory study of IT projects in China. Information Technology & People, 30(2), 351-373.

Cheung, S.O., Suen, H.C., H., Cheung,K. W.(2004).Web-based construction project performance monitoring system, Automation in Construction, *13*, 361–376.

Chinyio, E. A., & Olomolaiye, P. O. (2010). Communication in construction teams. Journal of Construction Engineering and Management, 136(9), 1022-1030.

El-Sayegh, S. M., & Abdul-Aziz, A. R. (2005).Construction cost control using earned value analysis. The Arabian Journal for Science and Engineering, 30(1C), 3-18.

Fleming, Q. W., & Koppelman, J. M. (2016). Earned value project management. Project Management Institute.

Chitkara,K.K.(2009). Construction Project Management: Planning, Scheduling and Controlling, Institute of Construction Project Management, Gurgaon, Haryana, India .18th ed.

Cleland, D. I., & Ireland, L. R. (2006). Project manager skills. Journal of engineering and technology management, 23(3), 220-233.

Connelly,A.(2009). *Journal of applied of applied structure equation modeling*, 2nd ed ·Sage publication.
Construction Industry Institute (CII). (2019).Quality performance metrics.

Construction Industry Research and Information Association (CIRIA). (2014). Community engagement in construction: A good practice guide. London: CIRIA.

Costello, A.(2008). The six disciplines for performance-based project management. River woods.

Creswell,J.W.(2009). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

Deribsa,A.(2018). Research Methodology: Handbook for Research Students and Practitioners. Mega Printing Press.

Deribsa,Abate.(2018). Research Methodology: Handbook for Research Students and Practitioners, Mega Printing Press.

Desta, T. (2018). Bus rapid transit systems in Ethiopian cities: A comparative study of Addis Ababa and Hawassa. *Journal of Transport Geography*, 73, 119-131.

Dger, D. (2008).Theory of Performance. Boston, MA: Pearson Education, Inc. pp. 11-12.

Doloi, H.(2012).Understanding the roles and responsibilities of stakeholders in construction projects. *Journal of construction engineering and management*, *138*(2), 267-278.

Dr. Ashraf ,Samarah & Dr.Ghanim A.Bekr.(2016). Causes and Effects of Delay in Public Construction Projects in Jordan.

Dutta, K. (2019). Construction industry in developing countries: A review. *Journal of Frontiers in Construction Engineering,8*(4), 463-474. DOI: 10.1007/s40521-019-00143-9

Elinwa,A.U.,Joshua,M.(2001).Time-overrun factors in Nigerian construction industry. *Journal of Construction Engineering and Management, 127* (5), 419-25.

Ellene , D. (2022). Assessments on the causes and effects of road construction project delay: case of Addis Ababa city road authority. Fulfillment of master's Thesis.

Enshassi , A., Lisk, R., Sawalhi ,I., and Radwan, I.(2003). Contributors to construction delays in Palestine. *Journal of American institute of constructors, 27*, (2), 45-53.

Fantaye,G.(2017).Factors Affecting cost and Time Overruns on Road Construction Projects under Addis Ababa City Administration. Fulfillment of master's Thesis.

Fasihuddin, A. I., & Kassim, K. (2019).Assessing the quality in road construction: A literature review. Journal of Engineering and Applied Sciences, 14(7), 8-16.

Fekadu, G.,Haregot, K., & Fekade,M.(2019). Factors affecting cost performance in road construction projects in Ethiopia. *Journal of Construction Engineering and Management, 145*(11).

Fetene , N. (2008).Causes and effects of cost overrun on public building construction projects in Ethiopia. Fulfillment of master's Thesis.

Gabelica, C., & Jonasson, H. (2016). Project quality management and project success: An empirical study. Total Quality Management & Business Excellence, 27(3-4), 243-257.

Gay R. and Airasian P.(2003). Educational Research Competencies for Analysis and Application 7thed.New York: Merrill Prentice Hall.

Gebre, G. K., Mulugeta, Y. A., & Asayehegn, K. G. (2017). Factors affecting the performance of road construction projects in Addis Ababa city road authority. *Journal of Construction Engineering, Project Management and Innovation,7*(1), 1704-1716.

Gebrehiwot, T. K., & Skibniewski, M. J. (2019).Analyzing the Impact of PSP Elements on Time Performance of Road Construction Projects in Ethiopia Using Bayesian Network Model. *Journal of Construction Engineering and Management, 145*(5).

Gebremedhin,S.(2019). Factors affecting the performance of construction projects: the case of defense construction enterprise. Fulfillment of master's Thesis.

George , D. and Mallery, P. (2003). SPSS for window Step by Step, 4th ed.

Gujarati, D. N. (2003). Basic econometrics (4th ed.). New York, NY: McGraw-Hill.

Gujarati, D. N., & Porter, D. C. (2009). Basic econometrics. McGraw-Hill Higher Education.

Gündüz , M.,Nielsen, Y. Özdemir, M.(2013). Quantification of delay factors using the relative importance index method for construction projects in Turkey. *Journal of Management in Engineering*, 29 (2), 133-39.

Guta, B. B., & Tadesse, K. M. (2019). Impact of resource planning on project scope performance: A case of Addis Ababa City Road Authority. *Journal of Construction Engineering and Project Management*, *9*(3), 47-56.

Haile, M. S.,Wondimu, A.T., & Zewdu,H.M.(2018). Factors affecting cost performance in road construction projects in Addis Ababa City Road Authority: A case of selected road projects. *International Journal of Construction Engineering and Management*, *7*(4), 304-313.DOI: 10.5923/j.ijcem.20180704.01

Hair, J. F. Jr., Anderson, R. E., Tatham, R. L. & Black, W. C. (1998). Multivariate data analysis, 5thed. New Jersey: Prentice-Hall.

HairJr.,J.F.,Black,W.C.,Babin,B.J. and Anderson,R.E.(2010).Multivariate Data Analysis:a Global Perspective, 7th ed.

Henok , A. (2020).Assessment of Time and Cost Performance Evaluation of Ethiopian Construction: A Case Study of Addis Ababa City Road Authority. Fulfillment of master's Thesis.

Hillson, D., & Simon, P. (2012). Practical risk management: The ATOM methodology (2nd ed.). Management Concepts.

Hillson, D., & Simon, P. (2020). Practical risk management for projects. Association for Project Management.

Hossain, M. M., & Barua, M. K. (2018). Project quality management practices: A literature review. Journal of Quality in Maintenance Engineering, 24(4), 494-512. doi: 10.1108/JQME-07-2017-0058

Huang,X., & Li,J.(2019).An Interval Type-2 Fuzzy Group Decision-Making Approach for Sustainable Supplier Selection. Sustainability, *11*(2), 382. DOI: 10.3390/su11020382

Jing,H. and Wang,X.(2006).The relationships between key stakeholders' project performance and project success: Perceptions of Chinese construction supervising engineers. International, *24*(3), 253-260.

John, W, Muller, R., Levitt, R. E., & Kunz, J. (2013). Hybrids and project management: A systematic review. International Journal of Project Management, 31(8), 1014-1024.

Karim, A., & Som, A. (2016).Stakeholder management strategy: A practical approach. PM World Journal, 5(2), 14-22.

Kassa,D.,Yilma,A., & Yohannes,A.(2020). Evaluation of Factors Affecting Cost Performance of Road Construction Projects in Addis Ababa City Road Authority. *Journal of Construction Engineering and Project Management*, *10*(3), 49-61.

Kerzner ,H.(2017).Project Management: A Systems Approach to Planning, Scheduling, and Controlling.12th ed.

Kerzner, H. (2013). Project management: A systems approach to planning, scheduling, and controlling. John Wiley & Sons.

Kerzner, H. (2017). Project management metrics, KPIs, and dashboards: A guide to measuring and monitoring project performance.

Kerzner,H.(2003),Project Management A Systems Approach to Planning, Scheduling, and Controlling, Baldwin-Wallace College Berea Ohio, John Wiley, New Jersey.

Knoke,D.,Bohrnstedt,W.G. and Mee, A.P., Statistics for social data analysis (4th edition), F.E. Peacock Publisher, Illinois, 2002.

Koppelman, J. M., & Kim, K. H. (2016). Performance measurement and management for engineers. New York: Springer.

Kothari,C.R.(2004).Research Methodology: Methods and Techniques (2nd ed.), New Age International, Ltd., Publishers.

Kuprenas,J.A.(2003). Project management actions to improve design phase cost performance. *Journal of Management in Engineering*, *19*(1), 25–32.

Kwak, Y. H., & Anbari, F. T. (2015). Understanding how project management, project success, and project complexity are interrelated.

Ledbetter,W.B.(1994).Quality performance on successful project. *Journal of Construction Engineering and Management,120* (1), 34-6.

Leite, H., & Salvador, R. (2017).Client satisfaction factors in Buildings construction projects. 7(2), 39.

Li, M., & Wu, S. (2019). A review of the critical factors affecting time performance in construction projects. International Journal of Construction Management, 19(1), 1-14.

Ling,F.Y.,Suipheng,L.,Qing,W.S.,Hua,L.H.(2007).Key project management practices affecting Singaporean firms project performance in china. *International Journal of project management, 22*, 101-115.

Liu, A. M. M., & Walker, D. H. T. (2006). Critical factors influencing time performance of construction projects. Journal of Construction Engineering and Management, 132(11), 1183-1192.

Pinto, J. K. (2016). Project management: Achieving competitive advantage. Pearson.

Shenhar, A. J., Levy, O., & Dvir, D. (2001). Mapping the dimensions of project success. Project Management Journal, 32(2), 5-17.

Liu, Y., Chen, Y., Song, Z., Yang, X., & Ong, J. (2019). Team dynamics and project performance: The mediating role of teamwork quality. International Journal of Project Management, 37(8), 956-969.

Liu,W., & Teng, J. (2018).The key performance indicators for stakeholder management in urban transit projects. 37, 69-78.

Maerege,G.(2019). Factors affecting performance of building construction projects at lideta sub-city: the case of commercial building projects. Fulfillment of master's Thesis.

Malhotra ,A. (2005). Analyzing accumulated Knowledge and influencing future Research.

Mbugua,L.(1999). Study of factors affecting construction cost performance in Nigerian construction sites. Covenant University, Nigeria.

Momeet,A.,Memon,N.A.,Nazeem,S.,Shaikh,F.A.,Jamali,M.(2022).Reasons of poor performance of construction projects of Pakistan.*Tropical Scientific Journal , 1*(1).

Montgomery,D.C.,Peck, E.A.and Vining,G.G.(2015).Introduction to Linear Regression Analysis. John Wiley & Sons, Hoboken.

Mullins, L. J. (1993).Management and Organizational Behavior. Pitman Publishing, London.

Mulugeta,A.,& Tesfaye,B.(2020). Investigating the Impact of Material Management Practices on Stakeholder Performance of Road Construction Projects: Evidence from Ethiopia. *Journal of Construction in Developing Countries, 25*(2), 49-66.

Muluneh,A.A.,Teklehaymanot,H.A.,& Daniel, D.F. (2019). Factors affecting quality performance of road construction projects in Addis Ababa City Road Authority. *Journal of Construction Engineering, Management and Innovation, 3*(2), 1-16.

Munns,A.K.,and Bjeirmi,B.F.(1996).The Role of Project Management in Achieving Project Success. *International Journal of Project Management*, *14*(2), 81-87.

Navon, R. (2005). Automated project performance control of construction projects, Automation in Construction, *14*,467- 476.

Neely, A. (1999). The performance measurement revolution: why now and what next. *International journal of operations & production management*.

Neely, A., Gregory, M., Platts , K.(1995). Performance measurement system design. *International Journal of Operations and Production Management*. *15*(4), 80-16.

Nitithamyong , P. and Skibniewski ,M.J .(2004).web based construction project management system: how to make them successful,*13*(4).491-506.

Norusis, M.J. (1992).*SPSS for Windows. Profession Statistics, (5)*. Chicago (IL).

O'Brien, J. J., & Fischer, M. A. (2010). Construction management. New York: McGraw-Hill.

Oluwajana, S.M., Ukoje, J.E., Okosun, S.E. and Aje, I. O.(2022). factors affecting time and cost performance of road construction projects in Nigeria. *African Journal of Applied Research, 8(*1), 72- 84.

Ozer, H. B., & Vasanthakumar, N. (2018).Evaluation of the quality of asphaltic concrete paving grade 60/70 using some physical parameters transport, 33(1), 1-8.

Pallant,J.(2011). SPSS Survival Manual: A step by step guide to data analysis using SPSS.4th ed.

Pheng,L. S.,Chuan, Q. T. (2006). Environmental factors and work performance of project managers in the construction industry. *International Journal of Project Management,24*, 24-37.

Pillai,A.S., Joshi,A.,Rao, K.S.(2002). Performance measurement of R&D projects in a multi-project, concurrent engineering environment. *International Journal of Project Management, 20*, 165-177.

Pinto, J. K., & Slevin, D. P. (2018). Critical factors in successful project implementation. Project Management Journal, 49(1), 63-75.

Poilt,D.and Hungler,B.(1985). Essentials of nursing research: Methods and applications, J. B. Lippincott Company.

Project Management Institute (2013).A guide to the project management body of knowledge (PMBOK Guide), Project Management Institute, Newton Square, PA.

Project Management Institute. (2017). A guide to the project management body of knowledge (PMBOK guide) (6th ed.). Project Management Institute.

Project Management Institute. (2017). A guide to the project management body of knowledge (PMBOK Guide, 6th ed.

R.Lyman Ott, Michael Longnecker, (2015).an introduction to Statistical Methods & Data Analysis , 7th ed.

Reich, B. H., Gemino, A., & Sauer, C. (2020). The impact of communication effectiveness on project performance. International Journal of Project Management, 38(3), 318-329.

Reichelt,K.,Lyneis,J.(1999). The dynamic of project performance: Benchmarking the drivers of cost and schedule overrun, *European Management Journal,17*(2), 135–150.

Robert ,D.B.(2003). Why Measure Performance. *63* (5).

Sabine, L.,Brian,S.E.(2004). A hand book of statistical analyses using SPSS, *1*,145-168.

Saito, G., Shimaoka, M., & Takeda, H. (2013).Quality management practices in the Japanese road construction industry. Journal of Construction Engineering and Management, 139(2), 125-132.

Saraf,D.(2013).Study of Factors Affecting Performance of Construction Project, *International Journal of Science and Research*, *4*(5).

Saunders, M., Lewis, P., Thornhill, A. (2009).Research Methods for Business Students' 5th ed , Prentice Hall, New York.

Semira,H.(2021). Assessment of delay on road construction projects: the case of Addis Ababa city road authority. Fulfillment of master's Thesis.

Sharma, R., & Kumar, S. (2015). Analysis of the time overruns of road construction projects. Journal of Construction Engineering and Management, 141(11), 05015009.

Singh,S & Smith, J.(2019).The role of contractors in the construction industry. *Journal of Construction Engineering and Management*, *145*(8).

Siraw,Y.(2016). Analysis of Factors Contributing to Time Overruns on Road Construction Projects under Addis Ababa City Administration. Fulfillment of master's Thesis.

Swan,W. and Kyng,E.(2005). An introduction to key performance indicators Centre for Construction Innovation.

Tabachnick, B. G., & Fidell, L. S. (2001).Using multivariate statistics. Boston: Allyn and Bacon.

Tadesse, T., & Ayele, A. (2021). The impact of stakeholder management on the quality performance of road construction projects in Addis Ababa City Road Authority. *Journal of Construction Engineering and Management*, *147*(2).

Tadesse,A.,&Pankhurst,R.(2014). Factors affecting scope performance of road construction projects in Addis Ababa City road authority.*Journal of Construction Engineering and Management*, *140*(3).DOI: 10.1061/(ASCE)CO.1943-7862.0000797

Tadesse,A.,Kifle,M.Y.,&Kassa,Z.Y.(2018).Effect of quality management practices on quality performance: Evidence from road construction projects in Addis Ababa City Road Authority, Ethiopia. *Journal of Construction in Developing Countries*, *23*(1), 29-44.

Tadesse,B.,&Omer,M.(2020). Factors affecting the cost performance of road construction projects in Addis Ababa City road authority, Ethiopia. *Journal of Construction Engineering and Project Management*, *10*(2), 31-43.

Tadesse,B.,Wu,Z.,&Ashenafi, G. (2021). Factors affecting the stakeholder performance of road construction projects: Evidence from the Addis Ababa City Road Authority. *Journal of Infrastructure Development*, *13*(1), 1-19.

Tadesse,G.,& Mulugeta,A.(2017). The impact of project documentation on cost performance in road construction projects: Evidence from Ethiopia. *Journal of Construction Engineering and Project Management,7*(3), 39-49. DOI: 10.6106/JCEPM.2017.7.3.039

Tadesse,M.(2021).The impact of sustainable procurement practices on stakeholder performance of road construction projects in the Addis Ababa City Road Authority. *Journal of Construction Economics and Management*, *39*(1), 1-18.

Takim,R and Akintoye, A. (2002). Performance indicators for successful construction project performance. Greenwood, D .(Ed.). *18th Annual ARCOM Conference*. University of Northumbria. *2*, 545-55.

Telaye,A.,Nigusse,A.,& Gebresenbet,F.(2019). Factors affecting stakeholder performance of road construction projects in the Addis Ababa City Road Authority, Ethiopia. *Journal of Construction Business and Management*, *3*(2), 1-11.

The Standish Group International. (2015). CHAOS Manifesto 2015: The law of diminishing returns.

Thoor,S.R.and Ogunlana, S.O.(2010). Beyond the iron triangle: Stakeholders perception of key performance indicators (KPIs) for large-scale public sector development projects. *International Journal of Project Management*, *28*(3), 228-236.

Tilahun, D., Abiy, M. N., & Belay, K. T.(2018). Factors affecting quality performance of road construction projects in Addis Ababa City Road Authority. *Journal of Construction in Developing Countries*, *23*(2), 73-91.

Tilahun,G.,&Tilahun,B.(2019). The Effect of Cost Allocation on the Cost Performance of Road Construction Projects: Evidence from Addis Ababa City Road Authority, Ethiopia. *International Journal of Engineering Research and Managemen*t, *6*(4), 38-44.

Tsegaye, S., & Girma, A. (2020). Factors affecting the quality performance of road construction projects in Addis Ababa City Road Authority. *International Journal of Construction Management*, *20*(1), 1-11. DOI: 10.1080/15623599.2019.1662354

Turner, J .R .(2004).Five conditions for project success. *International Journal of Project Management*, *22*(5), 349-350.

Turner, J. R. (2009). The handbook of project-based management: Improving the processes for achieving strategic objectives. New York, NY: McGraw-Hill Education.

Turner, J. R., & Müller R. (2010). The project manager's leadership style as a success factor on projects: A literature review. Project Management Journal, 41(2), 20-32. doi: 10.1002/pmj.20158.

Ugwu , D.(1994).Causes of delay and cost overruns in Nigerian construction projects.

Vaus , D.A.(2001).Research design in social science. Saga Publication Ltd. London.

Y, Taro. (1967).Statistics an introductory Analysis, Harper & Row, New York, 2nd ed.

Yin, R. K. (2018). Case study research and applications: Design and methods. Sage publications.

Zarnowiecki, D., Dollman, J., & Sinn, N. (2017). Investigating the influence of social determinants on body weight and health during adolescence: A systematic review. Journal of Adolescent Health, 60(6), 599-611.

Zou, P., Zhang, S., Mao, G., Zhang, X., & Zhong, R. (2018). Analysis of cost overruns in road construction projects based on system dynamics modeling.10(8).

Annexes

Appendix I - Questionnaire

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTER PROGRAM IN PROJECT MANAGEMENT

(QUESTIONNAIRE)

Dear sir/madam;

The purpose of this questionnaire is to collect data for the study entitled "Factors Affecting the Performance of Road Construction Projects in Addis Ababa City Roads Authority for partial fulfillment of the M.A. in Project Management. The genuine responses you forward will be used as input for the study and will make a great contribution to its success. Your privacy will be kept anonymous, so no one will know who provided the information. Furthermore, any information you provide in the questionnaire will be kept confidential and only used for the purpose of the study. Therefore, I have kindly requested that you respond genuinely to the different questions below.

Thank You in advance for your cooperation.

If you have any question concerning this questionnaire, please feel free to contact me:

Samson Tesfaye; Tel.0911832525

E-mail: samishahaymi@gmail.com.

General Instruction: Please, tick **"✓"** in the appropriate columns for your response for closed -ended questions among the provided alternatives but write your response in the space provided for open-ended questions.

SECTION ONE: Demographic Data

1.Type of organization

Owner ☐ consultant ☐ contractor ☐

2. Age of the respondent

25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64 ☐ 65 and above ☐

3. Gender of the respondent

Male ☐ female ☐

4. Level of education

Diploma ☐ first degree ☐ master's degree ☐ PhD and above ☐

5. Working experience in road construction (year**)**

Below 5 years ☐ 5-10years ☐ 11-15years ☐ 16-20years ☐

Above 20years ☐

Instruction: Please use the following Key words to answer and put a tick (✓) on the corresponding tables/boxes.

S.A = Strongly Agree (5)

A = Agree (4)

N = Neutral (3)

D.A = Disagree (2)

S.D.A = Strongly Disagree (1)

SECTION TWO: **Construction Project Performance Indicators (Dependent Variable)**

1. Please, tick "✓" in the appropriate columns to indicate the extent to which the following listed indicators affect the performance of road construction projects in Addis Ababa City Road Authority.

SN	Performance Indicators of road Construction Projects	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1	Time					
2	Cost					
3	Scope					
4	Quality					
5	Stakeholder Satisfaction					

SECTION THREE: **Measurement of the Independent Variables**

1.Please tick "✓" in the appropriate columns to indicate the extent to which you agree or disagree with the following listed project time management activities affecting road construction projects time performance in Addis Ababa City Road Authority.

SN	Project time management activities	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1	The schedule developed promptly					
2	Activity sequenced in an appropriate order					
3	Project duration estimated accurately					
4	The project scope defined clearly					
5	project activities defined clearly					

2.Please tick "✓" in the appropriate columns to indicate the extent to which you agree or disagree with the following listed project cost management activities affecting road construction projects cost performance in Addis Ababa City Road Authority.

SN	Project cost management activities	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1	Cost allocation done accurately					
2	The resource planning done effectively					
3	Project cost controlled effectively					
4	Project budget estimated accurately					
5	Project documentation done accurately					

3.Please tick "✓" in the appropriate columns to indicate the extent to which you agree or disagree with the following listed project scope management activities affecting road construction projects scope performance in Addis Ababa City Road Authority.

SN	Project scope management activities	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1	Project scope controlled effectively					
2	Communication in a project done effectively					
3	Project scope defined clearly					
4	Work breakdown structure done accurately					
5	Procurement done effectively					

4.Please kindly tick "✓" in the appropriate columns to indicate the extent to which you agree or disagree with the following listed project quality management activities affecting road construction projects quality performance in Addis Ababa City Road Authority.

SN	Project quality management activities	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1	Project completed according to specifications					
2	Quality planning done effectively					
3	Quality controlled effectively					
4	Quality audit done effectively					
5	the materials used up to Standard					

5.Please kindly tick "✓" in the appropriate columns to indicate the extent to which you agree or disagree with the following listed project stakeholder management activities affecting road construction projects stakeholder satisfaction in Addis Ababa City Road Authority.

SN	Project stakeholder management activities	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1	Stakeholders prioritized effectively					
2	Stakeholders involved in the decision-making process effectively					
3	Conflict resolution method with					

	stakeholders done effectively					
4	Stakeholder engagement done effectively					
5	Stakeholders identified effectively					

6.Please write if you suggest any extra contributing factors that affect the performance of the road construction projects in AACRA related to time, cost, scope, quality, and stakeholders satisfaction.

_____

_____

_____

Thank you

Appendix II- Interview Questions

Site Engineers, Resident Engineer, Project Manager were interviewed to understand the phenomenon according to their experience and knowledge. The following questions were asked in the interview questions.

1. What are the most critical factors that affect the performance of a road construction project according to your experience and observation?
2. Among the project time, project cost, project scope, project quality, and project Stakeholder management activities, which affects the road projects in AACRA more? Why?
3. What is your practice in project time, project cost, project scope, project quality, and project Stakeholder management in road projects in AACRA?
4. What are the leading causes of poor performance in road construction projects?
5. What is your suggestion for possible solutions to enhance the performance of road construction projects in AACRA?

Appendix III - SPSS Outputs

Validity Test

Correlation Coefficients

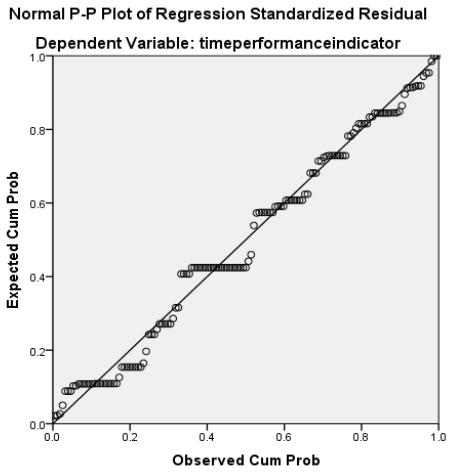
		Performance	PTMRP	PCMRP	PSCMRP	PQMRP	PSKTMRP
Performance indicators	Pearson Correlation	1	.601**	.766**	.710**	.617**	.690**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	143	143	143	143	143	143
Project time Management practices	Pearson Correlation	.601**	1	.318**	.406**	.229**	.365**
	Sig. (2-tailed)	.000		.000	.000	.006	.000
	N	143	143	143	143	143	143
Project cost Management practices	Pearson Correlation	.766**	.318**	1	.544**	.546**	.506**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	143	143	143	143	143	143
Project scope Management practices	Pearson Correlation	.710**	.406**	.544**	1	.299**	.546**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	143	143	143	143	143	143
Project quality Management practices	Pearson Correlation	.617**	.229**	.546**	.299**	1	.495**
	Sig. (2-tailed)	.000	.006	.000	.000		.000
	N	143	143	143	143	143	143
Project stakeholder Management practices	Pearson Correlation	.690**	.365**	.506**	.546**	.495**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	143	143	143	143	143	143

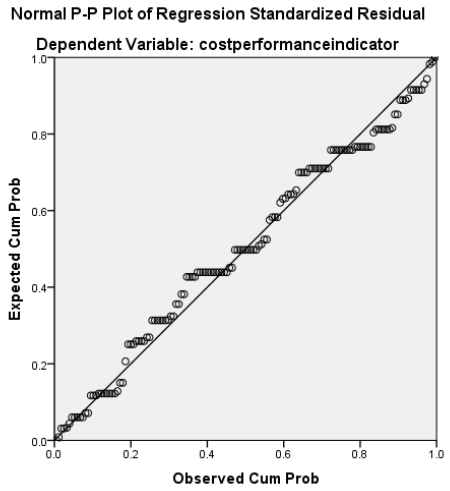
Multicollinearity Test

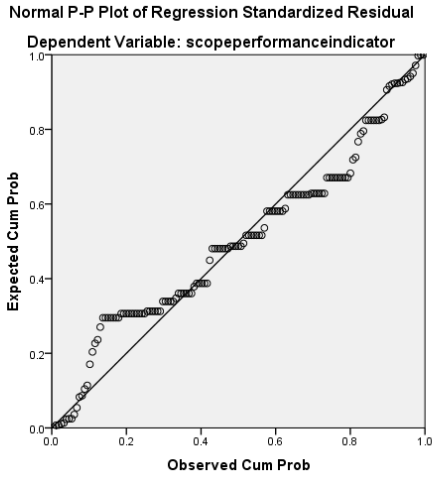
Multicollinearity Test Using VIF

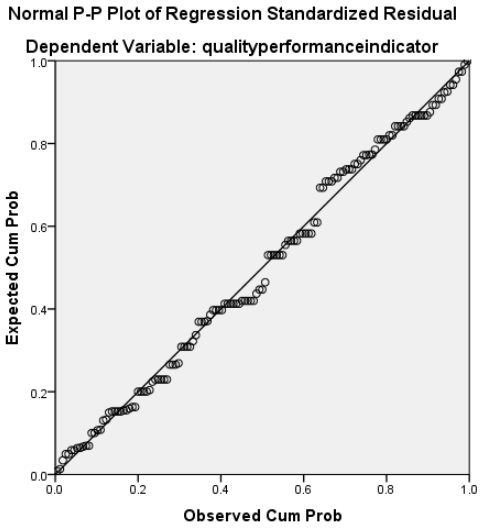
Variable	Tolerance	VIF
Project time Management activities	0.801	1.248
Project cost Management activities	0.533	1.877
project quality management activities	0.567	1.765
project scope management activities	0.628	1.593
project stakeholder management activities	0.561	1.783

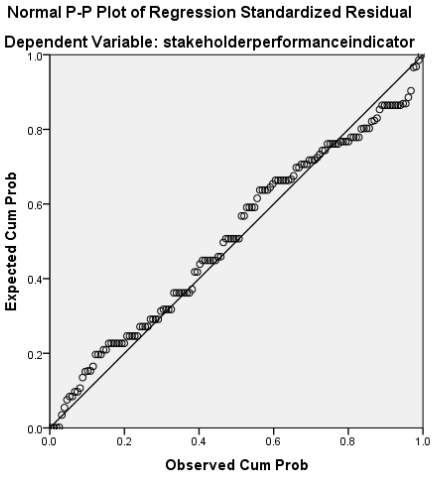
Linearity Test



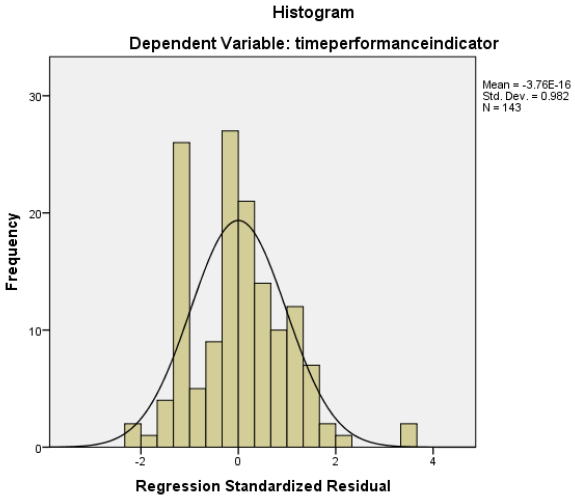


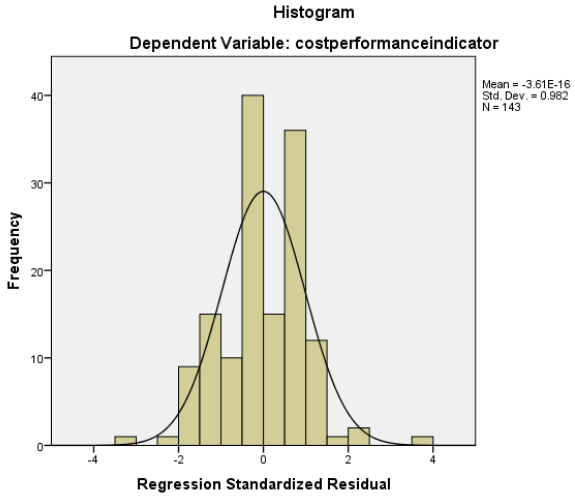

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: scopeperformanceindicator
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

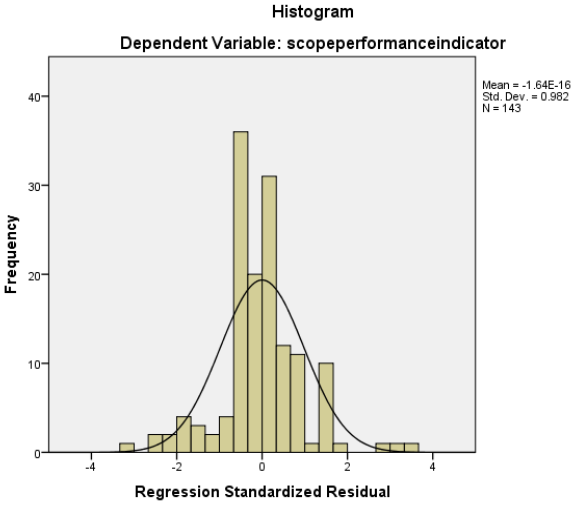

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: qualityperformanceindicator
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

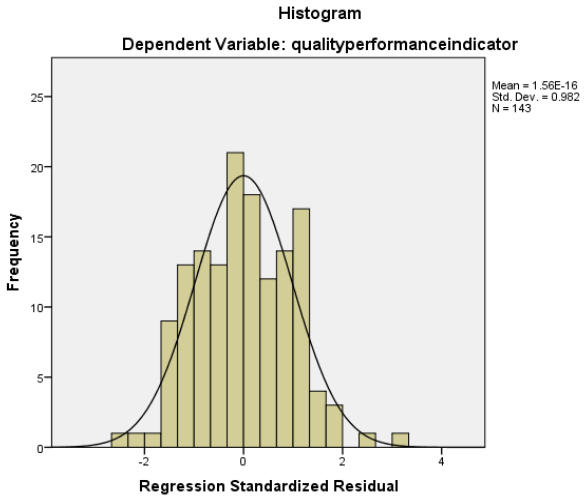

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: stakeholderperformanceindicator
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

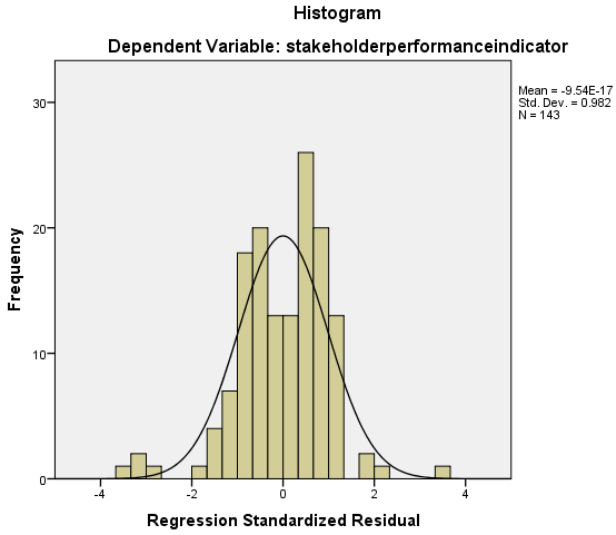
Normality Test











Skewness and kurtosis

Variables	N	Skewness	Kurtosis
	Statistic	Statistic	Statistic
Performance	143	.132	-1.022
PTMA	143	-.450	-.876
PCMA	143	.260	-.967
PSCMA	143	.054	-1.081
PQMA	143	.134	-1.341
PSKTMA	143	-.111	-1.389
Valid N (listwise)	143		

Auto-correlation /Durbin-Watson Test/

Dependent Variables	Durbin-Watson
Time	1.869
Cost	1.617
Scope	1.564
Quality	1.994
Stakeholder Satisfaction	1.784

Regression Analysis Results

Model Summary for Time Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.756	0.571	0.556	0.445

Time performance ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.157	5	7.231	36.536	0.000
	Residual	27.116	137	.198		
	Total	63.273	142			

Model Summary for Cost Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	0.892	0.796	0.789	0.324

Cost Performance ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	56.231	5	11.246	107.004	.000
	Residual	14.399	137	.105		
	Total	70.629	142			

Model summary for Scope Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	0.740	0.547	0.530	0.517

Scope Performance ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
3	Regression	44.210	5	8.842	33.084	.000
	Residual	36.615	137	.267		
	Total	80.825	142			

Model Summary for Project Quality Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
4	0.848	0.719	0.708	0.390

Quality Performance ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
4	Regression	53.100	5	10.620	69.943	0.000
	Residual	20.802	137	.152		
	Total	73.902	142			

Model Summary for Project Stakeholder Management Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
5	0.736	0.541	0.525	0.512

Stakeholder Performance ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
5	Regression	42.341	5	8.468	32.344	.000
	Residual	35.869	137	.262		
	Total	78.210	142			

Model summary for Independent Variables and Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
6	0.925	0.856	0.851	1.027

Independent Variables ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
6	Regression	859.155	5	171.831	162.808	.000
	Residual	144.593	137	1.055		
	Total	1003.748	142			

Appendix IV - Variable Labeling

Factors	Practices (activities)	Labeled
Project time management activities	The schedule developed promptly	T11
	Activity sequenced in an appropriate order	T12
	Project duration estimated accurately	T13
	The project scope defined clearly	T14
	project activities defined clearly	T15
Project cost management activities	Cost allocation done accurately	CO1
	The resource planning done effectively	CO2
	Project cost controlled effectively	CO3
	Project budget estimated accurately	CO4
	Project documentation done accurately	CO5
Project scope management activities	Project scope controlled effectively	SC1
	Communication in a project done effectively	SC2
	Project scope defined clearly	SC3
	Work breakdown structure done accurately	SC4
	Procurement done effectively	SC5
Project quality management activities	Project completed according to specifications	QT1
	Quality planning done effectively	QT2
	Quality controlled effectively	QT3
	Quality audit done effectively	QT4
	the materials used up to Standard	QT5
Project stakeholder management activities	Stakeholders prioritized effectively	STK1
	Stakeholders involved in the decision-making process effectively	STK2
	Conflict resolution method with stakeholders done effectively	STK 3
	Stakeholder engagement done effectively	STK 4
	Stakeholders identified effectively	STK 5