A STRATEGIC ANALYSIS OF PUBLIC PROCUREMENT MATURITY LEVEL TO ENHANCING ROAD CONSTRUCTION SUCCESS: A CASE OF ADAMA CITY

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DECLARATION

I hereby declare that this Master thesis entitled "A Strategic Analysis of Public Procurement Maturity Level to Enhancing Road Construction Success: A case of Adama City" is my original work. That is, it has not been submitted for the award of any academic degree, diploma or certificate in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citation. It is being submitted for the partial fulfillment for the award of the degree of Master of Science in Construction Engineering and Management at Adama Science and Technology University School of Civil Engineering and Architecture.

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I, the advisor of this thesis, hereby certify that I have read the revised version of the thesis entitled "A Strategic Analysis of Public Procurement Maturity Level to Enhancing Road Construction Success: A case of Adama City" prepared under my guidance by Abraham Legesse Bahiru submitted in partial fulfillment of the requirements for the degree of Masters of Science in Construction Engineering and Management. Therefore, I recommend that the candidate has fulfilled the requirement and hence he can submit the thesis to the department.

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Department Head	Signature	Date
School Dean	Signature	Date
Office of Postgraduate Studies, Dean	Signature	Date

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LIST OF ACRONYM

GDP	Gross Domestic Product
CMMM	Contract Management Maturity Model
PPMM	public procurement maturity model
PCPM	Public Construction Procurement Model
IPMM	Indonesia Procurement Maturity Model
PPM	Public Procurement Management
AHP	Analytical Hierarchy Process
KPI	Key Performance Indicators
SPPD	Strategic Planning and Policy Development
POE	Process Optimization and Efficiency
TIDU	Technology Integration and Data Utilization
RMCB	Risk Management and Capacity Building
BIM	Building Information Modeling

ABSTRACT

Effective procurement management practices are crucial for the success of road construction projects, contributing to factors like quality, budget, and schedule adherence. The study aims to evaluate and enhance the public procurement management practices within the road construction sector of Adama City, Ethiopia, aiming to elevate the maturity level of procurement processes and thereby improve the overall performance and success rate of road construction projects. To achieve the objective, the study employed a mixed-methods research approach, combining quantitative and qualitative research approach. Data were acquired by using a questionnaire and interview. The research design was used a combination of descriptive and exploratory research design: purposive sampling technique was use. The data analysis methods used descriptive analysis techniques and exploratory analysis techniques using mean score sand standard division, relative important index and multiple linear regression method, based on the findings relevant conclusions were drawn using Statistical Package for the social science and excel software. Addresses to stakeholder engagement, feedback mechanisms, clear job specifications, and ongoing training are crucial for achieving a high level of maturity in procurement management. Addresses to establishing clear guidelines, adhering to procedures, and involving stakeholders in the process, project teams; regulatory compliance, risk management, stakeholder engagement, transparency, and continuous improvement; clear responsibilities, incentive plans, career development, contractor evaluation, performance management systems, and effective human resource management; and comprehensive and specialized training to ensure efficient and high-quality in achieving favorable outcomes in terms of cost, schedule, and quality. Improvement strategies prioritization the procurement management maturity on project performance, by implementing clear guidelines for all stages of the procurement cycle and matching procurement methods to project needs, organizations can improve strategic planning and policy on project performance. Additionally, regularly evaluating and adjusting procurement strategies, as well as continuously assessing and updating processes, can enhance process optimization and efficiency. Moreover, integrating Building Information Modeling technology for better project visualization and leveraging advanced technologies to streamline procurement processes can improve technology integration and data utilization. Lastly, investing in professional training for procurement personnel and proactively identifying and managing risks to minimize cost overruns and delays are crucial steps to enhance risk management and capacity building for successful project performance. By implementing these strategies, organizations can strengthen their project management practices and achieve better outcomes in today's competitive business landscape.

Keywords: procurement management, road construction, project performance, maturity level assessment, key performance indicators.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The construction industry is an important part of the economical backbone in many countries, construction industry's share of Ethiopia's often accounting for 9.4% of the Gross Domestic Product (GDP) (Falcioni, 2015). Furthermore, construction products and processes have a large impact on safety, health and environmental aspects (Olusola et al., 2016). In many countries the construction industry has, however, attracted criticism for inefficiencies in outcomes such as time and cost overruns, low productivity, poor quality and inadequate customer satisfaction (Lynch, 2021).

The Ethiopian construction industry has shown rapid growth resulting in project success contrasting that of other developing countries and the road construction sector is a vital component of the infrastructure development and economic growth of any country (Nget al., 2019; Tian and Li, 2022). However, many road construction projects face challenges such as cost overruns, delays, poor quality, and low customer satisfaction. These challenges can be attributed to various factors, such as the complexity and uncertainty of the project environment, the lack of effective project management practices, and the misalignment of the project objectives with the organizational strategy and stakeholder expectations (Idrees and Shafiq, 2022). Therefore, there is a need to investigate how the road construction sector can improve its performance and efficiency by adopting and implementing appropriate project management practices (Newman et al., 2022).

Public procurement is the process of acquiring goods, services, and works by public entities from external sources, using public funds. Public procurement plays a vital role in the economic and social development of a country, as it accounts for a significant share of the public expenditure and influences the quality and efficiency of public services and infrastructure. However, public procurement is also prone to various challenges and risks, such as corruption, mismanagement, inefficiency, and poor performance, especially in developing countries where the institutional and regulatory frameworks are weak or inadequate (Cocciolo et al., 2022).

One of the sectors that heavily relies on public procurement is the road construction sector, which is essential for enhancing the connectivity, accessibility, and mobility of people and goods within and across countries (Verma et al., 2022). Road construction projects are complex, large-scale, and long-term endeavors that involve multiple stakeholders, such as public authorities, contractors, consultants, suppliers, and beneficiaries. The success of road construction projects depends largely on the effectiveness and efficiency of the public procurement management practices that are adopted and implemented throughout the project life cycle, from planning and design to execution and maintenance (Bisbey et al., 2020; Mwelu et al., 2022). However, previous studies have shown that public procurement management practices in the road construction sector are often immature, inconsistent, and unsystematic, leading to poor project performance in terms of cost, time, quality, and sustainability (Dagba, and Dagba, 2019; (Sönnichsen and Clement, 2020; Hailemarkos, 2022).

Therefore, there is a need to assess the maturity level of public procurement management practices and evaluate their impact on road project performance in the road construction sector in developing countries, particularly Ethiopia. Ethiopia is one of the fastest-growing economies in Africa and the country has embarked on an ambitious road development program and it is expensive to improve the delivery scheme and construction project management process at any organizational level, with many factors to attain project success (Hailemariam, 2022). However, the road sector faces many challenges, such as inadequate funding, low capacity, poor quality, and frequent delays, which hamper the achievement of the national and regional development goals (Abera, 2022).

Performance measurement is the most important aspect for an organization to know the extent to which the achievement of the goal is done. According to one of the factors affecting project performance is the level of project management maturity. The maturity level of project management allows organizations to identify how to improve project performance .According to argue that in order to gain performance improvements, it is important for the organization to continuously evaluate all of the project management processes in finding improvement areas to improve project management maturity. Research and evaluation are also conducted to ensure that the operational execution of the project is executed appropriately (Putri et al., 2019).

There are various models of project management maturity that are used to determine how well organizations are improving their performance. In this research, the framework of PM Solution's Project Management Maturity Model (PMMM) is applied as an instrument for improving the strategic management performance. During in the last decade, research has center the attention on studying the benefits of high level of maturity in the context of PMM .The utilization of PMMM for improvement the process brings with the valuable benefits in completing times of project shortly, controllable of costs, build on organizational strategic, and sustainable development and profitability to a long period of time (Karim et al., 2023).

According to Faifr (2020), maturity in project management is the implementation of a standard methodology and accompanying processes such that there existed a high likelihood of repeated success. (Shetalkumar, 2020), refer to maturity as a state where an organization is in perfect condition to achieve its objectives. Project maturity would then mean that the organization is perfectly conditioned to deal with its projects.

Assessment of procurement management involved determining whether BUS had standard contracts and whether the organization had a procurement plan for each project start. It also sought to understand whether contract administration formed an integral part of the project management organization. The organization uses traditional procurement methods as all public organizations.

It is recommended that the organization should formalize an evaluation process for reviewing and accepting proposals. This involves setting up proper evaluation criteria for the assessment of the project proposals from consultants in a manner that will reflect true costs and schedules. While it is accepted that the organization is guided by the Public Procurement and Asset Disposable Board Act in terms of procurement, it appears that there is a general tendency for the least cost method of evaluation of tenders which at times do not achieve the necessary savings for the organization (Perspective, 2021).

The organization's management of scope revealed the need for improvement in developing Work Breakdown Structure Dictionaries. It is recommended therefore that change control documentation be implemented and that work breakdown structure dictionaries be created for all the projects through a central project office which will act as the knowledge base for the organization (Andersen and Jessen, 2003).

A detailed literature on the management practices of construction projects in Adama city as well as in Ethiopia is difficult to find. As a result research works in such an industry is difficult or mystified (Fuad Bay and Skitmore, 2006). Despite this, this research can tried to summarize existing literature on the area, most of which are result of Master's thesis done at Addis Ababa University (Ethiopia) and a doctoral dissertation done abroad. Like any developing country the construction industry plays major role and contributes highly to the development of the economy of the country. Next to agriculture, the industry provides one of the largest employment opportunities.

1.2 Statement of the Problem

A project is part and parcel of the normal operations of public sector organizations. The projects which are funded by public funds aim at achieving certain organizational objectives set by public sector organizations to facilitate fulfillment of their mission. In some instances these objectives are not achieved. From previous studies, the challenge of poor project implementation appears to be a replica across the board within the public sector environment globally as evidenced below.

Public procurement management (PPM) is the process of acquiring goods, services, and works from external sources by public entities. It is a key function of public administration that affects the quality, efficiency, and effectiveness of public service delivery (Gerba, 2017; World Bank, 2022). PPM is especially important for the road construction sector, which requires large investments, complex coordination, and high technical standards (MAPS, 2021; Shuka, 2022); . However, PPM in Ethiopia faces many challenges, such as lack of transparency, accountability, and professionalism; inadequate planning, budgeting, and monitoring; and frequent delays, cost overruns, and disputes (Gerba, 2017; Shuka, 2022, World Bank, 2022; World Bank, 2022). These challenges undermine the performance of road projects, which are measured by indicators such as time, cost, quality, and user satisfaction (Shuka, 2022). Arising from the foregoing, the current study seeks to identify factors that influence successful public sector project implementation and best practices in public project implementation. The findings of the study was go a long way in addressing the shortcomings and impediments that affect project implementation not only at Adama city road construction sectors but

also in the larger public sector in Ethiopia. It also adds to the already existing knowledge and findings established by other researchers on public sector projects implementation.

According to Mwanaumo et al. (2018), there is not enough construction and management capacity in the country. The management of construction project is highly influenced by the utilization of scarce financial and physical resource with controlling activities limited to cost and time monitoring dimensions only. Contractors cannot properly administer contract, most of them are not properly trained to prepare cost and schedule reports, quality records, safety reports, change order records, claims records, progress reports, payment requisition, etc. Most local contractors even don't have claim management knowledge or are not interested to pursue legitimate claim for fear of damaging working relationships and their reputation in the industry as they will be dealing usually with few public institutions (Gromko et al., 2003).

One potential problem related to procurement maturity level in the context of road construction is the lack of standardized processes and procedures for procurement activities. This can lead to inefficiencies, delays, and increased costs in the procurement of goods and services for road construction projects (Kesto and Gebre,2022). Additionally, a low procurement maturity level may result in a higher risk of corruption and non-compliance with regulations, which can further impact the quality and timeliness of road construction projects. Improving the procurement maturity level in the road construction sector is essential to ensure transparency, accountability, and efficiency in the procurement process, ultimately leading to successful and sustainable road infrastructure development (Khan and Abbas, 2023).

Therefore, this study aims to assess the maturity level of PPM practices and evaluate their impact on road project performance in the road construction sector in Adama city. The main research question is: How does the maturity level of PPM practices affect road project performance in Adama city, Ethiopia?

1.3 Research Questions

The research questions are:

- ✓ How mature are the public procurement management in road construction sector?
- ✓ How does procurement practice affect the performance of road construction projects?
- ✓ How can improving strategies for procurement practice and project success in road construction sector?

1.4 Objective of the Study

1.4.1 General Objective

The general objective of the study is to investigate the public procurement management practices within the road construction sector in Adama City, to enhance the maturity level of procurement processes and thereby improve the overall performance and success rate of road construction projects in Adama.

1.4.2 Specific Objectives

The specific objectives of the study are:

- ✓ To determine the current maturity level of public procurement management practices in the road construction sector areas for improvement.
- ✓ To analyze the impact of public procurement management practices on the performance of road construction projects.
- ✓ To develop strategies to increase procurement maturity level for project success in the road construction sector.

1.5 Significance of the Study

The findings and recommendations of the study can potentially benefit not only the Adama city but also other similar contexts by providing a roadmap for enhancing procurement practices and project performance in the road construction sector. Besides, the Public Procurement which is charged with the regulation of public procurement will benefit by understanding the challenges in implementation of public projects.

This research has the potential to contribute to the advancement of procurement maturity and project success in the construction industry, ultimately leading to positive economic and societal impacts. The findings was also bring to the fore new knowledge which policy makers, procurement practitioners and scholars will find useful in accelerating success in public projects implementation. It is also hoped that the research findings was an eye opener to stimulate more research in the area of procurement practices vis-à-vis public projects.

1.6 Scope of the Study

The scope of the study is to investigate the public procurement management practices within the road construction sector in Adama City. Considering the specific objectives of the study,

the study would adopt a mixed-methods approach, combining quantitative and qualitative data collection and analysis techniques. The target population of the study is construction professionals in the road construction sector. The population size is small, so the sample size determination is not required. The data collection instruments would be a questionnaire survey and an interview. The survey would be used to collect quantitative data to achieve all specific objectives using liker scale items and an interview would have an aim to refine the draft questionnaire and collect relevant qualitative data.

The data analysis method was descriptive statistics, relative important index, analytical hierarchy process (AHP), multivariate regression analysis, and thematic analysis. The data analysis tools are SPSS. The period of the study is supposed to last after four consecutive months. The study follows the ethical principles and guidelines of the university and the relevant authorities. The studies also consider the limitations and challenges that may arise during the research process, such as data availability, accessibility, reliability, validity, and generalizability. The studies contribute to the existing literature on procurement management practice and road project performance, and provide practical implications and recommendations for the road construction sector in Adama city.

1.7 Limitations of the Study

This study is carried out under the limitations including investigating the public procurement management practices within the road construction sector in Adama City could be the lack of access to relevant data and information. This could hinder the ability to conduct a comprehensive analysis and draw accurate conclusions about the practices being followed. Few recent studies are published in local context, and limited access and availability of historical data in the case city could possibly limits the generalizability and robustness of the findings. However, the adoption of sound statistical procedures and eight methodologies significantly help to fairly and wisely make inferences and conclusions to similar scenarios.

1.8 Operational Definition

Procurement is the act of obtaining or purchasing goods or services, typically for business purposes.

Procurement management is a term that describes the process of managing and optimizing a project's budget as it applies to the goods, services, and resources you'll need to complete your project.

Project success is achieved when all project deliverables are completed within the specified timeframe, budget, and quality standards agreed upon in the project plan. Additionally, stakeholders' expectations are met, and the project's intended benefits are realized, leading to a positive impact on the organization or stakeholder satisfaction.

Project Performance is overall measurement of whether a project has met objectives and requirements of scope, cost, and schedule.

Maturity Level is a well-defined evolutionary plateau that establishes a level of capacity for improving workforce capability.

Procurement Maturity model is measures a company's ability to optimize its procurement function, understand the current practices and controls for procure-to-pay and implement digital technologies.

1.9 Organization of the Study

This thesis would be organized with the preliminary pages of the thesis document consisted of the cover page, title page, approval sheet, acknowledgment, table of content, list of tables, list of figures, acronyms and abstract. The main body part has five chapters, within each chapter there is different but interrelated subtopics. The first chapter introduces the study and contains the introduction, the background of the study, the statement of the problem, and objective of the study, research questions, and significance of the study, limitation of the study, and organization of the study.

Chapter 2 presents the literature review, with special reference to the topic that Chapter 3 contains the research methodology. These include introduction, research design, description of the study area, research approach, population, sampling techniques, source of data collection, data collection tools/instruments, method of data analysis, and presentation technique in this chapter.

Chapter 4 aims to involved analysis and discussion of the results that have been collected from questionnaire and case study. To realize this aim, the study presents the findings and

associated discussion in relation to Analysis of Data from the Questionnaires In this section, the data were statistically analyzed using micro soft excel with other necessary tests. General information of respondent's sub-objectives in this chapter. In the first section of Chapter 4, the Information about the maturity of procurement management in road construction sector, the impact of public procurement management practices on the performance of road construction projects and to prioritize those strategies to improve the procurement management maturity and the strategies are supposed to be evaluated based on the results of the first objective as it is aimed to identify an area of improvement

Chapter 5 summaries methodology followed and the findings of the various chapters and the study's conclusions. The chapter closes with this study's contributions to the literature, its limitations, and suggestions for further research.

In this chapter, the background and statement of the problem (motivation of the research) have been presented. Further, the study aims, associated objectives, scope of the study, significance of the study and the organization of the thesis to achieve these objectives have briefly been presented. In the next chapter, the literature review and the gaps in the prior research have been presented.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of this literature analysis is to identify the existing knowledge base and debates and consequently develop a meaningful and relevant research project. The purpose of this topic is to present the research, theory, concepts and ideology that exist with regard to the theoretical and practical issue of procurement management maturity level and performance of road construction projects provision.

Construction Industry has long been realized as one among the most important enablers for social, economic and political development of countries. The industry is a distinct sector of the economy, which makes its direct contributions to economic growth (Dedrick et al., 2003). The construction industry in Ethiopia has been on fast growing mode which plays an instrumental role in the country development. It provides the basis upon which other sectors can grow by constructing the physical facilities required for the production and distribution of goods and services and it has a significant multiplier effect on the economy as a whole (Mathouraparsad & Maurin, 2017).

According to Lafhaj et al. (2016) road construction sector is one of the largest sectors in Ethiopian construction industry and also stated that the road network of Ethiopia provides the dominant mode of freight and passenger transport and thus plays a vital role in supporting economic and social development of the country and it is an important national asset.

According to Lucas et al. (2016) road transport is an essential factor in the economic growth of developing countries to achieve continuity of road transport benefits and the overall economic development of the nation. The construction industry is the total through which physical development is achieved, and that is truly the locomotive of the national economy. The more resources, engineering, labor, materials, equipment, capital, and market exchange are provided from within the national economy.

According to Dakhil. (2013) construction industry can be defined as in both developed and developing countries may be viewed as that sector of the economy which, through planning, design, construction, maintenance and repair, and operation, transforms various resources into constructed facilities. Stated that construction industry converts a range of resources into

social, economic and environmental infrastructure. It is one of the most influential sectors both globally and in individual countries. Construction is principally defined by the concept of assembling materials and products, it is in fact multi-tasked to bring together numerous independent businesses and corporate personalities in to one goal oriented process is the particular challenge of the construction industry.

According to Igboroodowo et al. (2017), construction project in general is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment. Noted that the construction industry in Ethiopia is the process of transformation based on improving the competitiveness of the construction industry and enhancing its ability to fulfill the national development demands and also he stated that road construction sector is one of the largest sectors in Ethiopian construction industry that needs prevention.

2.2 Procurement Management

According to Wagner et al. (2013), procurement management is the process of purchasing or obtaining the goods, services, or outcomes needed from outside the company to complete the work are referred. It's a broad term and it includes a management of any contract negotiation, settlement and administration with outside entity (Haining, 2014).

The procurement methods implemented in project at operation level are considered uncertainty analysis, right skills evaluations, detail plan preparation, broad based bid selection techniques development of a wise, fair contract methods. Besides a systematized management strategy are needed to ensure authorities, accountability, timeliness & money for effective procurement (Asiedu and Adaku, 2020).

Procurement management is the process of acquiring goods, services, or works from an external source. It involves the planning, sourcing, purchasing, and controlling of the resources needed to meet the needs of a project or organization. The main objectives of procurement management are to obtain the right quality of goods and services, at the right time, and at the right price (Mwikali et al., 2012).

According to de Araújo et al. (2017), This process typically involves identifying the requirements, selecting suppliers, negotiating contracts, and managing supplier relationships. It also includes activities such as supplier evaluation, performance measurement, and risk

management. Effective procurement management can help organizations achieve cost savings, improve operational efficiency, and mitigate risks associated with the supply chain.

2.3 The Role of Procurement

The role of procurement is vast and it touches the overall success of any project implementation. Satisfying demands into real products/commodities or services based on the predefined requirements are some of the roles of procurement with in the supply chain management. The role of procurement is wider and it makes a significant contribution to organizational efficiency, and organizations should put in place efficient procurement processes to protect shareholders' funds. Any management strategy is designed by considering the issues of procuring and its helps for decisions making (Saad et al., 2016).

Afshari. (2023), indicated that the role of procurement has become significantly important and it has a major determinant of any projects and organization success. Different factors affects procurement functions and from these globalization, advances, technological developments, cost pressure, and regulatory compliance have the upper hand related to cost savings and achieving more value for money (Suliantoro et al., 2022).

Procurement has a significant correlation with organizational money and wealth and as a result it has a decisive role for any business (Chen et al., 2022). Procurement is a procedure for assessing and purchasing of goods and services. It incorporates a lot of activities and from finding possible suppliers to delivering goods from suppliers to consumers.

2.4 The Concept of Maturity Models

Mylrea and Robinson (2023), indicated that a maturity model describes key elements of effective processes connected to a specific organizational quality. The model draws the development path from an ad hoc, immature process to a mature, well-managed, disciplined and controlled process. The assumption underlying maturity models is that a mature level of development, will lead to improved business performance and therefore better results. Maturity models are often used as a self-assessment instrument and to define opportunities for further organizational development.

Maturity models are frameworks or tools that measure an organization's maturity level in a specific area or discipline. They provide a structured approach to assess, benchmark, and

improve an organization's capabilities and practices over time. Maturity models help organizations understand their current state, define desired goals, and track progress towards achieving higher levels of maturity. Maturity models provide organizations with a roadmap to improve their capabilities, processes, and practices. They enable organizations to assess their current state, set goals, and chart a path towards excellence and continuous improvement (Cubo et al., 2023).

2.5 Maturity Levels of Procurement Management Process

Maturity models developed for evaluating procurement management uses five levels of maturity, the assessment of variables does not utilize numerical scores to determine the level; instead, it employs a categorical scale of maturity, i.e. levels 1 to 5, with a specific definition for each variable (Cubo et al., 2023). Research indicates that greater maturity leads to better practices, and better practices lead to increased performance in the model. Therefore the measurement of maturity may be a useful tool to test the relationship between the purchasing model quality and its financial/non-financial contribution to the company (Liinaharja, 2023).

Herath et al. (2023), indicated that Process performance measurement typically focuses on the concept of process capability and maturity. Organizations have used process capability maturity models to assess, measure, and improve their organizational critical core processes, such as software development and project management). Process capability in these models is defined as the inherent ability of a process to produce planned results. Maturity refers to a measure of effectiveness or capability in any specific process. Maturity is usually described in terms of levels of effectiveness or capability. A maturity level refers to a level of organizational capability created by the transformation of one or more domains of an organization’s processes. Finally, a process capability maturity model refers to a roadmap for implementing the vital practices for one or more domains of organizational processes (Weerabahu et al., 2022).

Eduardo Talero, study indicated that the procurement management maturity model provides a visual tool to help public procurement organizations assess the major steps which they must accomplish when procuring supplies, services, or integrated solutions. The procurement management maturity model consists of five levels of maturity. The five maturity levels

reflected in the model allow an organization to assess its level of capability for each of the four dimensions key process areas of the procurement process.

The procurement management maturity model consists of five levels of maturity are Level-1: Ad Hoc is an initial level of maturity processes with low management awareness, Level-2: Basic is a level of maturity have established some basic contract management processes and standards within the organization, but these processes are required only on selected complex, critical, or high-visibility contracts, such as contracts meeting certain dollar thresholds or contracts with certain customers, Level-3: Structured is a level of maturity, contract management processes and standards are fully established, institutionalized, and mandated throughout the entire organization, Level-4: Integrated is the level of maturity has contract management processes which are fully integrated with other organizational core processes such as financial management, schedule management, performance management, and systems engineering and Level-5: Optimized is the highest level of maturity reflects an organization whose management systematically uses performance metrics to measure the quality and evaluate the efficiency and effectiveness of the contract management processes (Muda et al., 2023)

The maturity level assessment and impact on project performance have been widely used in the literature to evaluate its sustainability. A comprehensive review was carried out to determine road construction performance factors. The published literature and maturity level assessment and impact on project performance evaluation techniques were utilized to identify the factors that affecting road project performance .as shown in table 2.1.

Table 2. 1 Maturity Level Assessment and Impact on Project Performance

Category	Criteria	Reference
Procurement Strategy and Policy	Clarity and adherence to procurement authorization procedures.	(IOS, 2022)
	Existence and implementation of a documented procurement policy and standard.	(S.M and Mekennon, 2020)
	Clearly defined and documented selection phases for road construction projects.	(*LCO,* 2020)
	Availability and utilization of clear and comprehensive procurement guidelines.	(Shiferaw-Mitiku-Tebeka and Addis, 2019)

	Defined strategy for selecting contractors for road construction projects.	(et al., 2006)
	Established process for determining procurement priorities and targets for road construction projects.	(Weldegebriel, 2018)
	Extent of stakeholder involvement in the procurement strategy development process.	(J. Kujala et al., 2022)
Procurement Process	Existence and implementation of an integrated and systematic procurement plan for road construction projects.	(Arshad et al., 2021)
	Integration of risk management practices into the procurement process for road construction projects.	(DrMohammedSeid et al., 2019)
	Level of user involvement in the planning stages of road construction procurement.	(S. Kujala, 2003)
	Strict adherence to relevant regulations and ethical considerations during the procurement process.	(Ogar & Idagu, 2020)
	Transparency and completeness of reporting throughout the selection stage.	(Needleman et al., 2008)
	Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	(Schoenherr and Tummala, 2007)
	Efficiency and effectiveness of the selection process and contract management system for road construction projects.	(Tembo and Abdullahi, 2023)
	Implementation of a quality plan with control mechanisms for road construction projects.	(Willar et al., 2022)
	Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	(Orlitzky and Swanson, 2012)
	Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	(Graffy and Sonnier, n.d.)
	Commitment to continuous improvement of the procurement process for road construction projects.	(Getahun, 2016)
Procurement Organization and Human Resources	Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	(Minalu, 2018)
	Clear and efficient distribution of work responsibilities within the procurement department.	(Kakwezi P & Nyeko S, 2019)
	Level of collaboration and coordination between different stakeholders involved in the procurement	(Elkatawneh, 2014)

	process.	
	Existence and effectiveness of a performance management system for the procurement department.	(Patrucco et al., 2016)
	Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	(*EPPPP At*, 2020)
	Definition and utilization of performance indicators for contractors involved in road construction projects.	(Ngacho and Das, 2015)
	Regular evaluation of contractor performance based on pre-defined criteria.	(De Araujo et al., 2017)
	Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	(Francis et al., 2020)
	Effective human resource management practices within the procurement department.	(Mebrate and Shumet, 2024)
	Clearly defined job specifications for procurement personnel.	(Planned and Federation, 2021)
	Defined career path for professional development of procurement personnel.	(Islam et al., 2017)
	Existence and effectiveness of an incentive plan to motivate procurement personnel.	(Makruf et al., 2020)
Personnel Competency	Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	(Issadeen, 2021)
	Availability and participation in general procurement training programs for relevant personnel.	(Mahuwi and Israel, 2023)
	Availability and participation in specialized training programs related to road construction procurement.	(Oad et al., 2021)

(Source: Authors compiled though literature)

2.6 The Public Procurement Management Maturity Model

The Public Construction Procurement Management (PCPM) model was developed as an alternative for construction work procurement units since the uniqueness and complexity of construction projects require more integrated procurement system components in addition to organization and human resources. The reference models used for the PCPM development were the NPPA's IPM2 (Rashid et al., 2006) Procurement Maturity Model and the Michigan State University Model (Katalin, 2020). The maturity model that used for this research to

measure organizational maturity in implementing continuous improvement is PM Solutions Project Management Maturity Model (PMMM). Project Management Maturity Model (PMMM) is a development of SEI Capability Maturity Model that has been used in many organizations in improving organizational performance. PM Solutions also utilizes the PMI knowledge areas to get more specific measurements, so the maturity model has 5 SEI Maturity Levels as the basic framework adjusted based on 10 areas of knowledge PMBOK Guide (Perspective, 2021)

Jaafar and Nuruddin. (2011), study indicated that the PCPM model consists of four dimensions: procurement strategy and policy, procurement process, procurement organization and human resources. These dimensions are broken down into elements such as procurement strategy and policy (procurement policy, procurement strategy), procurement process (procurement planning, service provider selection, information technology facilities and infrastructures, monitoring and controlling), procurement organization (organizational setting, vendor management), human resources (procurement personnel and procurement personnel's competence). The elements are used as indicators to assess the maturity of the governmental construction works procurement system and validated by academics, experts, and procurement practitioners. The procurement policy indicators are authorization, procurement policy and standard, selection phases, procurement guidelines.

The procurement strategy indicators are selection strategy, priority and target determination, and engagement of stakeholders. The procurement plan indicators are integrated and systematic procurement plan, procurement risk management, and users' involvement in planning. The selection of service providers indicators are compliance to regulations, ethics, behavior, and fair competition, reporting the selection stage. It systems & support indicators are information management, selection process and contract management system, electronic procurement and contract template. The monitoring & control indicators are quality plan and control, stakeholder's satisfaction survey, feedback from stakeholders, continuous improvement. The organization arrangement indicators are structure, work distribution, collaboration and coordination, performance management, performance assessment team. The service provider management indicators are service provider (contractor) performance indicators, service provider (contractor) evaluation, rewards and punishment arrangement. The procurement personnel indicators are human resource management, job specifications, career

path of the procurement personnel, incentive plan. The personnel competency indicators are assessment and competency development, training program in general procurement, training program related to construction works (Chileshe et al., 2023).

Winarti et al. (2023) , the study indicated that provided to the procurement department in government agencies in Indonesia based on the discrepancy value between the present and expected condition of the procurement maturity level of government agencies in Indonesia and the link to procurement performance, namely ten priority indicators that must be reviewed and improved in order to attain higher procurement maturity levels and better procurement performance.

Maria. (2023), indicated that presenting a useful instrument for self-evaluation, this work demonstrates how maturity level measurement and benchmarking May help a company to decide what improve in its procurement process, and how a sector can better understand itself. Few scientific works present practical application of maturity evaluation of procurement management, and we did not find other that presents a comparison of different segments.

According to Kermanshachi and Pamidimukkala. (2023), illustrated that the selection and use of an appropriate procurement system is crucial to project success. The results indicate that there are nine procurement selection criteria commonly used by Australian clients: speed, time certainty, price certainty, complexity, flexibility, responsibility, quality level, risk allocation and price competition. Only time certainty and price certainty were seen by the respondents as unambiguous criteria, as the completion date and price can be objectively predicted by the client beforehand.

2.7 Relationship between Procurement Management and Project Performance

According to Zada et al. (2023), the objectives of any procurement procedures are contributing and putting an effort for the achievement of project objectives but customers are selecting a procurement procedure based on its familiarity instead of any differences between projects (Zhang et al., 2023). All companies should understand the effects of procurement procedures based on various natures and characteristics of project performance in different types of project from initial to project completion stages (Safapour et al., 2023).

According to Smith et al. (2023), reported on his study that proper understandings of procurement procedure based on the project context are vital for successful completion of

project and execution. According to (Moradi Shahdadi et al., 2023), indicated that companies are shall familiar with the procurement procedures and assess its performance at different stage of project executions based on the nature of the projects.

Different research was conducted on the effect of procurement on project performance. For instance, (Puolimatka, 2023) , stated that procurement components have a strong correlations and influence on project performance in a business company. He was also revealed that procurement as the system that represents the organizational structure adopted by clients for the implementation of project processes and eventual operations of the project. The project performance in terms of delivery, cost and quality is highly influenced by the type of project procurement method used to deliver the project. Therefore, selection of the best method of procurement is vital to achieve better project results. There are different forms of project performance exists through the different stages of project phase and accordingly there are terms of allocation of activities, sequencing, process and procedure and organization approach in project performance. From the project performance outcomes, time, cost and quality are a strong relationship with procurement methods.

According to Hudan et al. (2023), increased maturity/alignment is related to increased (procurement) performance. Provided an overview of procurement maturity and IT-alignment models and operationalized a procurement maturity model for the construction industry. Contributing to the goals of the in-depth study as identified in the “Introduction to the in-depth study”-sub-section it showed that existing dimensions and maturity levels of procurement maturity and IT-alignment models provide a profound fundament for creating an industry specific maturity model (in this case for the construction industry). This particular maturity/alignment model can be used to assess the level of maturity of a construction firm’s procurement function, and can be used as a strategy to define the next level. The correlation between the maturity growth and the performance achievement in terms of operational excellence is supported through simulation validation.

Project Procurement Management includes processes for goods and services acquisition from outside the organization (Denney et al., 2020). In this study, goods and services refer to the procurement of Public Infrastructure. Procurement traditionally viewed as repetitive clerical tasks, has emerged to be one of the major core organizational core functions, and procurement

management has become vital for achieving organizational objectives including public institutions under central government and local governments. Developing countries have been struggling with decentralization policy for effective service delivery (Chaturvedi, 2009). However, due to the rise in incomplete, failed, and bureaucratic government contract management, there are arguments regarding government contracts as they are perceived to have high accountability problems, poor service quality and have a poor-quality improvement track record and savings (Meričková & Nemec, 2013). The success of procuring entities is related to organizational procurement and contract planning, from feasibility to monitoring, evaluation and is dependent on organizational contract administration capabilities (Meričková & Nemec, 2013). In Norway, the Norwegian Auditor General's report of (2010-2011) failure to conform to procurement regulations by the public sector was the ranked first.

According to Hassan & Omwenga (2023), stated that connection between procurement procedures and the performance of an organization. Proper structures and systems in procurement ensured transparency, accountability, reduced costs and improved quality and specifications. Continuity of the workforce greatly contributed to organizational performance. The study confirmed that procurement practices actually contribute to increased organizational performance. Procurement practices enable organizations achieve differentiation through better customer service and reduced lead times (Sophia & Paul, 2023).

Poor planning can lead to inefficiency in the organization, lack of procurement planning value leading to poor project management and thus leading to poor project success (Mambwe et al., 2020). Lack of procurement planning can also be attributed to lack of qualified and experienced procurement personnel, commitment, and lack of visionary management in an organization. In fact, Thai (2014), states that despite procedures and checklists being convenient tools, procurement planning in an organization will achieve its goals if there is support from top management and stakeholders. Procurement planning without the support of managers and stakeholders will not achieve desired results. No procurement planning can be disastrous for an organization. The OECD (2015) stated that not attaining value for money, making untimely purchases difficult in procurement management can disrupt the core functions and service delivery. Organizations can procure goods or services that can only be performed after one activity has been performed, as a result can lead to waste of procurement

resources. Lack of procurement planning has occurred due to procurement of goods that expire off the shelf due to lack of adequate resources.

Procurement Functions Procurement is becoming an issue of public attention and debate, and continues to be subjected to reforms, restructuring, rules and regulations. Public procurement refers to the acquisition of goods, services and works by a procuring entity using public funds. Even though several NGO in Kenya are taking steps to refine their public procurement systems, the process is largely still shrouded by secrecy, inefficiency, corruption and under cutting.

The principle reason for the enactment of the Procurement Act was to have a legal regime that weeds out inefficiencies in the procurement process, remove patterns of abuse, and the failure of the public purchaser to obtain adequate value in return for the expenditure of public funds, In Kenya the Country Procurement Assessment Report of Kenya in 2003 revealed that in most State Corporation, staffs responsible for procurement were not procurement proficient though trained. A number of procurement managers from many organizations tend to ignore deliberately the application of procurement functions in Kenya as indicated by the Assessment of the procurement system in Kenya (2007). This is mostly because of vested personal interest. Due to the colossal amount of money involved in NGO procuring process and the fact that money comes from the public in form of donation, there is need for accountability and transparency (Lentz et al., 2013).

2.8 Measurement of Project Success

There is no standardized definition of project success. Each study may use a unique success measurement system based on the data available. Project success is usually defined depending on the project type, project phase, project representatives and participants, etc. The project success criteria can be evaluated through performance measures developed from research literature (Chan et al., 2004). Before studying DB project performance, the success variables need to be defined in terms of performance measurements.

2.9 Improvement Strategies for Procurement Management in Construction

The construction industry is highly competitive, and success depends on efficient cost control and effective management. Procurement is a critical area that can significantly impact project outcomes. Public procurement in the construction sector plays a crucial role in infrastructure

development and economic growth. Inefficiencies in this process, however, can lead to cost overruns, delays, and compromised quality (Ansari et al., 2019). Therefore, to improve public procurement management practices in the construction sector, companies should regularly review and refine their procurement strategies to identify areas to optimize processes and adopt new technologies and best practices. The following are some of the strategies to improve public procurement management practices in the construction sector.

Improvement strategies for procurement management in the construction industry play a crucial role in enhancing efficiency, reducing costs, mitigating risks, and improving project outcomes. By implementing these improvement strategies, construction organizations can optimize their procurement management processes, increase operational efficiency, reduce costs and risks, and achieve better project outcomes. It is important to regularly assess the effectiveness of these strategies and make adjustments as needed to ensure continuous improvement (Surya Atmaja et al., 2023).

The strategies prioritization that prevent their development and implementation. This literature review focuses on regarding potential improvements in procurement management, with a particular emphasis on project efficiency and effectively. The published literature and implementing these improvement strategies, construction organizations can optimize their procurement management processes, increase operational efficiency, reduce costs and risks, and achieve better project outcomes as shown in table 2.2.

Table 2. 2: Improvement Strategies Prioritization

Category	Improvement strategy	Reference
Strategic Planning and Policy Development	Develop a comprehensive infrastructure plan with clear project priorities and budgets.	(Hansen et al., 2019)
	Establish standardized procurement policies to ensure transparency and fairness.	(Grosso, 2015)
	Implement clear guidelines for all stages of the procurement cycle.	(Wagner et al., 2013)
	Match Procurement Methods to Project Needs based on project complexity and risk factors.	(Nicholas and Steyn, 2020)
Process Optimization	Continuously assess and update procurement strategies to optimize processes.	(Sánchez-Flores et al., 2019)

and Efficiency	Optimize operational processes to reduce costs and enhance efficiency.	(Mebrate and Shumet, 2024)
	Regularly evaluate the effectiveness of procurement strategies and adjust as necessary.	(Bank, 1996)
	Ensure effective tendering, evaluation, and contract administration procedures.	(EBRD, 2014)
Technology Integration and Data Utilization	Adopt new technologies and best practices to enhance efficiency.	(Ramos, 2023)
	Integrate advanced technologies to streamline procurement processes.	(*10*, n.d.)
	Adopt E-procurement Platforms for automation and efficiency.	(Dave et al., 2013)
	Implement BIM Technology for better project visualization.	(Araz et al., 2020)
	Utilize data analytics for decision-making and risk assessment.	(Nneka Adaobi: Ochuba et al., 2024)
	Leverage Data Analytics for cost tracking and performance indicators.	(Dlamini and Cumberlege, 2021)
Risk Management and Capacity Building	Proactively identify and manage risks to minimize cost overruns and delays.	(Bhutta and Huq, 1999)
	Benchmark against industry standards to adopt best practices.	(Lilly, 2018)
	Encourage continuous learning and improvement among procurement professionals.	(Kalyan and Prakash, 2019)
	Foster Collaborative Contracting Approaches for shared risk-reward models.	(Alves, 2019)
	Implement Effective Contract Management with performance metrics and dispute resolution.	(Edacherian, 2019)
	Invest in Professional Training for procurement personnel.	(Jaffu, 2023)
	Promote Stakeholder Collaboration to build trust and address concerns.	(Leal Filho and Londero Brandli, 2016)
	Measure Performance and Improve Continuously with	(Edacherian, 2019)

	KPIs.	
	Proactively identify and manage risks to minimize cost overruns and delays.	(Khan and Abbas, 2023)

(Source: Authors compiled though literature)

2.10 Strategic Planning and Procurement Policy

Long-term planning; standardized procurement policies, and risk identification and management are the strategic areas in relation to strategic planning and policy procurement. In it essential to develop a comprehensive infrastructure plan with clear project priorities and budgets, reducing ad-hoc procurements (Note & Countries, 2023). In addition, establish clear guidelines for procurement procedures, including tendering, evaluation, and contract administration, to ensure transparency and fairness are also important (Walker et al., 2023). Moreover, it needs to proactively identify and mitigate potential risks throughout the procurement process, minimizing cost overruns and unforeseen delays (Ghanbari et al., 2023).

The strategic planning in procurement aligns purchasing activities with the organization's overall strategy, while a procurement policy provides guidelines and procedures for conducting procurement processes in a fair, transparent, and efficient manner. Together, these concepts help organizations achieve their strategic objectives and optimize their procurement outcomes (Peng et al., 2023).

2.11 Procurement Method Selection and Contract Management

There are specific strategies under this section such as matching methods to project needs; collaborative contracting approaches, and effective contract management. In particular, it is important to choose the most appropriate procurement method (e.g., design-build, build-operate-transfer) based on project complexity, risk allocation, and desired outcomes(Imai et al., 2023). In addition, fostering collaborative partnerships with contractors, promoting early contractor involvement, open communication, and shared risk-reward models are also recommended (Aderibigbe et al., 2023). Implement robust contract administration practices, including clear performance metrics, timely dispute resolution mechanisms, and continuous performance monitoring can also be considered as improvement strategy (Junaidi, 2023).

By effectively managing contracts, organizations can optimize supplier performance, mitigate risks, safeguard rights, and achieve successful project outcomes. Both procurement method selection and contract management are crucial components of the procurement process. Proper selection ensures the use of the most appropriate sourcing approach, while effective contract management ensures that contracts are administered efficiently, risks are managed, and objectives are achieved. Together, these practices contribute to better procurement outcomes and organizational success (Peng et al., 2023).

2.11.1 Technology Integration and Data Analytics

E-procurement platforms that utilize online platforms to automate and streamline procurement processes, increasing transparency, competition, and efficiency (George Joseph Ochieng and Mary, 2023), and implementing Building information modeling (BIM) technology to improve information sharing, clash detection, and project visualization, reducing rework and errors are very crucial (Gokberk et al., n.d.). Moreover, data-driven decision making strategy by averaging data analytics tools to track costs, performance indicators, and trends, enabling evidence-based decision making throughout the procurement cycle are essential (Fahmi et al., 2023). According to Mahardhani.(2023), technology integration and data analytics are two interconnected concepts that play a crucial role in helping organizations harness the power of data and technology to make informed decisions, optimize processes, and drive business performance.

2.11.2 Capacity Building and Stakeholder Engagement

As part of capacity building and stakeholder engagement, professional training; stakeholder collaboration, and performance measurement and continuous improvement are best improvement strategies. It is crucial to invest in training programs for procurement personnel to enhance their skills in contract management, risk assessment, and negotiation (Hofbauer & Kececioglu, n.d.). In addition, actively engage with stakeholders, including contractors, communities, and regulatory bodies, to promote transparency, address concerns, and build trust is also important (Aripin et al., 2023). Moreover, it is vital to establish key performance indicators (KPIs) to track the effectiveness of procurement practices and implement ongoing improvement initiatives based on data analysis and feedback (Yurtay et al., 2023).

In general, improving public procurement management in the construction sector requires a multi-pronged approach that focuses on strategic planning, appropriate contract selection, technology integration, capacity building, and stakeholder engagement. By implementing these strategies, public entities can achieve greater value for money, optimize project outcomes, and contribute to sustainable infrastructure development (Willems et al., 2023).

2.12 The Research Gaps

Based on the literature reviews conducted, it can be realized that there is a lack of studies that assess the maturity level of procurement management practice in the road construction sector in Ethiopia. Most of the existing studies focus on other countries or regions, (Payapo et al., 2023). Therefore, there is a need to fill this gap by conducting a comprehensive and comparative analysis of procurement management practices and performance indicators in Ethiopia.

There is a lack of studies that examine the impact of procurement management practice on the performance of road construction projects using key performance indicators (KPIs). Most of the existing studies use qualitative or quantitative methods to measure project performance, such as cost, time, quality, safety, or customer satisfaction (Tetteh et al., n.d.) Adebowale & Agumba, (2023), however, there is no clear definition or standardization of what constitutes KPIs for road construction projects. Therefore, there is a need to fill this gap by developing and applying a set of KPIs that are relevant and reliable for evaluating procurement management practice and project performance and success.

There is a lack of studies that analyze and prioritize improvement strategies to increase procurement maturity level and project success in the road construction sector. Most of the existing studies provide general recommendations or best practices for improving procurement management practices (Aguinis et al., 2023). However, there is no systematic or evidence-based approach to identify and implement improvement strategies that are tailored to the specific context and needs of Ethiopia. The public procurement management practices within the road construction sector of Adama City, Ethiopia, are not meeting the desired level of maturity, leading to inefficiencies and suboptimal performance in road construction projects. This lack of maturity in procurement processes is hindering the overall success rate of projects

and negatively impacting the quality, cost, and schedule of road construction endeavors in the city.

Therefore, there is a need to address the lack of comprehensive evaluation of current public procurement management practices, limited research on specific challenges and inefficiencies in public procurement processes, inadequate focus on strategies to enhance the maturity level of procurement processes tailored to the road construction sector, limited exploration of the impact of immature procurement practices on overall performance and success rates, and insufficient attention to potential solutions and best practices for improving procurement management within the road construction sector. This gap can be filled by proposing appropriate strategies that consider various factors such as stakeholder preferences, resource constraints, risk tolerance, and environmental impact, drawing from experiences in the road construction sector in Adama City and Ethiopia.

The aim of this introduction is thus, after having presented what a procurement process is and what its impacts on a Supply Chain are, to define what procurement maturity is and to see how it is assessed. The researcher was sees how it was use in a real case and to what solutions for improvement it led, to finally explain how the implementation of these solutions was done and what the results were.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In order to achieve specific objectives of this research clearly defined methods and procedures would implemented based on type of study and outcome expected. The study mainly focus on the above three core objectives analyze the problems. This section explains the method and design that was used to conduct the research. This section includes the methodology used in this research work and provides an overview of research approach was adopted in the study which is the information about the research area, research design, population & sampling frame, sampling techniques, data collection method and tests of reliability and validity of questionnaire and the ethical consideration. A mixed research method was preferred as an appropriate research strategy to this study.

3.2 Study Area

The study was conducted at Adama, Ethiopia. Adama has 6 sub cities, located at 8°32′N 39°16′E / 8.54°N 39.27°E / 8.54; 39.27 at an elevation of 1712 meters, 99 km southeast of Addis Ababa. The city sits between the bases of an escarpment to the west, the Great Rift Valley to the east. Climate ranges from the month with the highest relative humidity. The spatial description of the study area graphically is presented in the Figure 3.1, as shown below within the context of the Adama city map.

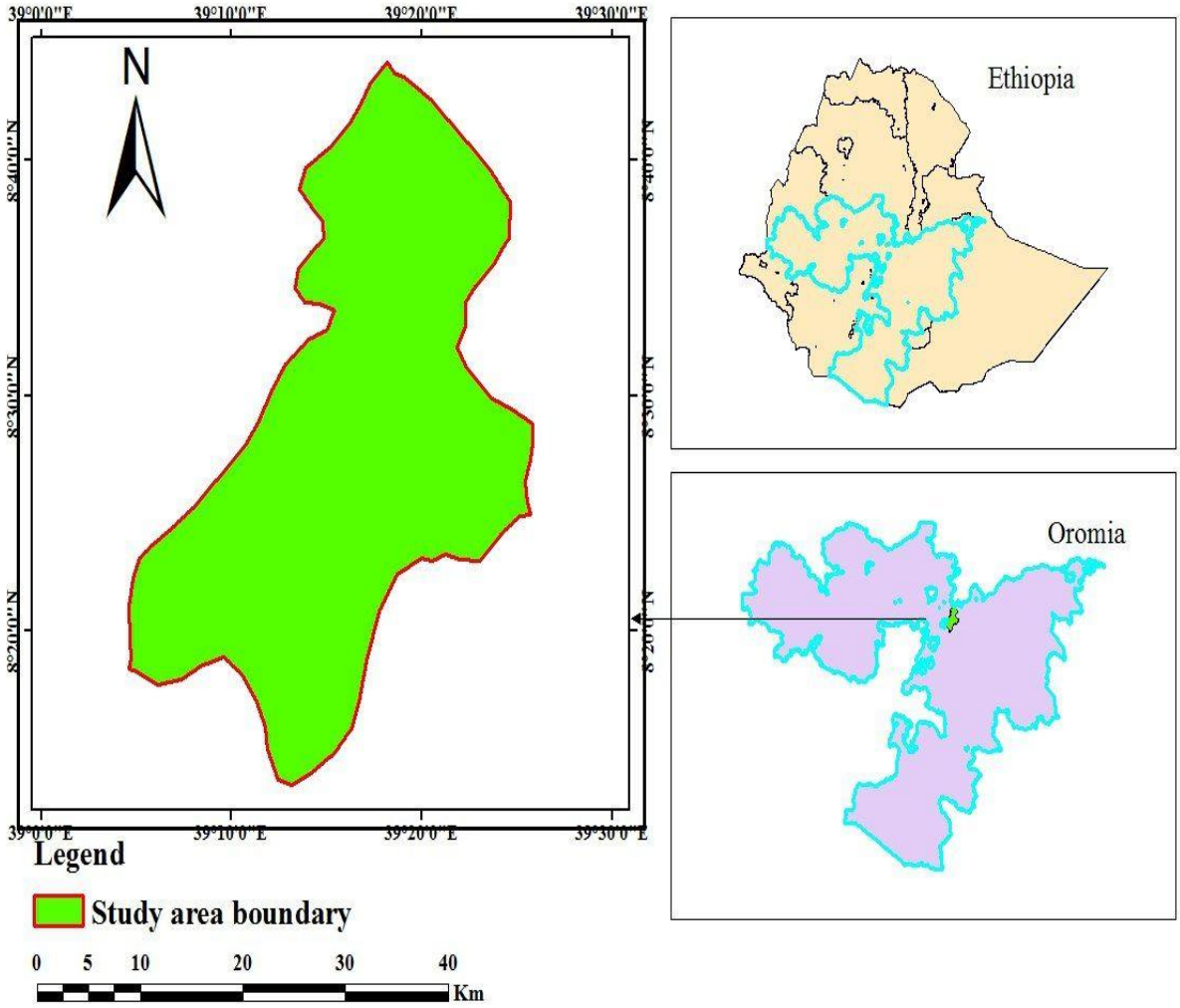

Figure 3. 1: Location Map of the study area

(Source: Adama city Municipal)

The focus of this research is to assess the maturity level of PPM practices and evaluate their impact on road project performance in the road construction sector in Adama city. According to Road Construction Success; A Strategic Analysis of Public Procurement Maturity Level are appropriately specified on time, are obtained at a reasonable cost and are available when needed. The research was conducted with consultants; contractors engaged in Adama road construction projects, Adama city construction authority, municipality (clients) are target populations of the study.

3.3 Research Approach

The research approach adopted a mixed-methods approach, combining quantitative and qualitative data collection and analysis techniques. The quantitative data was used to measure the level of maturity of procurement management practice and the road project performance indicators, as well as to test the hypotheses about the relationship between them. The qualitative data was used to explore the contextual factors and best practices of procurement management practice in the road construction sector in Adama city.

3.4 Research Design

The research design used a cross-sectional survey design, supplemented by semi-structured interviews. The questionnaire also included a maturity model framework to assess the level of maturity of procurement management practice in the road construction sector in Adama city. The research design for this study was used descriptive and exploratory research design.

A descriptive research design was employed to collect information, with a focus on to investigate the public procurement management practices within the road construction sector in Adama City. The exploratory research design would be valuable for gaining insights to investigate the public procurement management practices within the road construction sector in Adama City. By conducting interviews with stakeholders, a researcher was able to determine the maturity level, analysis the impact related to public procurement management on road construction. This would be helpful for informing the develop strategy.

The general approach followed to this research is summarized in the Figure 3.2

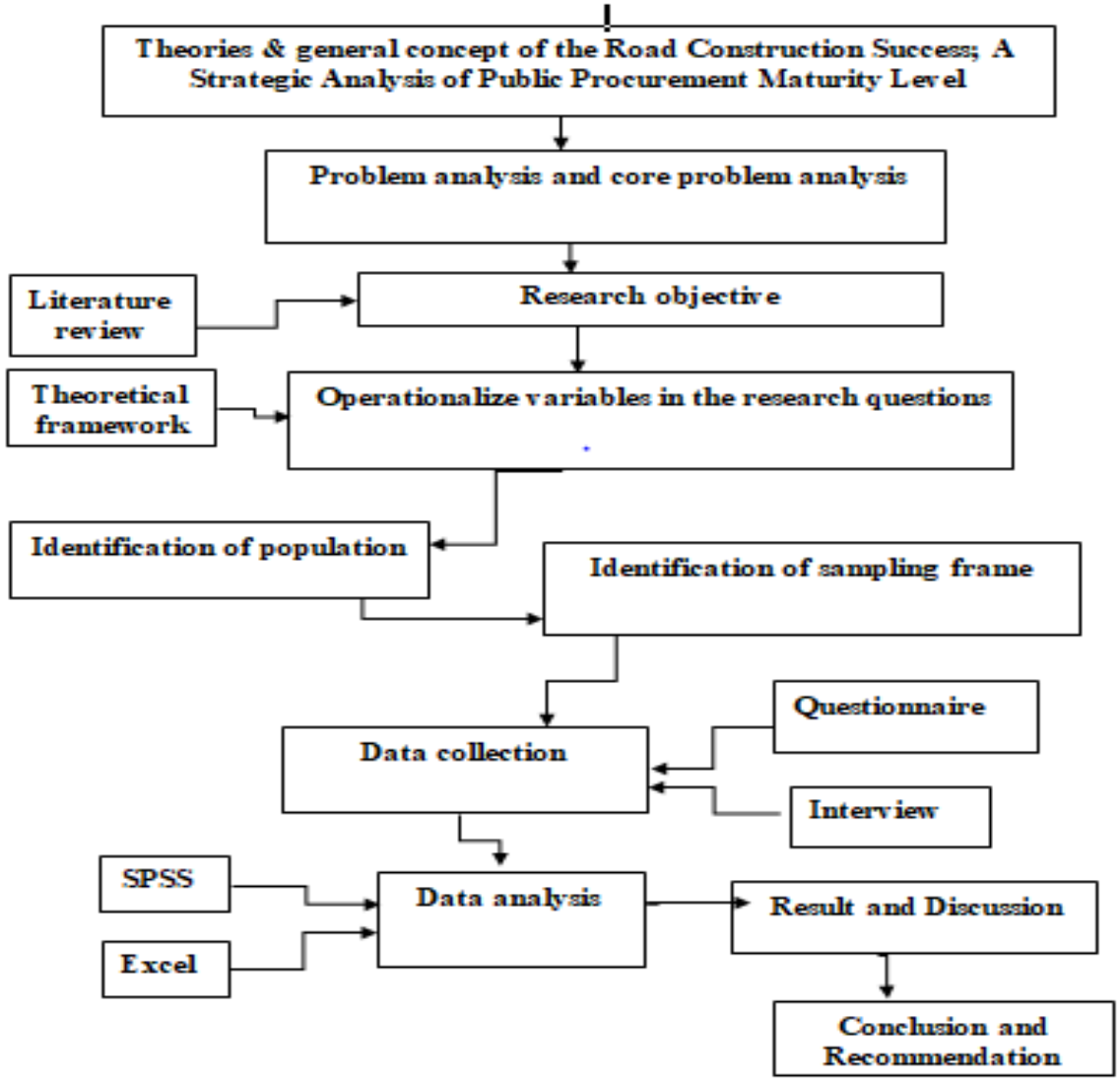

Figure 3.2: General approach followed to the research

(Source**:** Researcher's own research procedure)

3.5 Population and Sampling Frame

The population of the study consists of all construction professionals who are involved in road projects in the road construction sector in Adama city. The population size is expected to be reasonably small, as the number of road projects and construction professionals is limited by the available land and resources.

The sampling frame is a list or description of the population from which a sample would draw for the research study. The sample frame consists of all construction professionals in the road construction sector and the intention is to conduct a census survey, where the entire population of interest is surveyed, then no specific sampling technique is required for survey questionnaires.

3.6 Sampling Technique

Sampling is a method that allows researchers to infer information about a population based on results from a subset of the population, without having to investigate every individual. In this research, the size of target population frame consists of a total of 30 road construction projects are considered to be in the population frame to see the list of road construction projects appendix D.

In this research was adopted non-probability sampling technique used for interview. Non-probability sampling techniques are purposeful or judgmental sampling technique was used to select specific road construction projects for interview that are known to have different levels of procurement management practice maturity and snowball sampling technique was used to identify and select participants for interview who are knowledgeable about procurement management practices and project performance in the road construction sector.

3.7 Sources of Data

The sources of data for this study were both primary and secondary sources. The main sources of primary data for this study were questionnaires survey and interview that is researcher himself collects from the respondents. The survey was administered to a sample of road construction project managers, engineers, and procurement officers in Adama city, using a structured questionnaire. The questionnaire included questions on the procurement management practice dimensions as well as the road project performance indicators.

The researcher collects the secondary data types would gathering information from published and unpublished documents, maps, plans, standard documents, statistical information and other related information collected from different sources. This involves conducting a comprehensive literature review to gather existing knowledge and studies on the procurement management maturity level and its impact on project performance are secondary data.

3.8 Data Collection Methods

In order to achieve the objectives of the study, both qualitative & quantitative methods of data collection was employed. As part of quantitative data collection method, a questionnaire survey was used. An interview should also be used to collect qualitative data to ensure the validity of data. A questionnaire and interview was used as the main tools to collect a primary data from the target respondents. . The semi-structured interviews was conducted with a subset of the survey respondents, as well as with key informants, such as government officials and professionals in the road sector, to gain deeper insights into the procurement management practice and road project performance in the road construction sector in Adama city. The document analysis was involved reviewing relevant documents, such as project reports, contracts, procurement policies, and guidelines, to corroborate and triangulate the data from the survey and interviews. The following data collection techniques were used to collect these primary data for this study:

3.8.1 Questionnaire Survey

The survey divided in to four parts to collect quantitative data to address all objectives of the study. Initially, the title and purpose of the study and clear instructions on how to fill the survey forms would provide for better outcome. The first part of the questionnaire is general and specific information about respondents in order to understand their overall profile and ensure the quality of the data. The second part of the questionnaire is supposed to be the form to collect data regarding procurement management maturity attributes and examine the maturity of the road construction section in terms of procurement management practice. In addition, area of improvement should be identified. Accordingly, this specific form would be a five-Likert scale (1 to 5) that consists of list of procurement management dimensions and attributes along with level of Importance Weight (IW) and Performance Ratings (PR). A separate Likert scale should be consider for IW (1-Low Important to 5-Very High Important) and PR (1-Low Performance to 5-Very High Performance.

The third part of the questionnaire is vertical list of procurement management process attributes and horizontal list of road project performance indicators. The purpose of this specific form is to rate the level of impact of each procurement attribute on each performance indicator. This would help to perform relative important index to determine the level of impact

of the entire procurement management process or practice on the performance of road construction projects. This form would also have a five-Likert scale, 1 indicates Low Impact and 5 indicates very High impact.

The last part of the questionnaire is form to collect data to analyzed and prioritize the appropriate strategies for improving the existing procurement management maturity and increate the chance of project success. This form would contain list of potential strategies and each strategy is supposed to be evaluated and rated against each weak procurement attribute. The attributes that would be cluster in Very Low Performance-Very High Important quadrant of the multiple linear regressions should be considered as weak attributes and area of improvement. Finally, appropriate strategies for each attribute shall be prioritized separately.

3.8.2 Interview

An interview data collection method was used in this study to refine the draft questionnaire survey that is more valid and reliable and clarify findings from the thesis research through real-world perspectives, when required, by collecting qualitative data from senior researchers and industry experts.

Interviews can provoke discussion of complex topics, and they provide rich and complete data. In addition, it allow researchers to control the response environment, control the order in which issues are discussed, and learn about things that can be observed only with difficulty (Gao & Low, 2014). Interviews were used as a form of triangulation in this study.

Project managers, project consultants, and engineers were selected for interviews. This was because they could provide detailed information on how the projects were planned, controlled and managed. According to S. Nayyef et al., (2022), direct interview of respondents were sufficient to discuss and clarify the few contradictions during the questionnaire. As a result, ten participants were interviewed for this study.

3.9 Data Analysis Techniques

These data analysis techniques are best suited for this study to take into consideration based on its particular objectives: Frequencies, charts, and percentages were used in a descriptive analysis of the data gathered from the respondent's profile, which is the first section of the

questionnaire. This data includes the respondent's educational background, current job title/responsibility, work experience.

The quantitative data from the survey was analyzed using descriptive statistics, such as frequencies, means, standard deviations, correlations, and regression analysis, using SPSS software. The quantitative and qualitative data was integrated and compared to answer the research objectives and test the hypotheses.

3.9.1 Mean score technique

The first objective of this study is to examine the maturity of procurement management in road construction sector. In order to analyze this objective, mean score was used as it enables to evaluate the maturity of the procurement management process based on the importance and performance ratings of its attributes from the professionals' perspective in the road construction sector.

Procurement Management Maturity (PMM) Level is intended to be a framework that assesses the current state and the desired state of the procurement process in the sector along with mean score, and identifies the gaps and the improvement actions needed to achieve the best practices. According to the mean scores, the attributes that would be clustered in the quadrant of High Importance and Low Performance Rate was targeted and considered as area for improvement. The strategies for improving the procurement management maturity, supposed to be evaluated and prioritized based on this quadrant.

3.9.2 Relative Importance Index (RII) Technique

Data collected from the impacts of Public Procurement Management Maturity on project performance of the questionnaire is analyzed by relative importance index technique was used to determine the relative most significant impacts of Public Procurement Management Maturity on project performance in Adam road construction projects using five likert scale: 1 = Very Low impact, 2 = Low impact, 3 = Moderately impact, 4 = High impact and 5 = Very High impact. Data analysis technique by RII, the equation 3.1 is used to determine the relative importance index as shown below (Joro, 2013):

$$RII = \frac{\sum W_i f_{xi}}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{AN} \quad \dots \dots \dots \dots \dots \dots \quad 3.1$$

Where W_i is weight given to i^{th} response; i = 1, 2, 3, 4 and 5, f_{xi} is the responses frequency, N is total number of responses, RII is relative importance indices, A is the highest weight (i.e. 5 in this case), n_5 is number of respondents for value 5, n_4 is number of respondents for value 4, n_3 is number of respondents for value 3, n_2 is number of respondents for value 2 and n_1 is number of respondents for value 1.

3.9.3 Multivariate Regression Analysis

Multivariate regression analysis was used to prioritize improvement strategies to increase procurement management maturity level and project success in the road construction sector. SPSS software was used perform the multivariate regression. This analysis would consider the simultaneous effects of all independent variables on the dependent variables. For this purpose, independent variables representing key procurement management practices were identified based on the literature review and expert opinions. On the other hand, the dependent variables would represent project performance measures, such as project cost, project schedule, project quality, and project safety performance

A regression model was developed to predict project performance based on the identified procurement management practices. The model was evaluated for its accuracy and predictive power.

The followings are the general steps of applying multivariate regression analysis to prioritize improvement strategies to increase procurement maturity level and project success in the road construction sector.

Step 1. Descriptive statistics: Analyze the distribution of independent and dependent variables.

Step 2. Correlation analysis: Assess the relationships between independent variables and among themselves.

Step 3. Multivariate regression analysis: Develop regression models to estimate the impact of each procurement management practice on different performance dimensions.

A multiple regression analysis was carried out to determine the influence of independent variables on the dependent variable. Multiple regressions also used to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained.

According to Ballance (2004), the correct use of the multiple regression models requires that several critical assumptions be satisfied in order to apply the model and establish validity. Inferences and generalizations about the theory are only valid if the assumptions in an analysis have been tested and fulfilled. Before carrying out multiple regression analysis, the researcher has checked the required assumptions that the data must meet to make the analysis reliable and valid. The following assumptions of multiple linear regressions were tested using SPSS.

Step 4. Model validation: Evaluate the fit and accuracy of the regression models.
Step 5. Sensitivity analysis: Assess the impact of changes in independent variables on the predicted values of dependent variables.

3.10 Validity and Reliability

As mentioned by (Openjuru & Ph, 2019), reliability and validity are two main criteria for determining data quality where validity presumes reliability, that is, if a measure is not reliable, it cannot be valid.

3.10.1 Validity of the research method

Validity is the degree to which a test measures what it purports to measure and the validity of the questionnaire data depends in a crucial way on the ability and willingness of the respondents to provide the information requested. The questionnaire employed was adapted from reviewed literatures and similar study instruments and would made suit for the existing research environment. In addition, local professionals, and specialist's pilot tested the modified questionnaires in order to validate them. In general, the researchers want to make sure that their findings can be applied to different populations or environments, adjust for confounding variables, and use proper metrics in order to maximize the validity of their investigations.

3.10.2 Reliability of Questionnaire

Reliable measurement is the repetition of any measurement that produces the same result. In order to maintain reliability in the study, the researcher would administer the same type of questionnaire to all the subjects in this research would be given the same type of questions with the same type of wording thus carrying the same meaning to all. The reliability of a questionnaire, researchers and practitioners can have confidence in the results obtained from

their survey. Reliable questionnaires provide a solid foundation for drawing accurate conclusions and making informed decisions. In this study each statement of the questionnaires is rated on a 5 point Liker the response scale which included strongly agree, agree, undecided, disagree and strongly disagree. Based on this, internal consistency reliability was tested by Cronbach's alpha coefficient.

The test of reliability, the equation 3.2 is used to determine the Cronbach's alpha as shown below (Namdeo & Rout, 2016):

$$\alpha = \left(\frac{k}{k-1}\right)\left(\frac{S_T{}^2 - \sum S_i{}^2}{S_T{}^2}\right) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad 3.2$$

Where; α is the cronbach alpha coefficient, K is the number of items, S_i^2 is the variance of i^{th} item and S_i^2 is the variance of total score formed by summing items. The interpretation of Cronbach's alpha is the range of Cronbach's alpha normally is between 0 and 1. Guide line provided by them to assess the reliability of any data as shown in Table 3.1.

Table 3. 1: Guideline for assessing reliability results

S. No	Range	Reliability
1	0.9 and above	Excellent
2	0.7 – 0.9	High
3	0.5 - 0.7	Moderate
4	0.5 and below	Low

(Source: (Perry R. Hinton & Brownlow, 2014))

Before conducting an analysis based on the results obtained from the questionnaire, Cronbach analysis was carried out to ascertain the internal consistency of the questions using a five point Likert scale. The Cronbach Alpha test that shows the reliability of the questionnaire and the result of the reliability test that was conducted on the current maturity level of public procurement management practices in the road construction sector, the impact of public procurement management practices on the performance of road construction projects and improvement strategies to increase procurement management maturity level and project success in the road construction sector in Adama is represented in the Table 3.2, as shown below.

Table 3. 2: Result of Reliability test

Reliability Statistics	Cronbach's Alpha	No of items
Maturity level of Public Procurement Management practices	0.762	33
Public Procurement Management maturity impact on the project performance	0.773	33
Improvement strategies to increase procurement management maturity level and project success in the road construction sector	0.893	23
Overall	0.810	89

(Source**:** Own survey data analysis)

The result indicates that the 33 items in the current maturity level of public procurement management practices in the road construction sector in Adama are correlated. There is internal consistency between the items. Since the data collected was based on five Likert-scales; therefore to check reliability of the research Cronbach's Alpha method was used and all the components is high or close to 1. As a matter of fact the overall Cronbach Alpha value for the 33 items is 0.762 which showed high reliability of the data.

The result indicates that the 33 items in the impact of public procurement management practices on the performance of road construction projects in Adama are correlated. There is internal consistency between the items. Since the data collected was based on five Likert-scales; therefore to check reliability of the research Cronbach's Alpha method was used and all the components is high or close to 1. As a matter of fact the overall Cronbach Alpha value for the 33 items is 0.773 which showed high reliability of the data.

The result indicates that the 23 items in the improvement strategies to increase procurement management maturity level and project success in the road construction sector in Adama are correlated. There is internal consistency between the items. Since the data collected was based on five Likert-scales; therefore to check reliability of the research Cronbach's Alpha method was used and all the components is high or close to 1. As a matter of fact the overall Cronbach Alpha value for the 23 items is 0.893 which showed high reliability of the data. Therefore, the researchers conclude that the test and questions were reliable.

3.11 Ethical consideration

All the research participants included in this study would be appropriately informed about the purpose of the research and their willingness and consent was secured before the commencement of distributing the survey questionnaire and asking them to give their responses to the interview questions. The other ethical consideration of this research is in keeping the findings not to be disadvantageous to participants. The author should not intentionally misreport findings which would be disadvantageous to the participants.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Introduction

The results and discussion is the most important part of the study. This chapter is structured according to research objective and presents the findings. The important finding results were directly linked to enhance the public procurement management practices within the road construction sector of Adama City, Ethiopia. The information collected through survey questionnaires and interviews are analyzed within the framework of the study objectives. The analysis was carried out using mean score, RII and multivariate regression analysis method; focusing on determine the current maturity level of public procurement management practices in the road construction sector, analyze the impact of public procurement management practices on the performance of road construction projects and prioritize improvement strategies to increase procurement management maturity level and project success in the road construction sector in Adama. Accordingly, interpretations and discussions were presented on the basis of the findings. Hence, this chapter seeks to discuss the implications of the findings in relation to the research objectives that were set out in the introduction and the results are presented.

4.2. Respondent's General Information

4.2.1. Response rate

Response rates are generally considered to be the most widely compared statistic for judging the quality of surveys (Johnson and Owens, 2008). There is no specific response rate that guarantees an unbiased representation of the population. As a general rule of thumb, most reviewers look for a response rate ≥ of 70% (Rubenfeld, 2004)

The response rates of this study were calculated after surveying questionnaires. A total of 92 questionnaires which dealt with to examine a strategic analysis of public procurement management maturity and performance impact in Adama were distributed to the respondents. However, only 77 questionnaires were collected and had usable responses (83.4% response rate), interview and relevant documents have been also reviewed. Considering the difficulty of collecting data, an 83.4% response rate was reasonably very good. The results show in Table 4.1 as follows.

Table 4. 1: Rate of respondents

Response Distribution	No of distributed questionnaire	No of returned Responses	% of returned Responses
Contractor	22	19	86.4%
Consultant	19	16	84.2%
Client	23	18	78.3%
Expert	28	24	85.7%
Total	92	77	83.4%

(Source: Own survey data analysis)

4.2.2. Respondents level of qualification/Educational Background

Education as one of man's cultural needs is the most important factor to bring forth all round development. Moreover, it is a key to enhance the level of capability working together with others, which can also influence the process of integration at certain level. Educational statuses of the sample of the respondents have been presented on following Table 4.2, as shown below.

Table 4. 2: Respondents Educational background (qualification)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College Diploma	28	36.4	36.4	36.4
	Bachelor's Degree	42	54.5	54.5	90.9
	Master's Degree	7	9.1	9.1	100.0
	Total	77	100.0	100.0	

(Source: Own survey data analysis)

According to above analysis above Table 4.2, it was indicated that the highest educational level of the respondents the bachelor's degree and the college diploma. The majorities of the respondents 54.5% are first degree holders, the followed respondents 36.4% are college diploma holders and 9.1% of the respondents are master's degree holders. This implied that highly educated people with high expertise and high knowledge of matters. This also helped the researcher to quickly collect data since the respondents were able to read, write and easily interpret the questionnaires. Therefore, high educated respondents were key role players in providing adequate and relevant data which determine the research result rationally and logically.

4.2.3. Respondents work Experience

The frequency Table 4.3 shows that the respondents work experience less than 5 years have 12.9% from the total respondents, 39% from the total respondents have years of experience between 5 - 9 years, 39% from the total respondents have years of experience between 10 - 14 years and 9.1% from the total respondents have years of experience more than 14 years. The obtained results of respondent's year of work experience are given in the following Table 4.3, as shown below.

Table 4. 3: Respondents Work experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 5 YEARS	10	12.9	12.9	12.9
	5 - 9 YEARS	30	39.0	39.0	51.9
	10 - 14 YEARS	30	39.0	39.0	90.9
	> 14 YEARS	7	9.1	9.1	100.0
	Total	77	100.0	100.0	

(Source: Own survey data analysis)

These results illustrate that, more than 87% of the respondents have experience more than 5 years' work experience. These results will also provide a level of good that the obtained data will reflect what it was designed for. Those respondents have good positions in their organizations to provide confidant and specific data. Therefore, high experienced respondents were key role players in providing adequate and relevant data which determine the research result rationally and logically.

From the respondents' demography, the researcher concluded that among the different demographic groups, a test on the variables assessed does not show significant difference. Moreover, 64% of the respondents have educational qualification of first degree and above; more than 87% of the respondents have work experience of more than 5 years related to construction work procurement. Therefore, adequate level of education, high work experience related to construction work procurement, ensures that the respondents were key role players in providing adequate and relevant data which enhance the validity of the research results.

4.3. Practices of Maturity level of the Procurement Management Process of Road Construction projects

Assessment of public procurement management practice maturity level of achievement for each selected major attributes. By considering the degree to which the current procurement management effectively supports each of the attributes. This study is intended to analyzing the current public procurement management process maturity level in the alignment of how the effective of public procurement management process maturity level and the approaches for each attribute where contribute providers to effective maturity level of the public procurement management process in the road construction projects in Adama city presented as follows.

4.3.1. Maturity level of the Procurement Strategy and Policy

Assessment of maturity level of the procurement strategy and policy practices of achievement for each selected major attributes. The overview evaluation was done by utilizing mean score strategy and respondents were asked to score which current maturity level are considered to be procurement strategy and policy in Adama city. Ranking of the various current maturity level according to their mean value and the interpretation of the mean values, mean is ranked from the highest to the lowest which is rankings of 7 common maturity level of the procurement strategy and policy practices as per previous studies and practices were ranked. This means that all the seven variables are considered as maturity level of the procurement strategy and policy in Adama city. The value analysis carried out on the data mean score is shown in the Table 4.4 as follow.

Table 4. 4: Maturity level of the procurement strategy and policy

Maturity level of the procurement strategy & policy	Mean	Std. Dev.	Rank
Extent of stakeholder involvement in the procurement strategy development process.	4.03	0.873	1
Clearly defined and documented selection phases for road construction projects.	3.82	1.097	2
Availability and utilization of clear and comprehensive procurement guidelines.	3.64	1.157	3
Established process for determining procurement priorities and targets for road construction projects.	3.60	1.127	4
Defined strategy for selecting contractors for road construction projects.	3.42	1.196	5
Existence and implementation of a documented procurement policy and standard.	3.31	1.217	6
Clarity and adherence to procurement authorization procedures.	3.30	1.236	7
Valid N (list wise)			

(Source: Own survey data analysis)

As the results of the study shown above it clearly indicated that the dominant maturity level of the procurement strategy and policy process is extent of stakeholder involvement in the procurement strategy development process with the mean value of 4.03, Clearly defined and documented selection phases for road construction projects is the second maturity level of the procurement strategy and policy process with the mean value of 3.82, Availability and utilization of clear and comprehensive procurement guidelines is the third maturity level of the procurement strategy and policy process with the mean value of 3.64, the fourth maturity level of the procurement strategy and policy process is established process for determining procurement priorities and targets for road construction projects with the mean value of 3.60 and the fifth maturity level of the procurement strategy and policy process is defined strategy for selecting contractors for road construction projects with the mean value of 3.42 in the process. Top five maturity level of the procurement strategy and policy was discussed as follows:

The first rank of maturity level of the procurement strategy and policy process is extent of stakeholder involvement in the procurement strategy development process as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the extent of stakeholder involvement in the procurement strategy development process maturity level is given in the following Figure 4.1, as shown below.

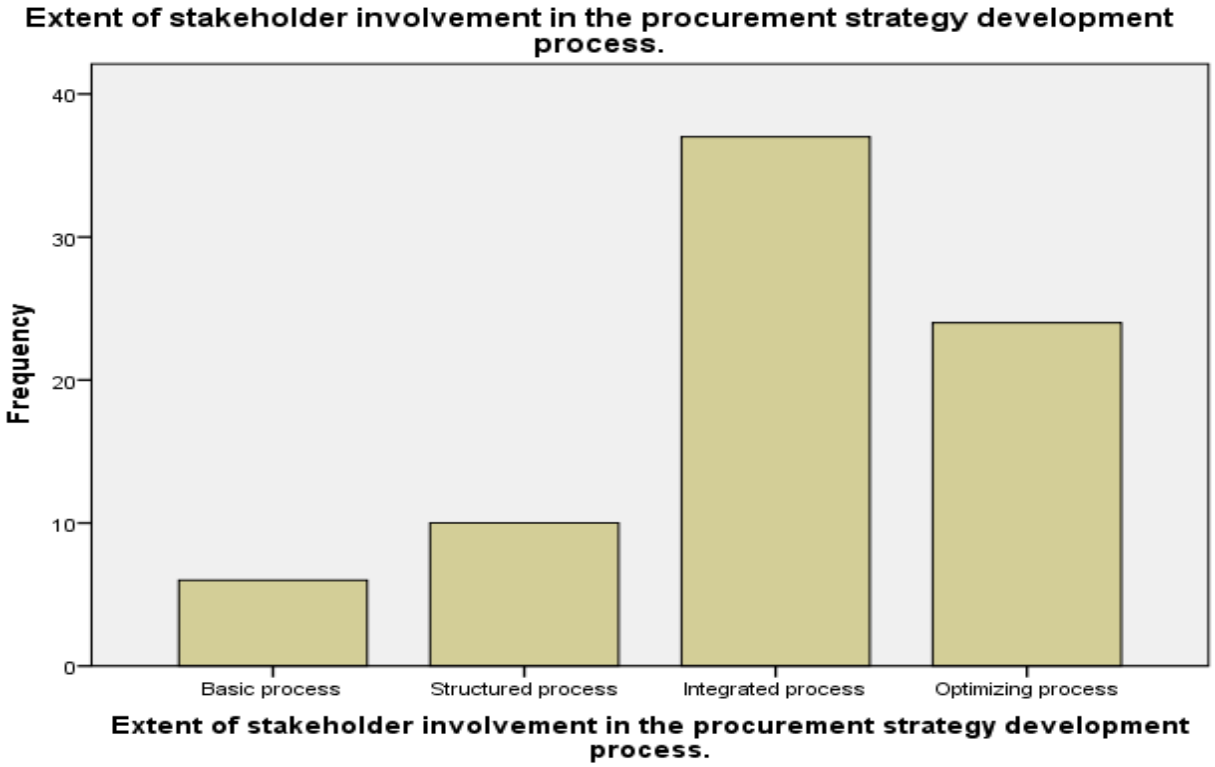

Figure 4. 1: Extent of stakeholder involvement in the procurement strategy development (Source: Own survey data analysis)

Based on the data collected, it can be concluded that the maturity level of the procurement strategy and policy process is relatively high in terms of stakeholder involvement in the procurement strategy development process. The majority of the stakeholder involvement levels fall within the Integrated to Optimized range, with Level 4 (Integrated) having the highest percentage at 48.1% and Level 5 (Optimized) follows closely at 31.2%. This indicates that there is a structured and integrated approach to involving stakeholders in the procurement strategy development process for road construction projects. The distribution across the different levels suggests a high level of maturity in engaging stakeholders effectively and

efficiently in the procurement strategy development process, leading to improved collaboration and alignment with project goals and objectives.

The second rank of maturity level of the procurement strategy and policy process is clearly defined and documented selection phases for road construction projects as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the clearly defined and documented selection phases for road construction projects maturity level is given in the following Figure 4.2, as shown below.

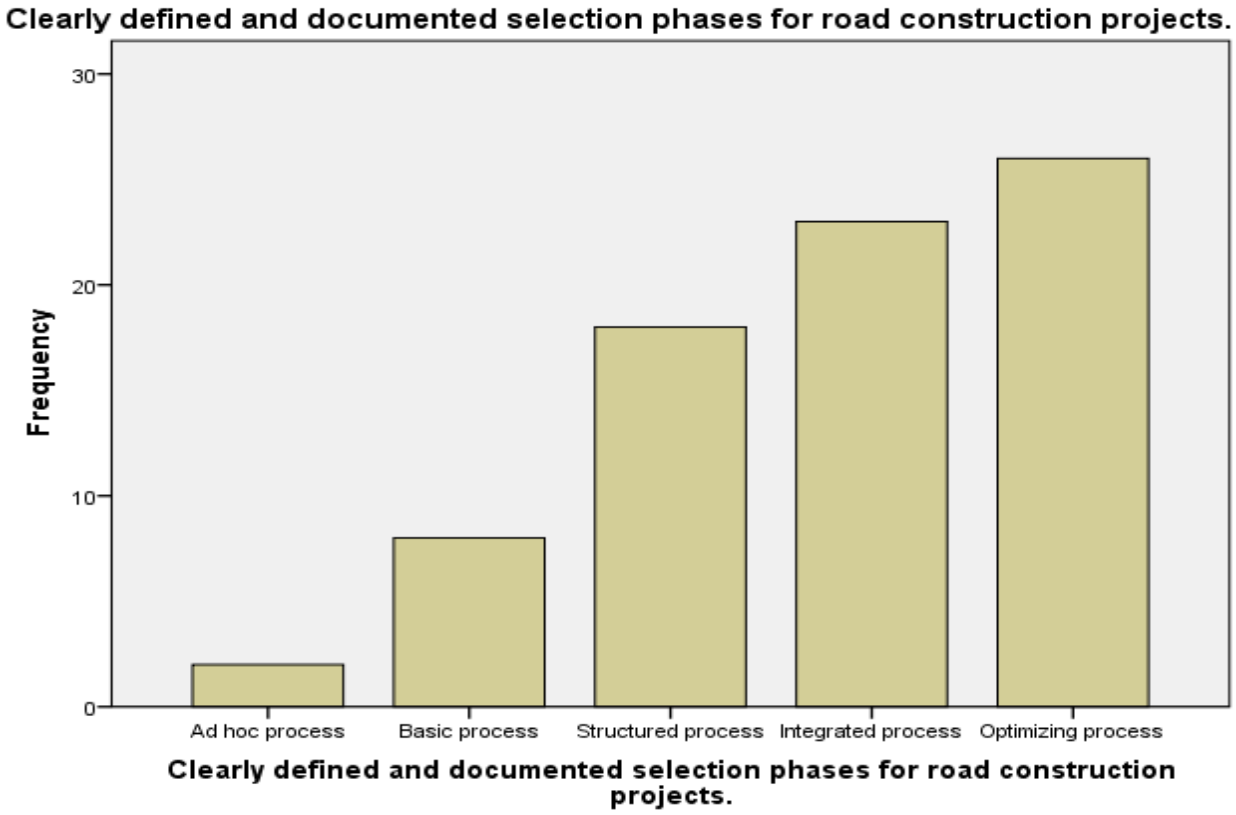

Figure 4. 2: Clearly defined and documented selection phases for road construction projects (Source: Own survey data analysis)

Based on the data collected, it can be concluded that the maturity level of the procurement strategy and policy process for road construction projects is relatively high. The majority of the selection phases fall within the structured to optimized levels, with Level 5 (Optimized) having the highest percentage at 34%. This indicates that the procurement strategy and policy process is well-defined and documented, showing a high level of maturity and efficiency in

managing road construction projects. The distribution across the different levels also suggests a progressive approach towards improving and optimizing the selection phases for procurement in road construction projects.

The third rank of maturity level of the procurement strategy and policy process is availability and utilization of clear and comprehensive procurement guidelines as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the availability and utilization of clear and comprehensive procurement guidelines maturity level is given in the following Figure 4.3, as shown below.

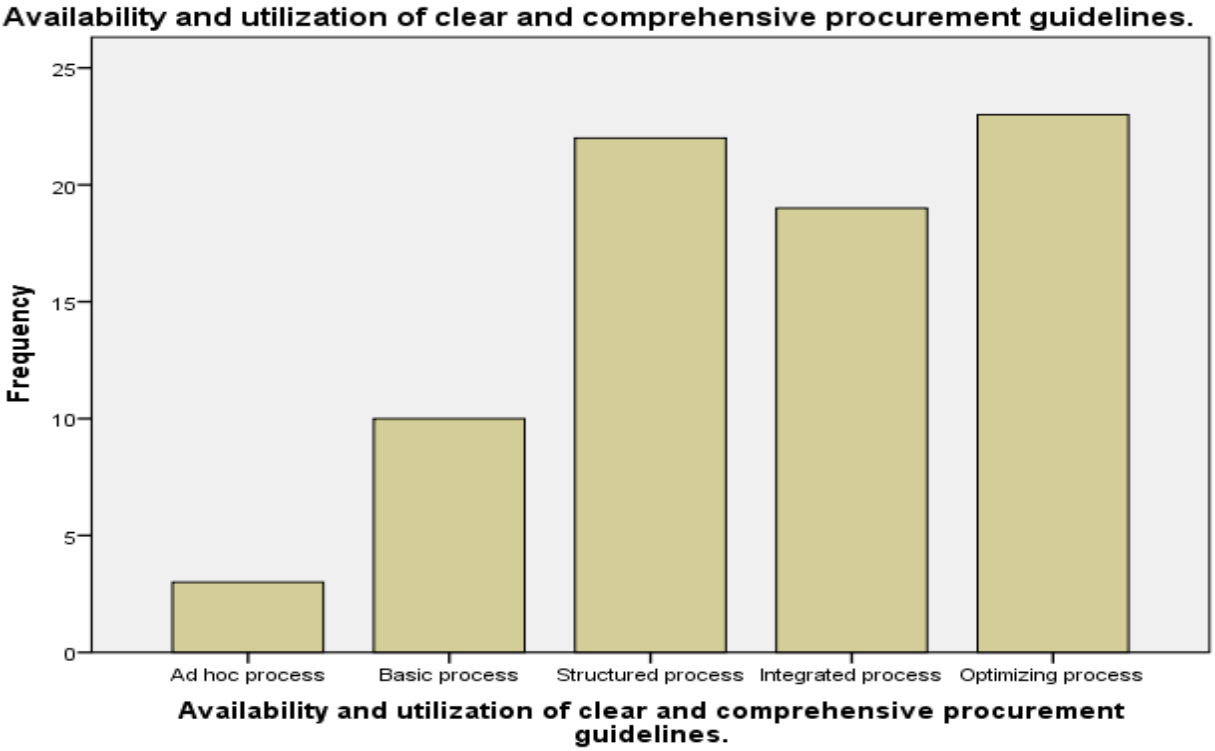

Figure 4. 3: Availability and utilization of clear and comprehensive procurement guidelines (Source: Own survey data analysis)

Based on the data collected, it can be concluded that the maturity level of the procurement strategy and policy process in terms of the availability and utilization of clear and comprehensive procurement guidelines is relatively high. The majority of the responses fall within the Structured to Optimized range, with Level 3 (Structured) having the highest percentage at 29%, followed closely by Level 5 (Optimized) at 30%. This indicates that there

are clear and comprehensive procurement guidelines in place for road construction projects, and they are being effectively utilized. The distribution across the different levels suggests a structured and integrated approach to procurement guidelines, which is essential for ensuring consistency, transparency, and efficiency in the procurement process. The higher percentages in the Integrated and Optimized levels indicate a higher level of maturity in the development and implementation of procurement guidelines, leading to improved procurement outcomes and overall project success.

The fourth rank of maturity level of the procurement strategy and policy process is established process for determining procurement priorities and targets for road construction projects as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the established process for determining procurement priorities and targets for road construction projects maturity level is given in the following Figure 4.4, as shown below.

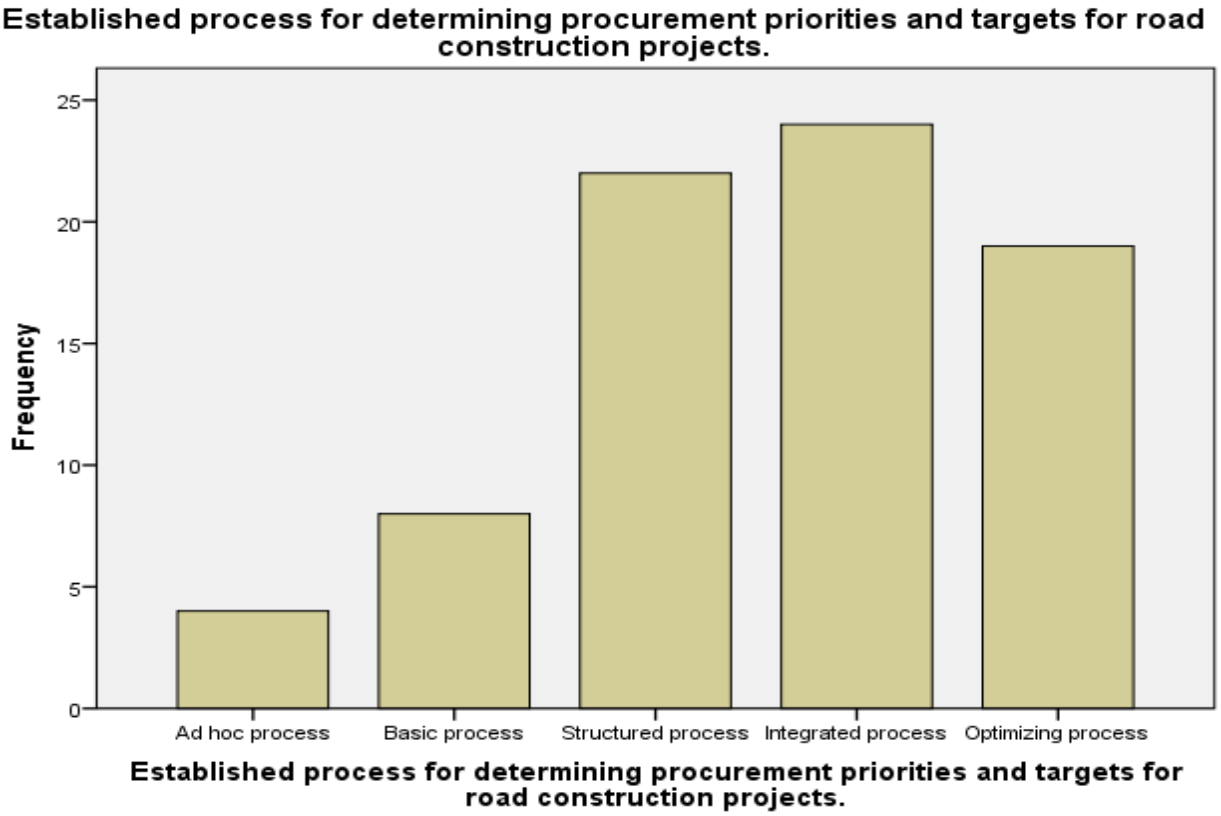

Figure 4. 4: Established process for determining procurement priorities and targets

(Source: Own survey data analysis)

Based on the data collected, it can be concluded that the maturity level of the procurement strategy and policy process for determining procurement priorities and targets for road construction projects is relatively high. The majority of the responses fall within the Structured to Integrated range, with Level 4 (Integrated) having the highest percentage at 31%. This indicates that there is a well-established process for determining procurement priorities and targets for road construction projects, with a high level of integration between different aspects of the procurement strategy and policy process. The distribution across the different levels suggests a systematic and coordinated approach to setting procurement priorities and targets, which is crucial for aligning procurement activities with project goals and objectives. The higher percentages in the Integrated and Optimized levels indicate a higher level of maturity in the development and implementation of procurement priorities and targets, leading to more effective and efficient procurement outcomes for road construction projects.

The fifth rank of maturity level of the procurement strategy and policy process is defined strategy for selecting contractors for road construction projects as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the defined strategy for selecting contractors for road construction projects maturity level is given in the following Figure 4.5, as shown below.

Figure 4. 5: Defined strategy for selecting contractors for road construction projects

(Source: Own survey data analysis)

Based on the data collected, it can be concluded that the maturity level of the procurement strategy and policy process for selecting contractors for road construction projects is relatively high. The majority of the responses fall within the Structured to Integrated range, with Level 4 (Integrated) having the highest percentage at 31%. This indicates that there is a well-defined strategy for selecting contractors for road construction projects, with a high level of integration between different aspects of the procurement strategy and policy process. The distribution across the different levels suggests a systematic and coordinated approach to contractor selection, which is essential for ensuring that qualified and capable contractors are chosen for road construction projects. The higher percentages in the Integrated and Optimized levels indicate a higher level of maturity in the selection process, leading to better outcomes in terms of contractor performance and project delivery. Overall, the data indicates that there is a solid foundation in place for selecting contractors for road construction projects, with a focus on optimizing the process to achieve the best results.

4.3.2. Maturity level of the Procurement Process

Assessment of maturity level of the procurement process of achievement for each selected major attributes. The overview evaluation was done by utilizing mean score strategy and respondents were asked to score which current maturity level are considered to be procurement process in Adama city. Ranking of the various current maturity level according to their mean value and the interpretation of the mean values, mean is ranked from the highest to the lowest which is rankings of 11 common maturity level of the procurement process as per previous studies and practices were ranked. This means that all the eleven variables are considered as maturity level of the procurement process in Adama city. The value analysis carried out on the data mean score is shown in the Table 4.5 as follow.

Table 4. 5: Maturity level of the procurement process

Maturity level of the procurement process	Mean	Std. Dev.	Rank
Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	3.75	1.114	1
Existence and implementation of an integrated and systematic procurement plan for road construction projects.	3.64	1.169	2
Transparency and completeness of reporting throughout the selection stage.	3.49	1.354	3
Strict adherence to relevant regulations and ethical considerations during the procurement process.	3.42	1.056	4
Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	3.40	1.217	5
Commitment to continuous improvement of the procurement process for road construction projects.	3.21	1.162	6
Integration of risk management practices into the procurement process for road construction projects.	3.13	1.174	7
Efficiency and effectiveness of the selection process and contract management system for road construction projects.	3.00	1.386	8
Level of user involvement in the planning stages of road construction procurement.	2.74	.951	9
Implementation of a quality plan with control mechanisms for road construction projects.	2.66	1.304	10
Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	2.49	1.084	11
Valid N (list wise)			

(Source: Own survey data analysis)

As the results of the study shown in table 4.5 it clearly indicated that the dominant maturity level of the procurement process is mechanisms for receiving and incorporating feedback from stakeholders into the procurement process with the mean value of 3.75, Existence and implementation of an integrated and systematic procurement plan for road construction

projects is the second maturity level of the procurement process with the mean value of 3.64, Transparency and completeness of reporting throughout the selection stage is the third maturity level of the procurement process with the mean value of 3.49, the fourth maturity level of the procurement process is strict adherence to relevant regulations and ethical considerations during the procurement process with the mean value of 3.42 and the fifth maturity level of the procurement process is utilization of information technology systems to support the procurement process (e.g., e-procurement platforms) with the mean value of 3.40 in the process. Top five maturity level of the procurement process was discussed as follows:

The first rank of maturity level of the procurement process is mechanisms for receiving and incorporating feedback from stakeholders into the procurement process as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the mechanisms for receiving and incorporating feedback from stakeholders into the procurement process maturity level is given in the following Figure 4.6, as shown below.

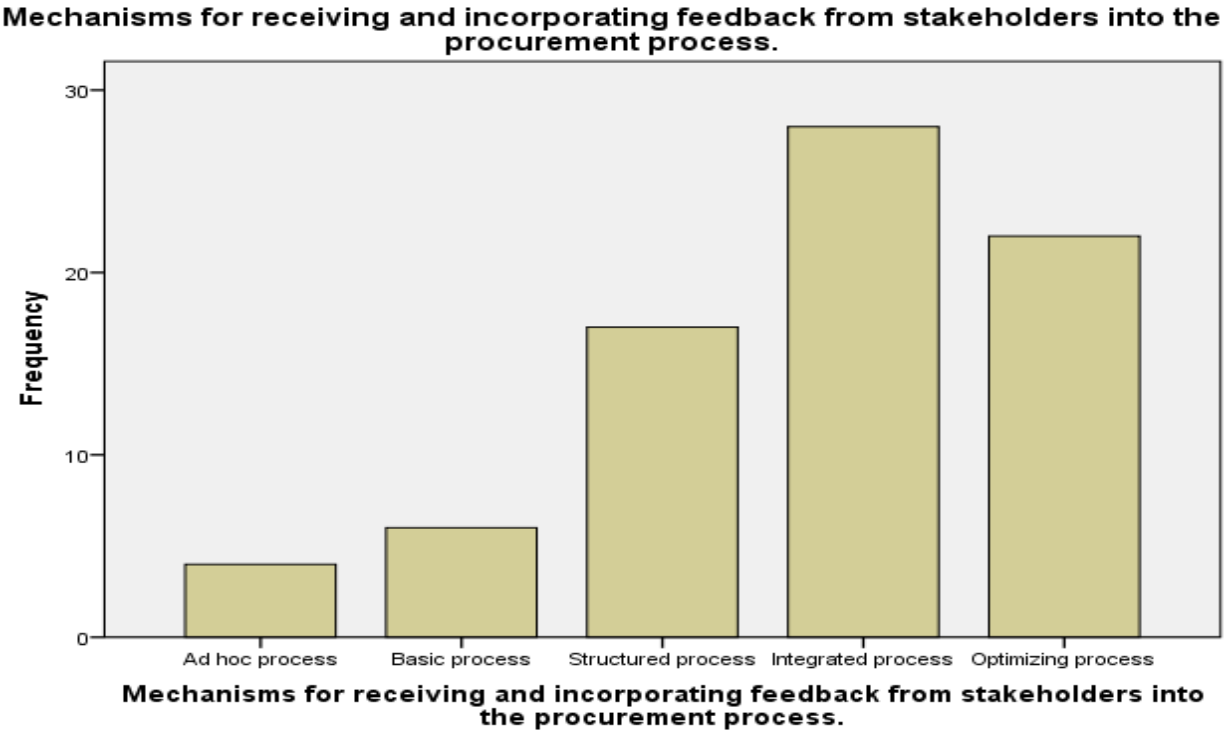

Figure 4. 6: Mechanisms for receiving and incorporating feedback from stakeholders

(Source: Own survey data analysis)

Based on the data in figure 4.6, the researcher can conclude that the maturity level of the procurement process in terms of mechanisms for receiving and incorporating feedback from stakeholders is relatively high. The majority of the organizations surveyed fall into the higher maturity levels, with Level 4 (Integrated) being the most common at 36%, followed by Level 5 (Optimized) at 29%. This indicates that a significant portion of organizations have structured and well-integrated processes for gathering and utilizing feedback from stakeholders in their procurement activities. However, there is still room for improvement as only a small percentage are at the lower maturity levels of Ad Hoc and Basic. Overall, the data suggests that organizations are increasingly recognizing the importance of stakeholder feedback in improving their procurement processes.

The second rank of maturity level of the procurement process is existence and implementation of an integrated and systematic procurement plan for road construction projects as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the existence and implementation of an integrated and systematic procurement plan for road construction projects maturity level is given in the following Figure 4.7, as shown below.

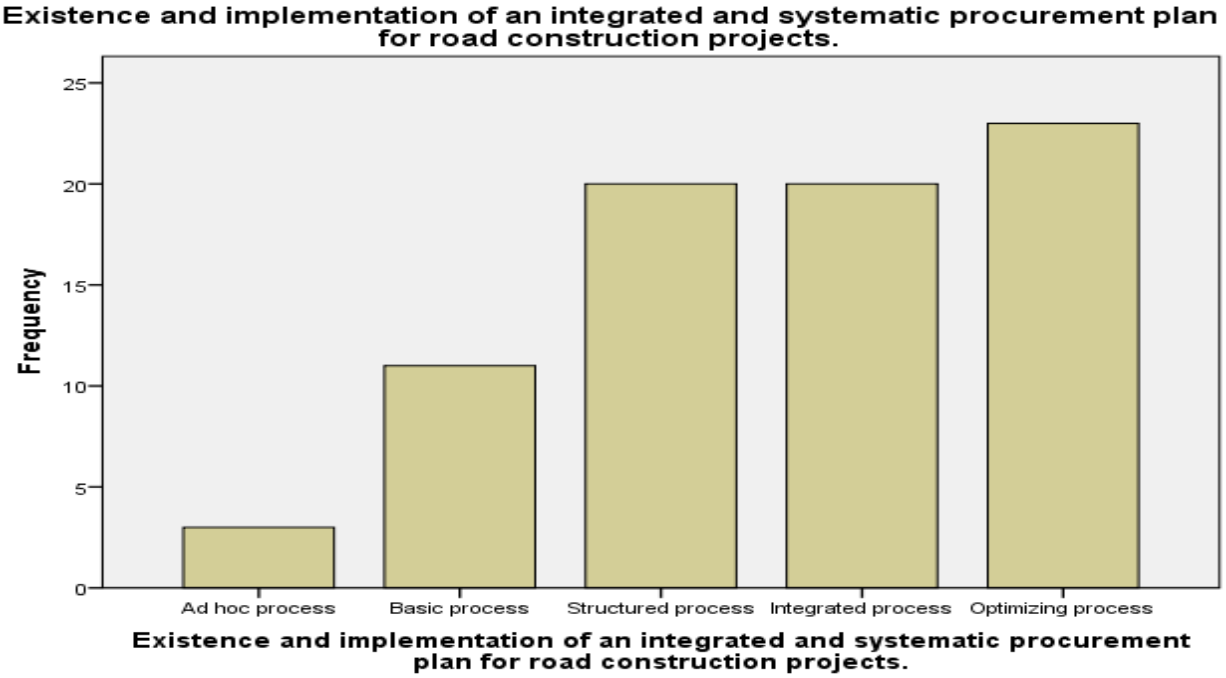

Figure 4. 7: Existence and implementation of an integrated and systematic procurement plan (Source: Own survey data analysis)

Based on the data in figure 4.7, it can be concluded that the maturity level of the procurement process regarding the existence and implementation of an integrated and systematic procurement plan for road construction projects is Level 5: Optimized. This conclusion is drawn from the highest percentage (30%) within the provided levels, which indicates that the majority of the procurement process is characterized by an optimized integrated and systematic procurement plan for road construction projects. This level of maturity suggests that the organization has established and implemented a comprehensive and well-structured procurement plan that encompasses all aspects of road construction projects. It is worth noting that Level 4: Integrated also has a high percentage (26%), indicating a strong focus on integrated procurement planning. However, Level 5: Optimized represents a higher level of maturity as it emphasizes the optimization of the procurement plan to ensure maximum effectiveness and efficiency in the context of road construction projects.

The third rank of maturity level of the procurement process is transparency and completeness of reporting throughout the selection stage as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained result of respondent's the transparency and completeness of reporting throughout the selection stage maturity level is given in the following Figure 4.8, as shown below.

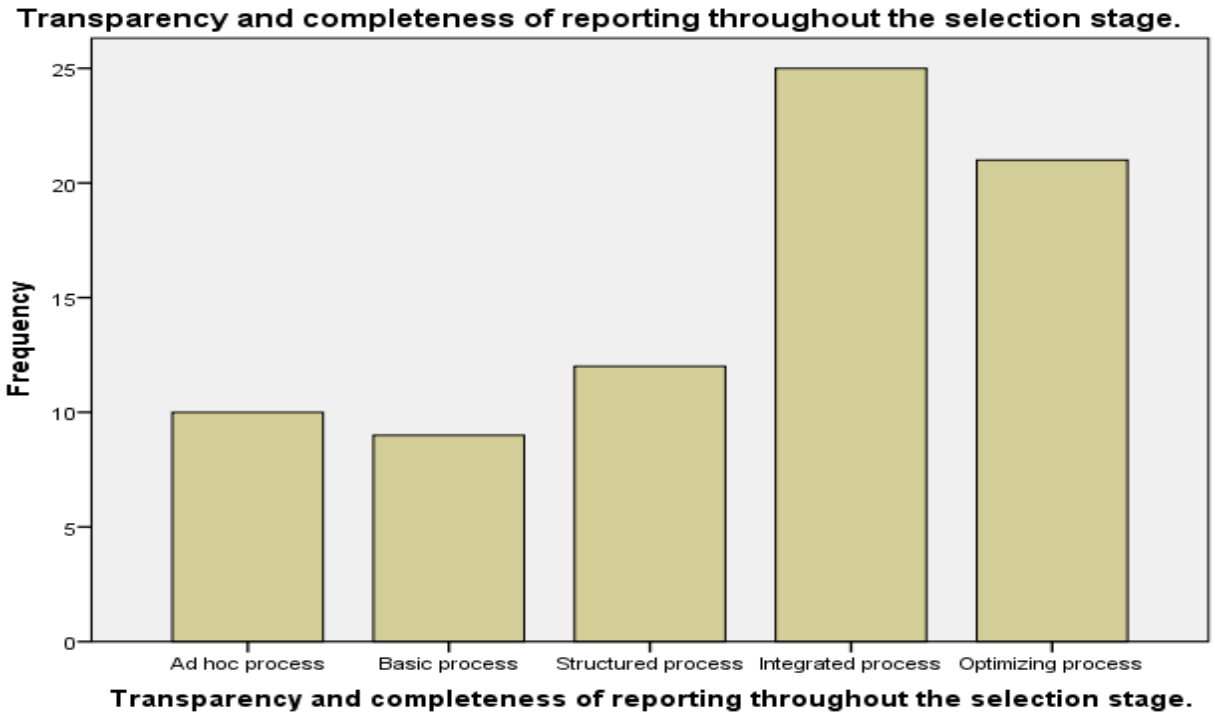

Figure 4. 8: Transparency and completeness of reporting throughout the selection stage (Source: Own survey data analysis)

Based on the data in figure 4.8, it can be concluded that the maturity level of the procurement process regarding transparency and completeness of reporting throughout the selection stage is Level 4: integrated. This conclusion is drawn from the highest percentage (35%) within the provided levels, which indicates that the majority of the procurement process is characterized by integrated transparency and completeness of reporting during the selection stage. This level of maturity suggests that the organization has established and implemented robust mechanisms for ensuring that all relevant information is transparently and completely reported throughout the selection process. It is worth noting that Level 5: Optimized also has a high percentage (33%), indicating a strong focus on optimized reporting practices. However, Level 4: integrated represents a higher level of maturity as it emphasizes the integration of reporting processes to ensure maximum transparency and completeness.

The fourth rank of maturity level of the procurement process is strict adherence to relevant regulations and ethical considerations during the procurement process as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the strict adherence

to relevant regulations and ethical considerations during the procurement process maturity level is given in the following Figure 4.9, as shown below.

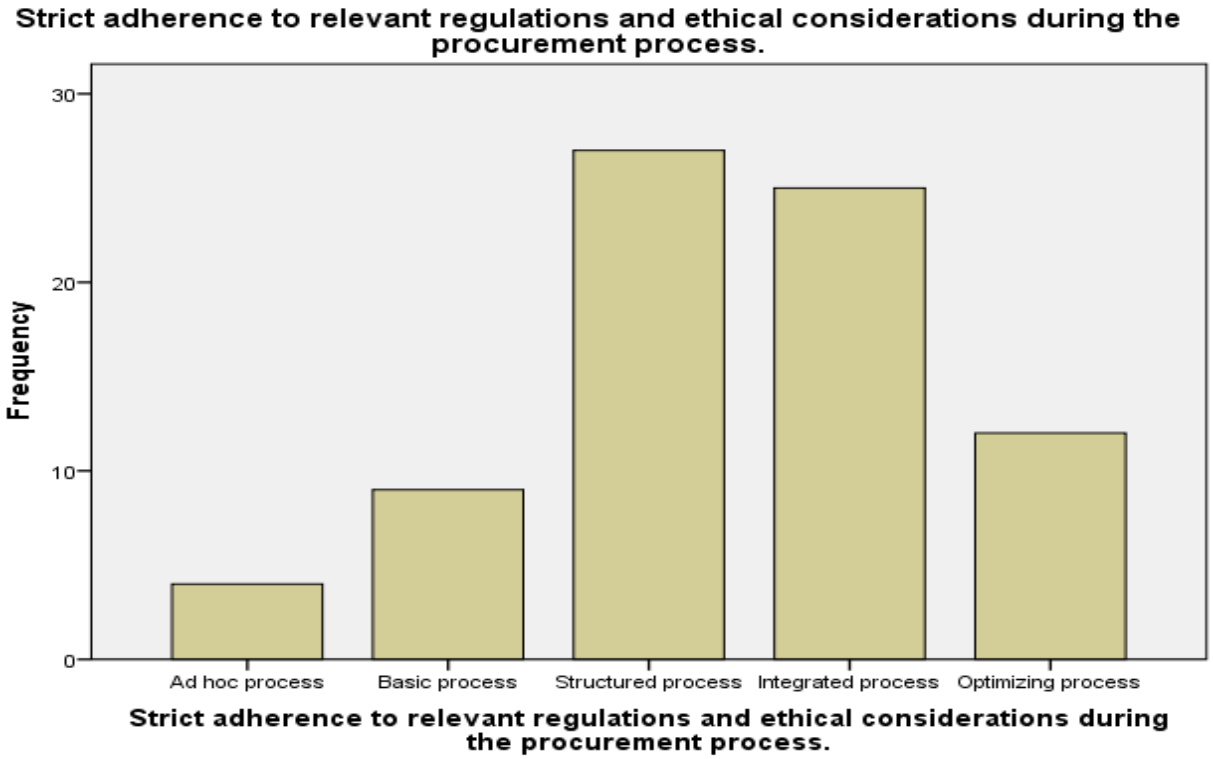

Figure 4. 9: Strict adherence to relevant regulations and ethical considerations

(Source: Own survey data analysis)

Based on the data in figure 4.9, it can be concluded that the maturity level of the procurement process regarding strict adherence to relevant regulations and ethical considerations is Level 3: Structured. This conclusion is drawn from the highest percentage (35%) within the provided levels, which indicates that the majority of the procurement process is characterized by structured adherence to relevant regulations and ethical considerations. This level of maturity suggests that the organization has established and implemented a comprehensive framework for ensuring compliance with regulations and ethical standards throughout the procurement process. It is worth noting that Level 4: Integrated also has a high percentage (33%), indicating a strong focus on integrated processes and procedures. However, Level 3: Structured represents a higher level of maturity as it emphasizes the integration of regulatory compliance and ethical considerations into all aspects of the procurement process.

The fifth rank of maturity level of the procurement process is utilization of information technology systems to support the procurement process as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the utilization of information technology systems to support the procurement process maturity level is given in the following Figure 4.10, as shown below.

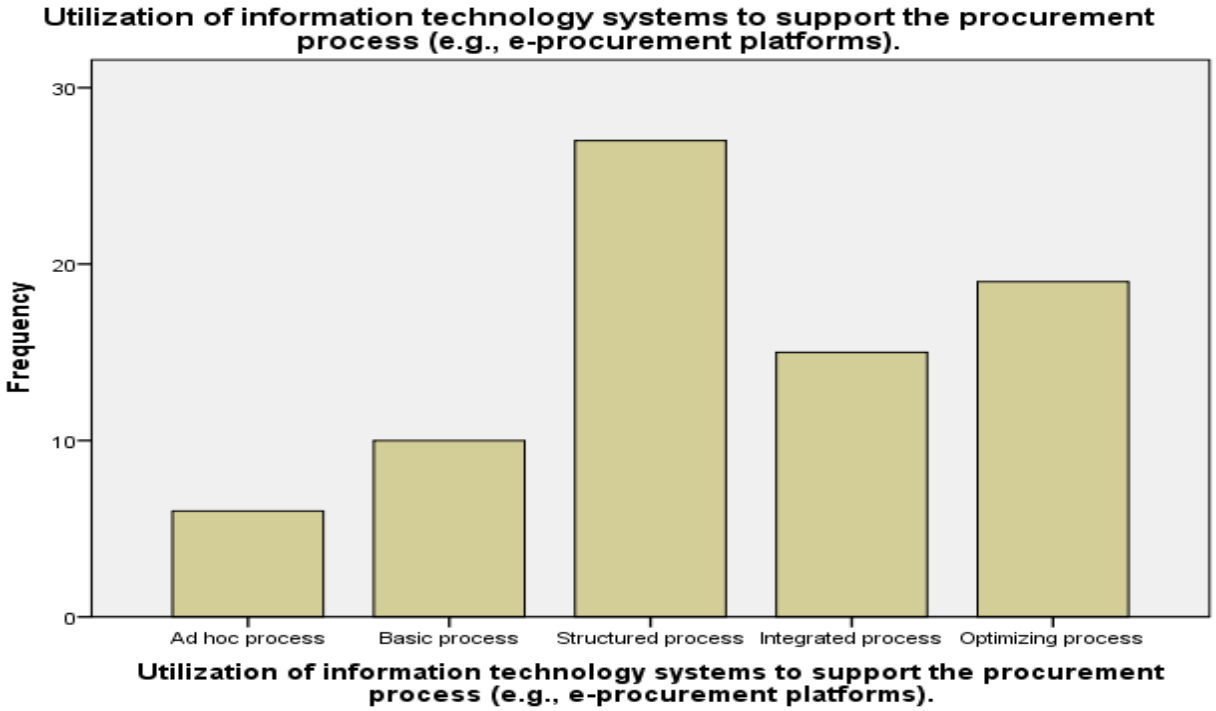

Figure 4. 10: Utilization of information technology systems to support the procurement

(Source: Own survey data analysis)

Based on the data in figure 4.10, the researcher can conclude that the maturity level of the procurement process in terms of utilizing information technology systems to support the procurement process is relatively high. The majority of the organizations surveyed fall into the higher maturity levels, with Level 3 (Structured) being the most common at 35%, followed by Level 5 (Optimized) at 25%. This indicates that a significant portion of organizations have structured and integrated IT systems to support their procurement activities effectively. However, there is still room for improvement as a notable percentage are at the lower maturity levels of Ad Hoc and Basic. Overall, the data suggests that organizations are increasingly

leveraging information technology systems to enhance and optimize their procurement processes.

4.3.3. Maturity level of the Procurement Organization and Human Resources

Assessment of maturity level of the procurement organization and human resources process of achievement for each selected major attributes. The overview evaluation was done by utilizing mean score strategy and respondents were asked to score which current maturity level are considered to be procurement organization and human resources process in Adama city. Ranking of the various current maturity level according to their mean value and the interpretation of the mean values, mean is ranked from the highest to the lowest which is rankings of 12 common maturity level of the procurement organization and human resources process as per previous studies and practices were ranked. This means that all the twelve variables are considered as maturity level of the procurement process in Adama city. The value analysis carried out on the data mean score is shown in the Table 4.6 as follow.

Table 4. 6: Maturity level of the procurement organization and human resources

Maturity level of the procurement organization & human resources	Mean	Std. Dev.	Rank
Clearly defined job specifications for procurement personnel.	3.18	1.144	1
Effective human resource management practices within the procurement department.	3.17	1.163	2
Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	3.05	1.037	3
Defined career path for professional development of procurement personnel.	3.05	1.180	4
Clear and efficient distribution of work responsibilities within the procurement department.	3.00	1.064	5
Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	2.99	1.057	6
Existence and effectiveness of an incentive plan to motivate procurement personnel.	2.95	1.146	7
Regular evaluation of contractor performance based on pre-defined criteria.	2.87	1.151	8

Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	2.83	1.031	9
Existence and effectiveness of a performance management system for the procurement department.	2.81	1.001	10
Level of collaboration and coordination between different stakeholders involved in the procurement process.	2.78	1.084	11
Definition and utilization of performance indicators for contractors involved in road construction projects.	2.65	1.156	12
Valid N (list wise)			

(Source: Own survey data analysis)

As the results of the study shown in table 4.6, it clearly indicated that the dominant maturity level of the procurement organization and human resources process is clearly defined job specifications for procurement personnel with the mean value of 3.18, Effective human resource management practices within the procurement department is the second maturity level of the procurement organization and human resources process with the mean value of 3.17, Clarity and effectiveness of the organizational structure for procurement in the road construction sector and defined career path for professional development of procurement personnel is the third and fourth maturity level of the procurement organization and human resources process with the mean value of 3.05 and the fifth maturity level of the procurement organization and human resources process is clear and efficient distribution of work responsibilities within the procurement department with the mean value of 3.00 in the process. Top five maturity level of the procurement organization and human resources process was discussed as follows:

The first rank of maturity level of the procurement organization and human resources is clearly defined job specifications for procurement personnel as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the clearly defined job specifications for procurement personnel maturity level is given in the following Figure 4.11, as shown below.

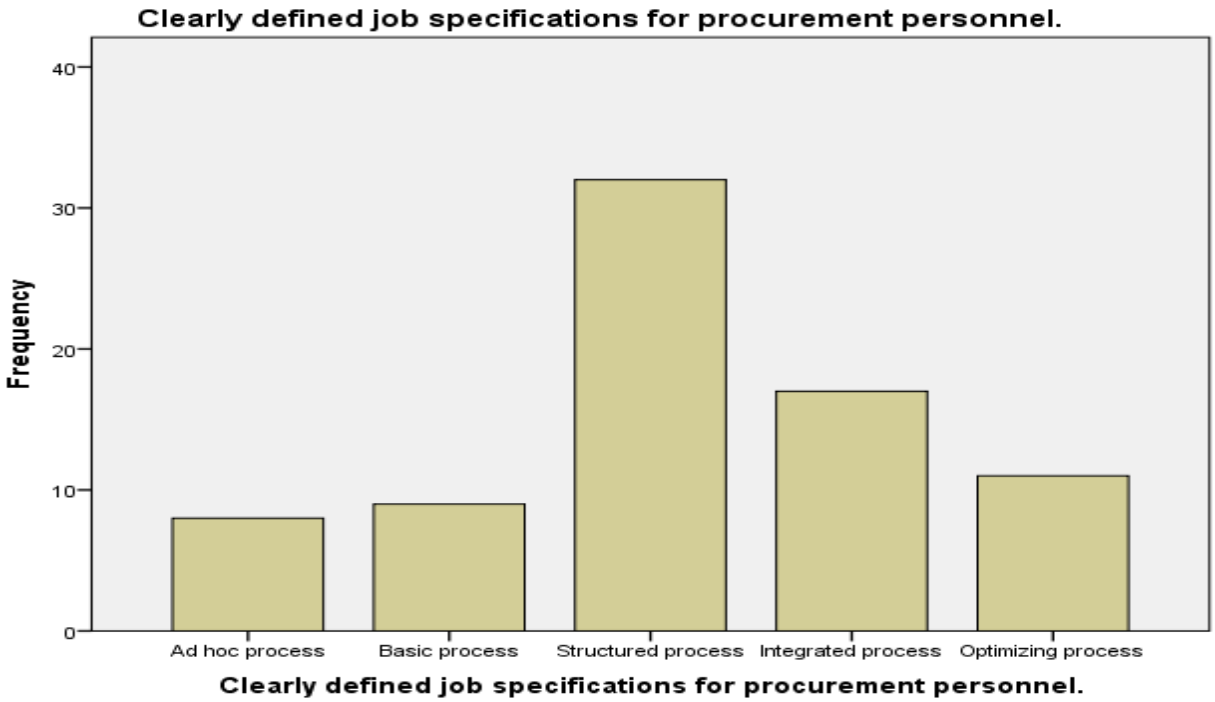

Figure 4. 11: Clearly defined job specifications for procurement personnel

(Source: Own survey data analysis)

Based on the data in figure 4.11, the researcher can conclude that the maturity level of the procurement organization in terms of having clearly defined job specifications for procurement personnel is relatively high. The majority of the organizations surveyed fall into the higher maturity levels, with Level 3 (Structured) being the most common at 42%, followed by Level 4 (Integrated) at 22% and Level 5 (Optimized) at 14%. This indicates that a significant portion of organizations have structured, integrated, and optimized job specifications for their procurement personnel, which can contribute to more efficient and effective procurement processes. However, there are still organizations at the lower maturity levels of Ad Hoc and Basic, indicating that there is room for improvement in terms of clearly defining job specifications for procurement personnel across the board. Overall, the data suggests that organizations are making progress in this area but there is still work to be done to ensure all organizations have well-defined job specifications for their procurement personnel.

The second rank of maturity level of the procurement organization and human resources is effective human resource management practices within the procurement department as set of processes required to ensure that the project includes all the work required, and only the work

required, to complete the project successfully. The obtained result of respondent's the effective human resource management practices within the procurement department maturity level is given in the following Figure 4.12, as shown below.

Figure 4. 12: Effective human resource management practices

(Source: Own survey data analysis)

Based on the data in figure 4.12, researcher can conclude that the maturity level of the procurement organization in terms of effective human resource management practices within the procurement department is relatively high. The majority of the organizations surveyed fall into the higher maturity levels, with Level 3 (Structured) being the most common at 38%, followed by Level 4 (Integrated) at 16% and Level 5 (Optimized) at 18%. This indicates that a significant portion of organizations have structured, integrated, and optimized human resource management practices within their procurement departments, which can contribute to better talent management, development, and retention within the procurement function. However, there are still organizations at the lower maturity levels of Ad Hoc and Basic, indicating that there is room for improvement in terms of implementing effective human resource management practices across all organizations. Overall, the data suggests that organizations

are making progress in this area but there is still work to be done to ensure all organizations have effective human resource management practices within their procurement departments.

The third rank of maturity level of the procurement organization and human resources is clarity and effectiveness of the organizational structure for procurement in the road construction sector as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the clarity and effectiveness of the organizational structure for procurement in the road construction sector maturity level is given in the following Figure 4.13, as shown below.

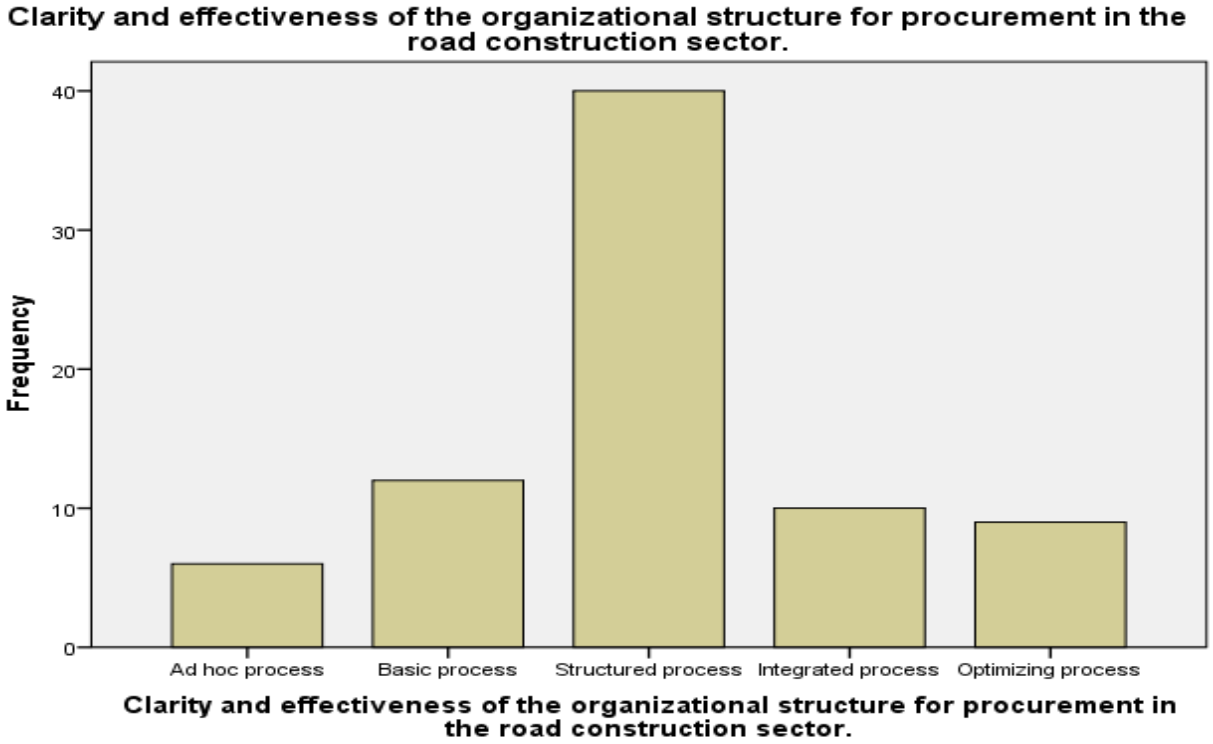

Figure 4. 13: Clarity and effectiveness of the organizational structure for procurement (Source: Own survey data analysis)

Based on the data in figure 4.13, the researcher can conclude that the maturity level of the procurement organization in the road construction sector, specifically in terms of the clarity and effectiveness of the organizational structure for procurement, is relatively high. The majority of organizations fall into Level 3 (Structured) at 52%, indicating that a significant portion of organizations have a structured organizational structure in place for procurement

activities. This suggests that there is a clear framework and processes in place for procurement functions within these organizations. Additionally, this indicating that a notable portion of organizations have integrated and optimized their organizational structures for procurement, further enhancing efficiency and effectiveness in procurement operations. While there are still organizations at the lower maturity levels of Ad Hoc and basic, the overall distribution of maturity levels suggests that a majority of organizations in the road construction sector have established structured, integrated, or optimized organizational structures for procurement. This indicates a positive trend towards more effective and efficient procurement practices within the sector.

The fourth rank of maturity level of the procurement organization and human resources is defined career path for professional development of procurement personnel as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the defined career path for professional development of procurement personnel maturity level is given in the following Figure 4.14, as shown below.

Figure 4. 14: Defined career path for professional development of procurement personnel (Source: Own survey data analysis)

Based on the data in figure 4.14, the researcher can conclude that the maturity level of the procurement organization in defining career paths for professional development of procurement personnel is moderately high. The majority of organizations fall into Level 3 (Structured) at 36%, indicating that a significant portion of organizations have structured career paths in place for the professional development of procurement personnel. This suggests that there are clear frameworks and processes for career progression and development within these organizations. Additionally, this indicating that a notable portion of organizations have integrated and optimized career development structures for procurement personnel, which can lead to increased efficiency and effectiveness in procurement operations. While there are still organizations at the lower maturity levels of Ad Hoc and Basic, the overall distribution of maturity levels suggests that a majority of organizations have established structured, integrated, or optimized career paths for professional development within their procurement departments. This indicates a positive trend towards investing in the growth and advancement of procurement personnel within the organizations.

The fifth rank of maturity level of the procurement organization and human resources is clear and efficient distribution of work responsibilities within the procurement department as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the clear and efficient distribution of work responsibilities within the procurement department maturity level is given in the following Figure 4.15, as shown below.

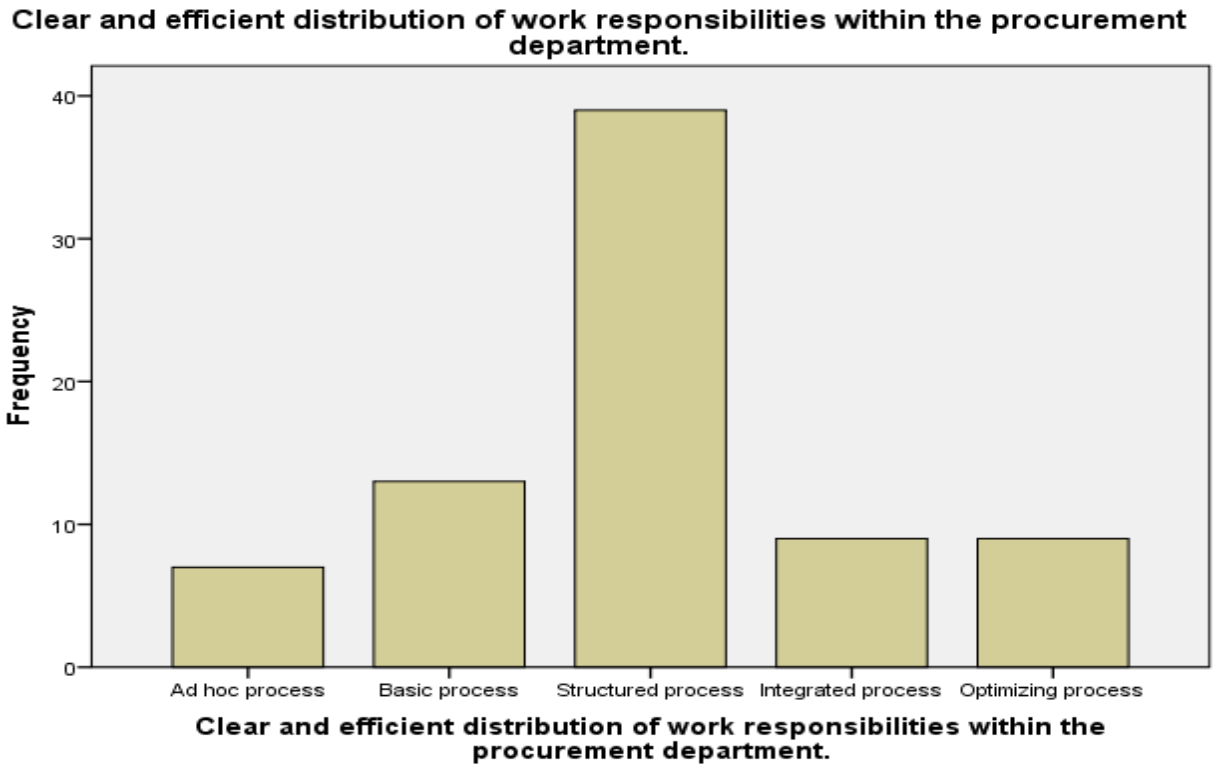

Figure 4. 15: Clear and efficient distribution of work responsibilities

(Source: Own survey data analysis)

Based on the data in figure 4.15, the researcher can conclude that the maturity level of the procurement organization in efficiently distributing work responsibilities within the procurement department is moderately high. The majority of organizations fall into Level 3 (Structured) at 51%, indicating that a significant portion of organizations have structured processes in place for assigning and managing work responsibilities within the procurement department. This suggests that there are clear frameworks and guidelines for how work responsibilities are distributed among procurement personnel. Additionally, this indicating that a notable portion of organizations have integrated and optimized systems for distributing work responsibilities within the procurement department. This suggests that these organizations have streamlined and efficient processes for assigning tasks, managing workloads, and ensuring accountability within the procurement team. While there are still organizations at the lower maturity levels of Ad Hoc and Basic, the overall distribution of maturity levels suggests that a majority of organizations have established structured, integrated, or optimized systems for distributing work responsibilities within their procurement departments. This indicates a

positive trend towards creating clear and efficient processes for managing workloads and responsibilities within the procurement organization.

4.3.4. Maturity level of the Personnel Competency

Assessment of maturity level of the personnel competency process of achievement for each selected major attributes. The overview evaluation was done by utilizing mean score strategy and respondents were asked to score which current maturity level are considered to be personnel competency process in Adama city. Ranking of the various current maturity level according to their mean value and the interpretation of the mean values, mean is ranked from the highest to the lowest which is rankings of 3 common maturity level of the personnel competency process as per previous studies and practices were ranked. This means that all the three variables are considered as maturity level of the personnel competency process in Adama city. The value analysis carried out on the data mean score is shown in the Table 4.7 as follow.

Table 4. 7: Maturity level of the personnel competency

Maturity level of the personnel competency	Mean	Std. Dev.	Rank
Availability and participation in general procurement training programs for relevant personnel.	3.19	1.064	1
Availability and participation in specialized training programs related to road construction procurement.	3.00	1.203	2
Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	2.99	1.045	3
Valid N (list wise)			

(Source: Own survey data analysis)

As the results of the study shown in table 4.7 it clearly indicated that the dominant maturity level of the personnel competency is availability and participation in general procurement training programs for relevant personnel with the mean value of 3.19, Availability and participation in specialized training programs related to road construction procurement is the second maturity level of the personnel competency with the mean value of 3.00 and the third maturity level of the personnel competency is regular assessment of procurement personnel's competencies and implementation of relevant development programs with the mean value of 2.99 in the process. The maturity level of the personnel competency was discussed as follows:

The first rank of maturity level of the personnel competency is availability and participation in general procurement training programs for relevant personnel as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the availability and participation in general procurement training programs for relevant personnel maturity level is given in the following Figure 4.16, as shown below.

Figure 4. 16: Availability and participation in general procurement training programs (Source: Own survey data analysis)

Based on the data in figure 4.16, the researcher can conclude that the maturity level of personnel competency in terms of availability and participation in general procurement training programs for relevant personnel is moderately high. The majority of organizations fall into Level 3 (Structured) at 47%, indicating that a significant portion of organizations have structured processes in place for providing general procurement training programs to their personnel. This suggests that there are formalized training programs available for relevant personnel to enhance their procurement skills and knowledge.

The second rank of maturity level of the personnel competency is availability and participation in specialized training programs related to road construction procurement as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the availability and participation in specialized training programs related to road construction procurement maturity level is given in the following Figure 4.17, as shown below.

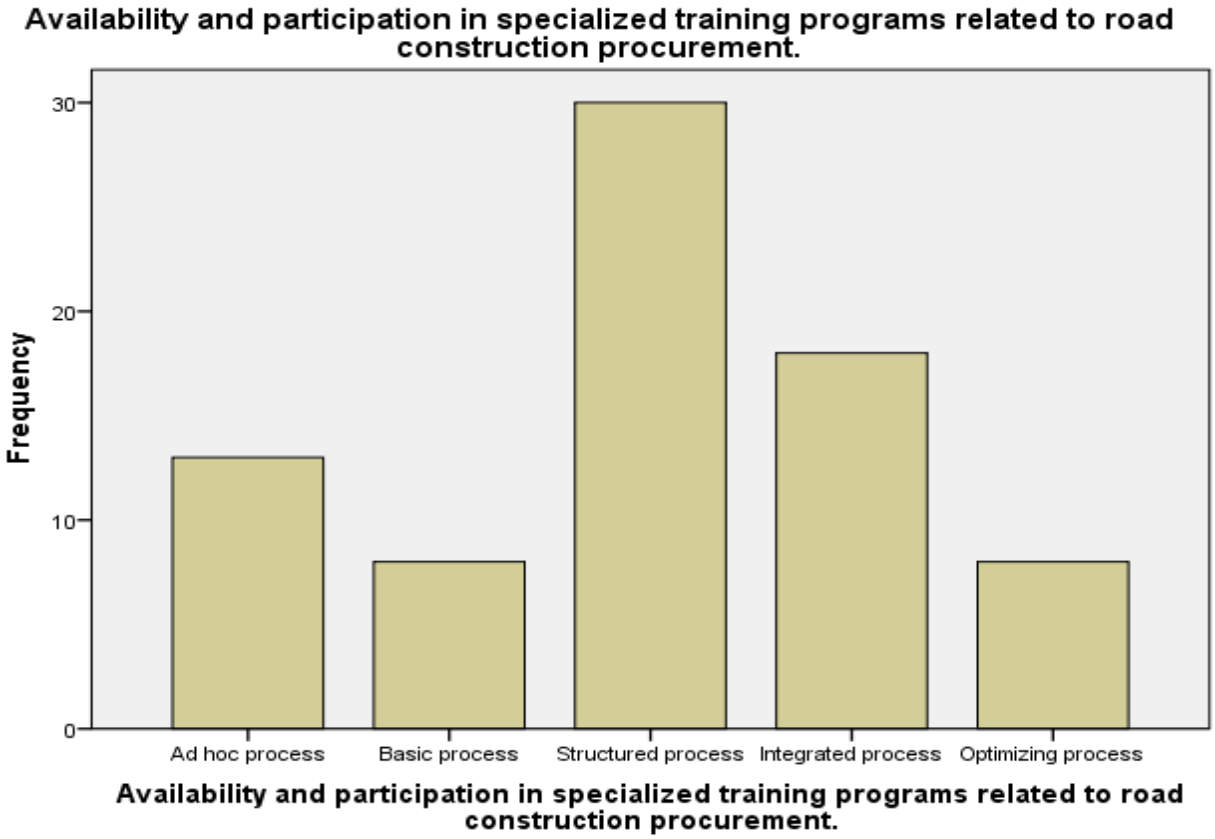

Figure 4. 17: Availability and participation in specialized training programs

(Source: Own survey data analysis)

Based on the data in figure 4.17, the researcher can conclude that the maturity level of personnel competency in terms of availability and participation in specialized training programs related to road construction procurement is moderately high. The majority of organizations fall into Level 3 (Structured) at 39%, indicating that a significant portion of organizations have structured processes in place for providing specialized training programs related to road construction procurement to their personnel. This suggests that there are

formalized training programs available for relevant personnel to enhance their knowledge and skills in this specific area.

The third rank of maturity level of the personnel competency is regular assessment of procurement personnel's competencies and implementation of relevant development programs as set of processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. The obtained results of respondent's the regular assessment of procurement personnel's competencies and implementation of relevant development programs maturity level is given in the following Figure 4.18, as shown below.

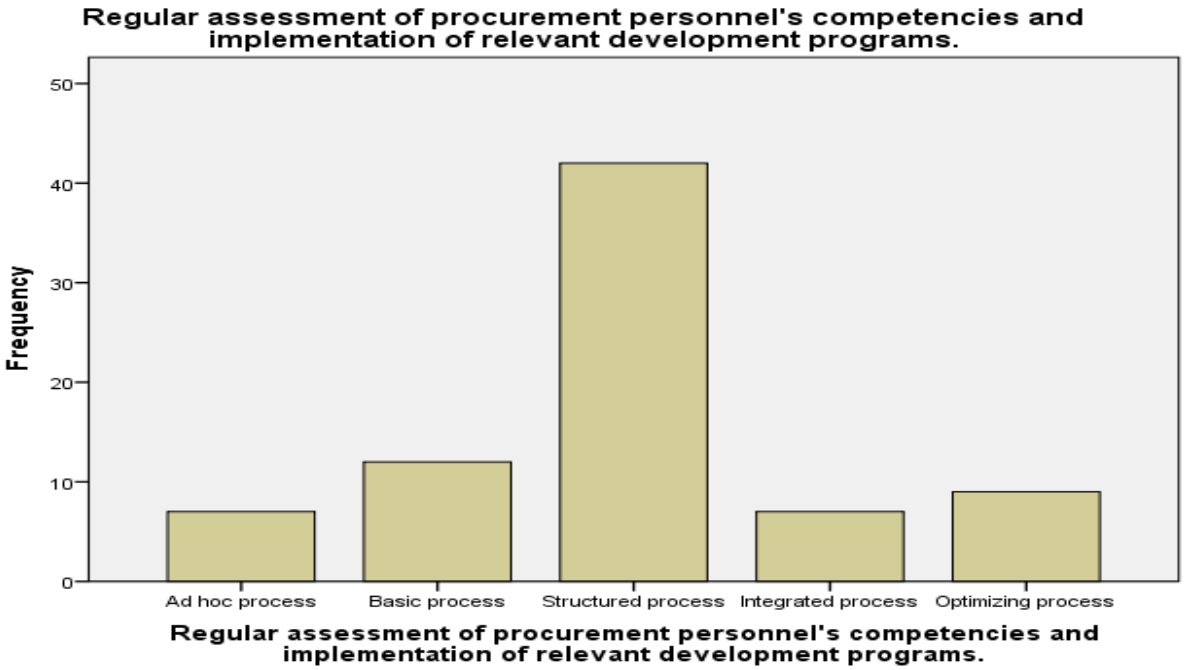

Figure 4. 18: Regular assessment of procurement personnel's competencies and implementation

(Source: Own survey data analysis)

Based on the data in figure 4.18, the researcher can conclude that the maturity level of personnel competency in terms of regular assessment of procurement personnel's competencies and implementation of relevant development programs is moderately high. The majority of organizations fall into Level 3 (Structured) at 55%, indicating that a significant portion of organizations have structured processes in place for regularly assessing procurement

personnel's competencies and implementing relevant development programs. This suggests that there are formalized assessment mechanisms and development programs available to enhance the skills and knowledge of procurement personnel.

4.4. Public Procurement Management Maturity Impact on Project Performance

4.4.1. Procurement Strategy and Policy Impact on Project Performance

The contribution of each of the variables to overall procurement strategy and policy impacts on project performance was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of RII five point likert-scale: (1 - Very low impact; 2 - Low impact; 3 - Moderate impact; 4 - High impact and 5 - Very high impact) which was computed using equation and rankings of 7 common procurement strategy and policy impacts on project performance interims of cost, schedule and quality as per previous studies and impacts were categorized into three major groups and were ranked which is the results of the analysis are presented in Tables 4.8, as shown below.

Table 4. 8: Procurement strategy and policy impact on project performance

Procurement strategy and policy impact on project performance	**RII**	**Rank**
Impacts on cost		
Existence and implementation of a documented procurement policy and standard.	0.63	1
Clarity and adherence to procurement authorization procedures.	0.60	2
Established process for determining procurement priorities and targets for road construction projects.	0.57	3
Availability and utilization of clear and comprehensive procurement guidelines.	0.56	4
Extent of stakeholder involvement in the procurement strategy development process.	0.54	5
Defined strategy for selecting contractors for road construction projects.	0.49	6
Clearly defined and documented selection phases for road construction projects.	0.49	6
Impacts on Schedule		
Existence and implementation of a documented procurement policy and	0.66	1

standard.		
Clarity and adherence to procurement authorization procedures.	0.61	2
Availability and utilization of clear and comprehensive procurement guidelines.	0.61	2
Defined strategy for selecting contractors for road construction projects.	0.58	4
Extent of stakeholder involvement in the procurement strategy development process.	0.58	4
Clearly defined and documented selection phases for road construction projects.	0.56	6
Established process for determining procurement priorities and targets for road construction projects.	0.52	7
Impacts on Quality		
Existence and implementation of a documented procurement policy and standard.	0.62	1
Clarity and adherence to procurement authorization procedures.	0.59	2
Extent of stakeholder involvement in the procurement strategy development process.	0.56	3
Established process for determining procurement priorities and targets for road construction projects.	0.55	4
Availability and utilization of clear and comprehensive procurement guidelines.	0.54	5
Clearly defined and documented selection phases for road construction projects.	0.52	6
Defined strategy for selecting contractors for road construction projects.	0.50	7

(Source: Own survey data analysis)

Based on above result analysis of the responses that the dominant procurement strategy and policy impacts on cost of construction project performance is existence and implementation of a documented procurement policy and standard with RII value of 0.63, Clarity and adherence to procurement authorization procedures is the second procurement strategy and policy impacts on cost of construction project performance with RII value of 0.60 and the third procurement strategy and policy impacts on cost of construction project performance is

established process for determining procurement priorities and targets for road construction projects with RII value of 0.57.

Based on above result analysis of the responses that the dominant procurement strategy and policy impacts on schedule of construction project performance is existence and implementation of a documented procurement policy and standard with RII value of 0.66, Clarity and adherence to procurement authorization procedures is the second procurement strategy and policy impacts on schedule of construction project performance with RII value of 0.61 and the third procurement strategy and policy impacts on schedule of construction project performance is availability and utilization of clear and comprehensive procurement guidelines with RII value of 0.61.

Based on above result analysis of the responses that the dominant procurement strategy and policy impacts on quality of construction project performance is existence and implementation of a documented procurement policy and standard with RII value of 0.62, Clarity and adherence to procurement authorization procedures is the second procurement strategy and policy impacts on quality of construction project performance with RII value of 0.59 and the third procurement strategy and policy impacts on quality of construction project performance is extent of stakeholder involvement in the procurement strategy development process with RII value of 0.56.

Discussion and conclusions on procurement strategy and policy have significant impacts on the cost, schedule, and quality of construction project performance presented as follows:

The procurement strategy and policy have significant impacts on the cost of construction project performances which are the existence and implementation of a documented procurement policy and standard can help ensure that procurement processes are efficient, transparent, and cost-effective. Clear guidelines can prevent unnecessary expenses and ensure that resources are used effectively. Clarity and adherence to procurement authorization procedures are crucial in controlling costs. When procurement decisions are made in accordance with established procedures, the risk of cost overruns due to unauthorized spending or inefficient purchasing is minimized. An established process for determining procurement priorities and targets for road construction projects can help allocate resources effectively, prioritize critical needs, and optimize cost management strategies.

The procurement strategy and policy have significant impacts on the schedule of construction project performance which are a documented procurement policy and standard can streamline the procurement process, reducing delays in acquiring necessary materials or services. Consistent procedures can help ensure that procurement activities are completed on time, contributing to overall project schedule adherence. Clarity and adherence to procurement authorization procedures can prevent delays caused by unauthorized purchases or procedural bottlenecks. By following established protocols, project teams can maintain momentum and avoid disruptions. Clear and comprehensive procurement guidelines can help stakeholders understand their roles and responsibilities, facilitating efficient decision-making and coordination. When everyone involved in procurement understands the process, project schedules are less likely to be impacted by miscommunication or confusion.

The procurement strategy and policy have significant impacts on the quality of construction project performances which are a documented procurement policy and standard that emphasizes quality requirements can help ensure that materials and services procured meet project specifications. By setting clear quality standards, project teams can deliver a final product that meets or exceeds expectations. Clarity and adherence to procurement authorization procedures can prevent the use of substandard materials or services that could compromise project quality. Following established procedures helps maintain quality control throughout the procurement process. Stakeholder involvement in the procurement strategy development process can enhance quality outcomes by incorporating diverse perspectives and expertise. Engaging stakeholders in decision-making can lead to better-informed choices that prioritize quality considerations.

The results show that the Public procurement management maturity on procurement strategy and policy impact on project performance all respondents agreed that the impacts on schedule were the highest impact with average RII value of 0.587, impacts on cost were considered the second most important impacts with average RII value of 0.554 & the followed by impacts on quality with average RII value of 0.552.

Finally, an effective procurement strategy and policy framework is essential for managing costs, schedules, and quality in construction projects. By establishing clear guidelines,

adhering to procedures, and involving stakeholders in the process, project teams can optimize performance outcomes across all key areas.

4.4.2. Procurement Process Impact on Project Performance

The contribution of each of the variables to overall procurement process impacts on project performance was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of RII five point likert-scale: (1 - Very low impact; 2 - Low impact; 3 - Moderate impact; 4 - High impact and 5 - Very high impact) which was computed using equation and rankings of 11 common procurement process impacts on project performance interims of cost, schedule and quality as per previous studies and impacts were categorized into three major groups and were ranked which is the results of the analysis are presented in Tables 4.9, as shown below.

Table 4. 9: Procurement process impacts on project performance

Procurement process impacts on project performance	**RII**	**Rank**
Impacts on cost		
Strict adherence to relevant regulations and ethical considerations during the procurement process.	0.69	1
Integration of risk management practices into the procurement process for road construction projects.	0.644	2
Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	0.641	3
Transparency and completeness of reporting throughout the selection stage.	0.641	3
Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	0.639	5
Implementation of a quality plan with control mechanisms for road construction projects.	0.636	6
Level of user involvement in the planning stages of road construction procurement.	0.631	7
Commitment to continuous improvement of the procurement process for road construction projects.	0.62	8
Existence and implementation of an integrated and systematic procurement plan for road construction projects.	0.60	9
Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	0.59	10

Efficiency and effectiveness of the selection process and contract management system for road construction projects.	0.56	11
Impacts on Schedule		
Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	0.69	1
Integration of risk management practices into the procurement process for road construction projects.	0.66	2
Transparency and completeness of reporting throughout the selection stage.	0.65	3
Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	0.63	4
Level of user involvement in the planning stages of road construction procurement.	0.63	4
Efficiency and effectiveness of the selection process and contract management system for road construction projects.	0.60	6
Commitment to continuous improvement of the procurement process for road construction projects.	0.59	7
Implementation of a quality plan with control mechanisms for road construction projects.	0.59	7
Strict adherence to relevant regulations and ethical considerations during the procurement process.	0.58	9
Existence and implementation of an integrated and systematic procurement plan for road construction projects.	0.57	10
Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	0.54	11
Impacts on Quality		
Integration of risk management practices into the procurement process for road construction projects.	0.65	1
Commitment to continuous improvement of the procurement process for road construction projects.	0.64	2
Existence and implementation of an integrated and systematic procurement plan for road construction projects.	0.63	3
Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	0.62	4
Level of user involvement in the planning stages of road construction procurement.	0.61	5
Efficiency and effectiveness of the selection process and contract management system for road construction projects.	0.59	6

Strict adherence to relevant regulations and ethical considerations during the procurement process.	0.58	7
Transparency and completeness of reporting throughout the selection stage.	0.55	8
Implementation of a quality plan with control mechanisms for road construction projects.	0.54	9
Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	0.53	10
Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	0.52	11

Source: Own survey data analysis

Based on above result analysis of the responses that the dominant procurement process impacts on cost of construction project performance is strict adherence to relevant regulations and ethical considerations during the procurement process with RII value of 0.69, Integration of risk management practices into the procurement process for road construction projects is the second procurement process impacts on cost of construction project performance with RII value of 0.644 and the third and fourth procurement process impacts on cost of construction project performance are mechanisms for receiving and incorporating feedback from stakeholders into the procurement process and transparency and completeness of reporting throughout the selection stage with RII value of 0.641.

Based on above result analysis of the responses that the dominant procurement process impacts on schedule of construction project performance is mechanisms for receiving and incorporating feedback from stakeholders into the procurement process with RII value of 0.69, Integration of risk management practices into the procurement process for road construction projects is the second procurement process impacts on schedule of construction project performance with RII value of 0.66, the third procurement process impacts on schedule of construction project performance is transparency and completeness of reporting throughout the selection stage with RII value of 0.65 and the fourth procurement process impacts on schedule of construction project performance is regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process with RII value of 0.63.

Based on above result analysis of the responses that the dominant procurement process impacts on quality of construction project performance is integration of risk management practices into the procurement process for road construction projects with RII value of 0.65,

Commitment to continuous improvement of the procurement process for road construction projects is the second procurement process impacts on quality of construction project performance with RII value of 0.64, the third procurement process impacts on quality of construction project performance is existence and implementation of an integrated and systematic procurement plan for road construction projects with RII value of 0.63 and the fourth procurement process impacts on quality of construction project performance is mechanisms for receiving and incorporating feedback from stakeholders into the procurement process with RII value of 0.62.

Discussion and conclusions on procurement process have significant impacts on the cost, schedule, and quality of construction project performance presented as follows:

The procurement processes have significant impacts on the cost of construction project performance which are strict adherence to relevant regulations and ethical considerations during the procurement Process that is ensuring compliance with regulations and ethical standards in procurement practices can positively impact the cost performance of construction projects. By promoting fair competition, preventing corruption, and fostering transparency, adherence to regulations enhances cost efficiency, minimizes legal risks, and promotes a level playing field for vendors, potentially resulting in cost savings.

Integration of risk management practices into the procurement process for road construction projects which is incorporating risk management practices into the procurement process can mitigate cost-related risks in construction projects. By identifying, assessing, and addressing potential risks early in the procurement stage, project teams can proactively manage uncertainties, prevent cost overruns, and optimize resource allocation for improved cost performance.

Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process which is soliciting feedback from stakeholders and incorporating their input into the procurement process can enhance cost performance by aligning project requirements with stakeholder expectations. Effective stakeholder engagement can help identify cost-saving opportunities, streamline procurement decisions, and optimize project outcomes based on stakeholder needs and preferences.

Transparency and completeness of reporting throughout the selection stage which is maintaining transparency and completeness in reporting during the selection stage of procurement can impact cost performance by fostering accountability, reducing potential for conflicts of interest, and enhancing decision-making processes. Clear and comprehensive reporting can facilitate informed vendor selection, promote cost-effective procurement decisions, and safeguard project budgets against irregularities or inefficiencies.

The procurement processes have significant impacts on the schedule of construction project performance which are mechanisms for receiving and incorporating feedback from stakeholders into the procurement process that is incorporating stakeholder feedback into the procurement process can influence project schedules by aligning procurement activities with stakeholder expectations and project timelines. Engaging stakeholders proactively can help address schedule-related concerns, streamline procurement procedures, and enhance project coordination for improved schedule performance.

Integration of risk management practices into the procurement process for road construction projects which is integrating risk management practices into procurement processes can contribute to schedule performance by identifying and mitigating potential risks that may impact project timelines. By addressing schedule-related risks early on, project teams can proactively manage uncertainties, prevent delays, and ensure timely project delivery.

Transparency and completeness of reporting throughout the selection stage which is transparency in reporting throughout the selection stage of procurement can impact project schedules by promoting accountability, facilitating timely decision-making, and enhancing coordination among project stakeholders. Comprehensive reporting can support efficient procurement processes, minimize delays in vendor selection, and maintain project schedules in a structured and transparent manner.

Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process which is gathering and analyzing stakeholder satisfaction surveys related to the procurement process can influence project schedules by identifying areas for improvement, addressing stakeholder concerns, and enhancing collaboration among project participants. Continuous feedback from stakeholders can help streamline procurement activities, mitigate

schedule-related challenges, and foster a culture of responsiveness that supports timely project execution.

The procurement processes have significant impacts on the quality of construction project performance which are integration of risk management practices into the procurement process for road construction projects that is embedding risk management practices into the procurement process can impact project quality by identifying and addressing risks that may affect construction outcomes. Proactively managing procurement-related risks can help mitigate quality issues, ensure compliance with standards, and enhance the overall quality of construction projects.

Commitment to continuous improvement of the procurement process for road construction projects which is a commitment to continuous improvement of the procurement process can positively influence project quality by promoting efficiency, effectiveness, and innovation in procurement practices. Embracing a culture of ongoing improvement fosters best practices, enhances quality control mechanisms, and drives excellence in procurement activities for better construction project outcomes.

Existence and implementation of an integrated and systematic procurement plan for road construction projects which is having an integrated and systematic procurement plan can impact project quality by providing a structured framework for procurement activities, resource allocation, and quality assurance measures. A well-defined procurement plan ensures consistency, clarity, and alignment with project requirements, contributing to enhanced quality control and project success.

Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process which is incorporating stakeholder feedback into the procurement process can influence project quality by incorporating diverse perspectives, addressing stakeholder needs, and enhancing project outcomes. Effective stakeholder engagement promotes transparency, responsiveness, and collaboration in procurement activities, leading to improved quality assurance and stakeholder satisfaction in construction projects.

The findings suggest that strict adherence to relevant regulations and ethical considerations during the procurement process are crucial for cost, schedule, and quality of construction

project performance. Additionally, integrating risk management practices into the procurement process is identified as a key factor impacting both cost and schedule performance.

Furthermore, the mechanisms for receiving and incorporating feedback from stakeholders into the procurement process are highlighted as important for both cost and quality performance. Transparency and completeness of reporting throughout the selection stage also emerge as a critical factor affecting cost and schedule performance.

The integration of risk management practices into the procurement process is specifically emphasized for its impact on schedule performance. Commitment to continuous improvement of the procurement process is identified as a key factor impacting the quality of construction project performance.

The results show that the public procurement management maturity impacts on procurement process impact in project performance all respondents agreed that the impacts on cost were the highest impact with average RII value of 0.63, impacts on schedule were considered the second most important impacts with average RII value of 0.61 & the followed by impact on quality with average RII value of 0.59.

Overall, these conclusions underscore the multifaceted influence of procurement practices on construction project performance, emphasizing the importance of regulatory compliance, risk management, stakeholder engagement, transparency, and continuous improvement in achieving favorable outcomes in terms of cost, schedule, and quality.

4.4.3. Procurement Organization and Human Resources Impacts on Project Performance

The contribution of each of the variables to overall procurement organization and human resources impacts on project performance was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of RII five point likert-scale: (1 - Very low impact; 2 - Low impact; 3 - Moderate impact; 4 - High impact and 5 - Very high impact) which was computed using equation and rankings of 12 common procurement organization and human resources impacts on project performance interims of cost, schedule and quality as per previous studies and impacts were categorized into three major groups and were ranked which is the results of the analysis are presented in Tables 4.10, as shown below.

Table 4. 10: Procurement organization and human resources impacts on project performance

Procurement organization and human resources impacts on project performance	**RII**	**Rank**
Impacts on cost		
Clear and efficient distribution of work responsibilities within the procurement department.	0.67	1
Existence and effectiveness of an incentive plan to motivate procurement personnel.	0.63	2
Defined career path for professional development of procurement personnel.	0.61	3
Regular evaluation of contractor performance based on pre-defined criteria.	0.602	4
Existence and effectiveness of a performance management system for the procurement department.	0.600	5
Effective human resource management practices within the procurement department.	0.597	6
Clearly defined job specifications for procurement personnel.	0.592	7
Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	0.584	8
Level of collaboration and coordination between different stakeholders involved in the procurement process.	0.577	9
Definition and utilization of performance indicators for contractors involved in road construction projects.	0.545	10
Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	0.543	11
Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	0.529	12
Impacts on Schedule		
Regular evaluation of contractor performance based on pre-defined criteria.	0.821	1
Existence and effectiveness of a performance management system for	0.816	2

the procurement department.		
Definition and utilization of performance indicators for contractors involved in road construction projects.	0.779	3
Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	0.769	4
Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	0.758	5
Defined career path for professional development of procurement personnel.	0.735	6
Level of collaboration and coordination between different stakeholders involved in the procurement process.	0.732	7
Effective human resource management practices within the procurement department.	0.732	7
Clear and efficient distribution of work responsibilities within the procurement department.	0.727	9
Existence and effectiveness of an incentive plan to motivate procurement personnel.	0.712	10
Clearly defined job specifications for procurement personnel.	0.699	11
Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	0.691	12
Impacts on Quality		
Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	0.686	1
Defined career path for professional development of procurement personnel.	0.668	2
Effective human resource management practices within the procurement department.	0.662	3
Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	0.657	4
Regular evaluation of contractor performance based on pre-defined criteria.	0.652	5

Clearly defined job specifications for procurement personnel.	0.642	6
Definition and utilization of performance indicators for contractors involved in road construction projects.	0.639	7
Existence and effectiveness of an incentive plan to motivate procurement personnel.	0.629	8
Existence and effectiveness of a performance management system for the procurement department.	0.629	8
Level of collaboration and coordination between different stakeholders involved in the procurement process.	0.610	10
Clear and efficient distribution of work responsibilities within the procurement department.	0.610	10
Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	0.605	12

(Source: Own survey data analysis)

Based on above result analysis of the responses that the dominant procurement organization and human resources impacts on the cost of construction project performance is clear and efficient distribution of work responsibilities within the procurement department with RII value of 0.670, Existence and effectiveness of an incentive plan to motivate procurement personnel is the second procurement organization and human resources impacts on the cost of construction project performance with RII value of 0.629, the third procurement organization and human resources impacts on the cost of construction project performance is defined career path for professional development of procurement personnel with RII value of 0.610 and the fourth procurement organization and human resources impacts on the cost of construction project performance is regular evaluation of contractor performance based on pre-defined criteria with RII value of 0.603.

Based on above result analysis of the responses that the dominant procurement organization and human resources impacts on the schedule of construction project performance is regular evaluation of contractor performance based on pre-defined criteria with RII value of 0.821, Existence and effectiveness of a performance management system for the procurement department is the second procurement organization and human resources impacts on the schedule of construction project performance with RII value of 0.816, the third procurement

organization and human resources impacts on the schedule of construction project performance is definition and utilization of performance indicators for contractors involved in road construction projects with RII value of 0.779 and the fourth procurement organization and human resources impacts on the schedule of construction project performance is composition and effectiveness of a dedicated team for performance assessment within the procurement department with RII value of 0.769.

Based on above result analysis of the responses that the dominant procurement organization and human resources impacts on the quality of construction project performance is clarity and effectiveness of the organizational structure for procurement in the road construction sector with RII value of 0.686, Defined career path for professional development of procurement personnel is the second procurement organization and human resources impacts on the quality of construction project performance with RII value of 0.668, the third procurement organization and human resources impacts on the quality of construction project performance is effective human resource management practices within the procurement department with RII value of 0.662 and the fourth procurement organization and human resources impacts on the quality of construction project performance is composition and effectiveness of a dedicated team for performance assessment within the procurement department with RII value of 0.657.

Discussion and conclusions on procurement organization and human resources have significant impacts on the cost, schedule, and quality of construction project performance presented as follows:

The procurement organization and human resources have significant impacts on the cost of construction project performance which are clear and efficient distribution of work responsibilities within the procurement department that is efficient distribution of work responsibilities ensures that tasks are allocated based on individual strengths and expertise, leading to increased productivity and cost-effectiveness. When roles are clearly defined, there is less likelihood of duplication of efforts or misunderstandings, resulting in smoother procurement processes and reduced costs.

Existence and effectiveness of an incentive plan to motivate procurement personnel which is an effective incentive plan can motivate procurement personnel to perform at their best, leading to improved efficiency and cost savings. Incentives tied to cost-saving measures or

meeting project deadlines can encourage staff to negotiate better deals, identify cost-saving opportunities, and manage budgets effectively, ultimately impacting the project's overall cost performance positively.

Defined career path for professional development of procurement personnel which is a defined career path provides procurement personnel with clear goals and opportunities for advancement, leading to higher job satisfaction and motivation. This can result in staff members being more committed to their roles, acquiring new skills and knowledge, and contributing to cost-effective procurement strategies that positively impact project costs.

Regular evaluation of contractor performance based on pre-defined criteria which is regular evaluation of contractor performance helps identify areas for improvement and ensures that contractors are meeting project requirements efficiently. By holding contractors accountable through performance evaluations, organizations can mitigate risks, reduce rework costs, and ensure that project deliverables meet quality standards within budget constraints.

The procurement organization and human resources have significant impacts on the schedule of construction project performance which are regular evaluation of contractor performance based on pre-defined criteria that is regular evaluation of contractor performance is essential for maintaining project schedules. By assessing contractors' adherence to timelines, quality standards, and communication effectiveness, organizations can identify potential schedule risks early on and take corrective actions to prevent delays.

Existence and effectiveness of a performance management system for the procurement department which is a performance management system for the procurement department can help monitor and improve staff performance related to project scheduling. By setting clear goals, providing feedback, and offering training opportunities, organizations can ensure that procurement personnel contribute effectively to project schedules.

Definition and utilization of performance indicators for contractors involved in road construction projects which is utilizing performance indicators for contractors involved in road construction projects can help track progress, identify bottlenecks, and optimize scheduling processes. By measuring key metrics such as on-time delivery, quality of work and adherence to specifications, organizations can proactively manage project schedules and ensure timely completion. Composition and effectiveness of a dedicated team for performance assessment

within the procurement department having a dedicated team for performance assessment within the procurement department can streamline the evaluation process and ensure consistent monitoring of schedule performance. This team can identify trends, analyze data, and provide recommendations for improving scheduling practices to enhance overall project performance.

The procurement organization and human resources have significant impacts on the quality of construction project performance which are clarity and effectiveness of the organizational structure for procurement in the road construction sector that is a clear and effective organizational structure for procurement ensures that responsibilities are well-defined, communication channels are established, and decision-making processes are streamlined. This can lead to better coordination, quality control, and risk management practices that positively impact project quality outcomes.

Defined career path for professional development of procurement personnel which is providing a defined career path for procurement personnel encourages continuous learning and professional growth, leading to a more skilled and knowledgeable workforce. This can result in improved quality management practices, better supplier relationships, and enhanced project quality performance.

Effective human resource management practices within the procurement department which is effective human resource management practices, such as training programs, performance evaluations, and employee engagement initiatives, contribute to a motivated and skilled workforce. By investing in the development and well-being of procurement personnel, organizations can enhance their ability to deliver high-quality construction projects.

Composition and effectiveness of a dedicated team for performance assessment within the procurement department which is a dedicated team for performance assessment within the procurement department can focus on monitoring quality metrics, identifying areas for improvement, and implementing quality assurance measures. This team can play a crucial role in ensuring that project quality standards are met consistently throughout the construction process.

The results show that the public procurement management maturity on procurement organization and human resources impact in project performance all respondents agreed that

the impacts on schedule were the highest impact with average RII value of 0.75, impacts on quality were considered the second most important impacts with average RII value of 0.64 & the followed by impact on cost with average RII value of 0.59.

Overall, these conclusions underscore the multifaceted influence of procurement organization and human resources on construction project performance, emphasizing the importance of clear responsibilities, incentive plans, career development, contractor evaluation, performance management systems, and effective human resource management in achieving favorable outcomes in terms of cost, schedule, and quality.

4.4.4. Personnel Competency Impacts on Project Performance

The contribution of each of the variables to overall personnel competency impacts on project performance was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of RII five point likert-scale: (1 - Very low impact; 2 - Low impact; 3 - Moderate impact; 4 - High impact and 5 - Very high impact) which was computed using equation and rankings of 3 common personnel competency impacts on project performance interims of cost, schedule and quality as per previous studies and impacts were categorized into three major groups and were ranked which is the results of the analysis are presented in Tables 4.11, as shown below.

Table 4. 11: Personnel competency impacts on project performance

Personnel competency impacts on project performance	**RII**	**Rank**
Impacts on cost		
Availability and participation in general procurement training programs for relevant personnel.	0.683	1
Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	0.652	2
Availability and participation in specialized training programs related to road construction procurement.	0.610	3
Impacts on Schedule		
Availability and participation in general procurement training programs for relevant personnel.	0.673	1

Availability and participation in specialized training programs related to road construction procurement.	0.631	2
Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	0.626	3
Impacts on Quality		
Availability and participation in specialized training programs related to road construction procurement.	0.709	1
Availability and participation in general procurement training programs for relevant personnel.	0.655	2
Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	0.644	3

(Source: Own survey data analysis)

Based on above result analysis of the responses that the dominant personnel competency impacts on cost of construction project performance is availability and participation in general procurement training programs for relevant personnel with RII value of 0.683 and the second personnel competency impacts on cost of construction project performance is regular assessment of procurement personnel's competencies and implementation of relevant development programs with RII value of 0.652.

Based on above result analysis of the responses that the dominant personnel competency impacts on schedule of construction project performance is availability and participation in general procurement training programs for relevant personnel with RII value of 0.673 and the second personnel competency impacts on schedule of construction project performance is availability and participation in specialized training programs related to road construction procurement with RII value of 0.631.

Based on above result analysis of the responses that the dominant personnel competency impacts on quality of construction project performance is availability and participation in specialized training programs related to road construction procurement with RII value of 0.709 and the second personnel competency impacts on quality of construction project performance is availability and participation in general procurement training programs for relevant personnel with RII value of 0.655.

Discussion and conclusions on personnel competency have significant impacts on the cost, schedule, and quality of construction project performance presented as follows:

The personnel competencies have significant impacts on the cost of construction project performance which are availability and participation in general procurement training programs for relevant personnel that are personnel who have undergone general procurement training programs are likely to have a better understanding of procurement processes, regulations, and best practices. This can lead to more efficient procurement practices, reduced errors, and cost savings. Well-trained personnel are more equipped to negotiate better deals, identify cost-saving opportunities, and manage budgets effectively. Additionally, trained personnel are more likely to adhere to procurement policies and procedures, reducing the risk of costly mistakes or non-compliance issues. This can help control costs and minimize the impact of unexpected expenses on the project budget.

Regular assessment of procurement personnel's competencies and implementation of relevant development programs which is regular assessment of procurement personnel's competencies can help identify areas for improvement and ensure that staff members have the necessary skills and knowledge to perform their roles effectively. By addressing competency gaps through targeted development programs, organizations can enhance the capabilities of their procurement team and improve overall project performance. Investing in the development of procurement personnel can result in higher productivity, better decision-making, and improved cost management. Well-trained and competent staffs are more likely to make informed choices, negotiate effectively with suppliers, and contribute to cost-effective procurement strategies.

The personnel competencies have significant impacts on the schedule of construction project performance which are availability and participation in general procurement training programs for relevant personnel that are personnel who have received general procurement training are better equipped to understand the importance of timely procurement activities in project scheduling. They can prioritize procurement tasks, anticipate potential delays, and proactively address scheduling conflicts related to material or service acquisition. This can help ensure that project timelines are met and avoid costly delays. Trained personnel are more likely to follow established procurement procedures, communicate effectively with suppliers, and

coordinate procurement activities with other project tasks. This can streamline the procurement process, reduce lead times, and contribute to overall schedule adherence.

Availability and participation in specialized training programs related to road construction procurement which is specialized training programs focused on road construction procurement can provide personnel with specific knowledge and skills relevant to the unique requirements of road projects. This specialized training can help staff members understand the complexities of road construction procurement, including regulatory requirements, technical specifications, and industry best practices. Personnel with specialized training in road construction procurement are better prepared to address project-specific challenges, such as sourcing specialized materials or managing subcontractors. This expertise can lead to more efficient procurement processes, improved coordination with road construction activities, and enhanced schedule performance.

The personnel competencies have significant impacts on the quality of construction project performances which are availability and participation in specialized training programs related to road construction procurement that is specialized training programs focused on road construction procurement can enhance personnel's understanding of quality requirements specific to road projects. Staff members who have received this training are more likely to select materials and services that meet road construction standards, adhere to technical specifications, and comply with industry regulations. This can contribute to improved project quality outcomes. Training in road construction procurement can also help personnel identify potential quality issues early in the procurement process, allowing for timely resolution and proactive quality management. By understanding the unique quality considerations of road projects, staff members can make informed decisions that support the delivery of a high-quality final product.

Availability and participation in general procurement training programs for relevant personnel which are general procurement training programs provide personnel with a foundation in procurement principles, including quality management practices. Staff members who have completed general procurement training are more likely to prioritize quality considerations in their procurement decisions, assess supplier capabilities, and evaluate product specifications to ensure compliance with quality standards. Well-trained personnel are better equipped to

implement quality assurance measures, monitor supplier performance, and address quality issues throughout the procurement process. By fostering a culture of quality consciousness through general procurement training, organizations can improve overall project quality performance and customer satisfaction.

The results show that the public procurement management maturity on procurement personnel impact in project performance all respondents agreed that the impacts on quality were the highest impact with average RII value of 0.669, impacts on cost were considered the second most important impacts with average RII value of 0.648 & the followed by impact on schedule with average RII value of 0.643.

Overall, these conclusions emphasize the crucial role of personnel competency, particularly in terms of training programs and skills assessment, in influencing the cost, schedule, and quality of construction project performance. It highlights the need for comprehensive and specialized training to ensure efficient and high-quality outcomes in construction projects.

4.6 Improvement Strategies Prioritization the Procurement Management Maturity on Project Performance

The contribution of each of the variables to overall improvement strategies prioritization the procurement management maturity on project performance was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by multiple linear regression analysis using five point likert-scales.

Multiple Linear Regression Analysis Model

In order to make the data ready for analysis and to get reliable results from the research, the model stated were tested multiple linear regression model assumption. Among them the major ones are test for normality so, the model assumptions fulfill for multiple regression analysis and the result was followed at Appendix C.

After checking normality test, the researcher was analysis the multiple linear regressions also used to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained which the result as show in the table 4.12.

Table 4. 12: Improvement Strategies project performance

Improvement Strategies	Mean	Std. Dev.	Rank
Project Performance	3.109	0.231	5
Strategic Planning and Policy Development (SPPD)	3.42	0.816	4
Process Optimization and Efficiency (POE)	3.52	0.779	3
Technology Integration and Data Utilization (TIDU)	3.55	0.787	2
Risk Management and Capacity Building (RMCB)	3.72	0.795	1

(Source: Own survey data analysis)

Based on above result analysis of the responses that the most potential improvement strategies prioritization the procurement management maturity on project performance in Adama road projects are Risk Management and Capacity Building with mean value of 3.72, Technology Integration and Data Utilization with mean value of 3.55, Process Optimization and Efficiency with mean value of 3.52 and Strategic Planning and Policy Development with mean value of 3.42.

The sign of the correlation coefficient determines whether the correlation is positive or negative. The magnitude of the correlation coefficient determines the strength of the correlation. The strength of correlation can be described using the guide that Evans (1996) suggests for the absolute value of r as cited in (Beldjazia and Alatou, 2016). If "r = 0.00 - 0.19 is very weak, r = 0.20 - 0.39 is weak, r = 0.40 - 0.59 is moderate, r = 0.60 - 0.79 is strong and r = 0.80 - 1.0 is very strong". Pearson correlation coefficients were determined with the objective to obtain information about the relationships between the dependent and independent variables as presented in table 4.13.

Table 4. 13: Correlations

		Project Performance	SPPD	POE	TIDU	RMCB
Pearson Correlation	Project Performance	1.000	0.418	-0.438	-0.528	0.552
	SPPD	0.418	1.000	0.093	0.025	-0.135
	POE	-0.438	0.093	1.000	0.536	0.557
	TIDU	-0.528	0.025	0.536	1.000	0.700
	RMCB	0.552	-0.135	0.557	0.700	1.000
Sig. (1-tailed)	Project Performance	.	0.440	0.115	0.404	0.482
	SPPD	0.040	.	0.210	0.414	0.122
	POE	0.015	0.210	.	0.000	0.000
	TIDU	0.004	0.414	0.000	.	.000
	RMCB	0.082	0.122	0.000	0.000	.
N	Project Performance	77	77	77	77	77
	SPPD	77	77	77	77	77
	POE	77	77	77	77	77
	TIDU	77	77	77	77	77
	RMCB	77	77	77	77	77

(Source: Own survey data analysis)

The results indicated that there is a significant correlation between Risk Management and Capacity Building, Technology Integration and Data Utilization, Process Optimization and Efficiency, and Strategic Planning and Policy Development with project performance are moderate correlation. Consequently, the relationship between the two variables is strong.

As indicated in the below model summary table 4.14, The "R" column represents the value of R, the multiple correlation coefficient. R value of 0.542 indicates strong correlation between project performance and the four independent variables which shows a good level of prediction. The "R Square" column represents the R2 value (also called the coefficient of determination), which is the proportion of variance in the dependent variable that can be explained by the independent variables. As shown from the table, R2 value of 0.516 indicates that 51.6% of the variation in the project performance of Adama road construction projects can

be explained by the procurement management maturity (independent variables included in the model).

Table 4. 14: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.542	0.516	0.484	0.44485	0.516	4.046	4	72	0.000

a. Predictors: (Constant), RMCB, SPPD, POE, TIDU

b. Dependent Variable: Project Performance

(Source: Own survey data analysis)

Table 4. 15: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.179	4	1.196	4.046	0.000
	Residual	10.446	72	0.198		
	Total	15.627	76			

a. Dependent Variable: Project Performance

b. Predictors: (Constant), RMCB, SPPD, POE, TIDU

(Source: Own survey data analysis)

The F critical at 5% level of significance was 4.046. Since F calculated is greater than the F critical (value = 4.046), this shows that the overall model was significant. From Table 4.15 above, the significance value is 0.000 which is less that 0.05 thus the model is statistically significance in predicting how Risk Management and Capacity Building, Technology Integration and Data Utilization, Process Optimization and Efficiency, and Strategic Planning and Policy Development affects project performance at Adama road construction project.

The results of Coefficients Regression analysis are presented in Tables 4.16, as shown below.

Table 4. 16: Coefficients Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	3.140	0.187		16.811	0.000			
	SPPD	0.428	0.200	0.403	2.143	0.037	0.018	0.056	0.055
	POE	0.427	0.159	0.394	2.690	0.010	-0.138	-0.171	-0.171
	TIDU	0.426	0.159	0.353	2.304	0.002	-0.028	-0.010	-0.009
	RMCB	-0.526	0.159	-0.453	-3.304	0.002	0.005	0.095	0.094

a. Dependent Variable: Project Performance

(Source: Own survey data analysis)

Standardized Coefficients

The standardized coefficients are useful to know which of the different independent variables is more important. They are used in comparison of improvement strategies prioritization the procurement management maturity on project performance of any independent variable on the dependent variable. As indicated in regression coefficients table 4.16, Risk Management and Capacity Building, Technology Integration and Data Utilization, Process Optimization and Efficiency, and Strategic Planning and Policy Development. As it can be seen from the regression coefficient table, the predictor variables are statistically significant in predicting project performance.

Discussion and conclusions on the potential improvement strategies prioritization the procurement management maturity on project performance are:

Risk management and capacity building which is prioritizing risk management and capacity building can help in identifying potential risks early on and developing strategies to mitigate them. This can lead to a more proactive approach to managing risks and ultimately improving project performance.

Technology integration and data utilization which is integrating technology and utilizing data can streamline procurement processes, improve decision-making, and enhance overall

efficiency. This can lead to better transparency, accountability, and cost-effectiveness in procurement activities.

Process optimization and efficiency which is focusing on process optimization and efficiency can help in streamlining procurement processes, reducing delays, and minimizing errors. This can lead to faster delivery of goods and services, improved quality, and increased stakeholder satisfaction.

Strategic planning and policy development which is developing strategic plans and policies for procurement can help in aligning procurement activities with organizational goals and objectives. This can lead to more effective resource allocation, better vendor management, and improved overall project performance.

In conclusions, prioritizing these improvement strategies can help in enhancing the maturity of procurement management practices, which in turn can positively impact project performance. By focusing on risk management, technology integration, process optimization, and strategic planning, organizations can improve their procurement processes, reduce costs, increase efficiency, and ultimately achieve better project outcomes. It is important for organizations to assess their current procurement practices, identify areas for improvement, and prioritize these strategies to drive continuous improvement in procurement management maturity.

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CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The maturity level of the procurement strategy and policy process is determined by stakeholder involvement in strategy development, while the procurement process maturity is influenced by feedback mechanisms. The organization's maturity level is linked to clear job specifications, and personnel competency is tied to training programs. Stakeholder engagement, feedback mechanisms, clear job specifications, and ongoing training are crucial for achieving a high level of maturity in procurement management.

A documented procurement policy and standard significantly impact cost, schedule, and quality in construction projects. Clear guidelines help manage resources efficiently, meet timelines, and maintain quality standards. Adhering to policies and standards enhances project success, leading to cost-effectiveness, timely delivery, and quality assurance. Overall, these factors contribute to improved project performance.

The existence and implementation of a documented procurement policy and standard have a significant impact of Procurement Strategy and Policy on the cost, schedule, and quality of construction project performance. Having a well-documented procurement policy and standard in place significantly impacts the cost, schedule, and quality of construction project performance. Clear guidelines help manage resources efficiently, meet timelines, and maintain quality standards. Adhering to policies and standards enhances project success, leading to cost-effectiveness, timely delivery, and quality assurance. Additionally, strict adherence to regulations and ethical considerations in the procurement process ensures transparency, fair competition, and the best value for money. Stakeholder engagement and feedback mechanisms help maintain project schedules, while integrating risk management practices enhances quality outcomes. Overall, these factors contribute to improved project performance in terms of cost-effectiveness, timely delivery, and quality assurance.

Efficient organization and management of human resources in the procurement department significantly impact the cost, schedule, and quality of construction projects. Clear distribution of work responsibilities improves cost management by reducing redundancies and optimizing resource allocation. Regular evaluation of contractor performance against predefined criteria is

essential for maintaining project schedules. A well-defined organizational structure with clear communication and decision-making processes is crucial for ensuring project quality. By establishing clear roles and responsibilities, promoting accountability, and fostering collaboration, organizations can enhance project quality and deliver successful road construction projects. Optimizing the organization and human resources within the procurement department leads to improved cost management, maintained project schedules, and enhanced project quality in the road construction sector.

Personnel competency is crucial for the success of construction projects. General procurement training programs can improve understanding of procurement processes, leading to better cost management and adherence to schedules. Specialized training in road construction procurement can enhance expertise in areas like quality control. Investing in these programs equips personnel with the skills to manage and deliver high-quality projects. Prioritizing personnel competency through training can significantly impact project success, improving cost control, schedule adherence, and overall quality outcomes.

Implementing clear guidelines for all stages of the procurement cycle and matching procurement methods to project needs, regularly evaluating and adjusting procurement strategies, continuously assessing and updating processes, integrating BIM technology for project visualization, leveraging advanced technologies for procurement streamlining, investing in professional training for procurement personnel, and proactively managing risks are crucial steps to enhance procurement management maturity and improve project performance. These strategies can optimize strategic planning, policy implementation, process efficiency, technology integration, data utilization, risk management, and capacity building for successful project outcomes in today's competitive business environment.

5.2. Recommendations

Recommendation on the potential improvement strategies prioritization for procurement management maturity implementation on project performance:

For Government Organizations:

- ✓ Establish clear procurement policies and procedures which are developing and enforcing standardized procurement policies and procedures that align with government regulations

and guidelines. This will promote transparency, fairness, and accountability in procurement processes.

- ✓ Enhance stakeholder engagement which is engage with various stakeholders, including government departments, suppliers, and citizens, to gather input, address concerns, and ensure alignment with public interests. Effective stakeholder engagement can lead to better procurement outcomes and public trust.
- ✓ Implement procurement training programs which are providing comprehensive training programs for procurement staff to enhance their knowledge of government procurement regulations, best practices, and ethical standards. Well-trained staff can improve compliance, efficiency, and effectiveness in procurement activities.
- ✓ Leverage technology solutions which are invest in procurement management software and e-procurement platforms to streamline government procurement processes, increase transparency, and reduce administrative burdens. Technology solutions can enhance efficiency, data accuracy, and compliance with government regulations.
- ✓ Conduct supplier performance evaluation which is implement a robust supplier performance evaluation system to assess suppliers based on criteria such as quality, cost-effectiveness, and compliance with government standards. Monitoring supplier performance can help identify reliable partners and improve service delivery.

For contractors and consultants,

- ✓ Similar prioritization should be exercised to enhance risk management, ethical practices, performance evaluation, stakeholder engagement, and training programs. By focusing on these key areas, stakeholders across the procurement spectrum can contribute to better project outcomes, increased efficiency, and improved stakeholder satisfaction.

By prioritizing these improvement strategies tailored to the specific needs of government organizations, contractors, and consultants, stakeholders can enhance their procurement management maturity and contribute to improved project performance outcomes. Continuous monitoring, evaluation, and adaptation of these strategies will be essential for sustained success in procurement activities across different sectors.

5.3. Future research direction

Based on the identified future research directions, the following areas can be explored to further enhance procurement management maturity and project performance includes integrated BIM and procurement processes, advanced technology adoption, data-driven procurement decision making, procurement policy implementation, continuous process improvement, risk management strategies and professional training impact assessment. By delving into these research areas, organizations can gain valuable insights into leveraging technology, data, and best practices to enhance procurement maturity and drive successful project outcomes in the competitive business environment of the road construction sector.

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APPENDIX

Appendix A: Survey Questionnaire

Adama Science and Technology University School of Civil Engineering and Architecture Office of Graduate Studies

The Department of Civil Engineering (Specialized by Construction Engineering and Management).

Title: "**Enhancing Road Construction Success: A Strategic Analysis of Public Procurement Maturity Level: A case of Adama City,"**

Dear Participant,

You are cordially invited to contribute to a significant study spearheaded by Abraham Legesse, a Master's candidate in Construction Engineering and Management at Adama Science and Technology University. This research, encapsulated in the thesis "Enhancing Road Construction Success: A Strategic Analysis of Public Procurement Maturity Level: A case of Adama City," is dedicated to the systematic evaluation and advancement of public procurement management within the road construction sector of Adama City.

The overall goal of this research is to improve the success rate of road construction projects in Adama City. This will be achieved by systematically evaluating and enhancing public procurement management practices within the road construction sector. By increasing the maturity level of these practices, we aim to improve project performance in key areas such as cost, schedule, and quality.

This questionnaire is divided into four sections, each addressing a specific objective of the research and general information about respondents:

Section 1: General Information about the Respondents

This initial section gathers basic background information about the respondents to gauge the diversity of perspectives and levels of expertise. Respondents will provide details regarding their educational qualifications, current job roles, and experience in the construction industry, particularly within public procurement.

Section 2: Maturity Level Assessment

In this section, respondents will assess the current maturity level of public procurement management practices in Adama City's Road construction sector. You will be asked to evaluate the significance of various maturity criteria and the extent to which the procuring entity has attained these maturity levels.

Section 3: Impact on Project Performance

Here, the focus shifts to the influence of public procurement management practices on the performance of road construction projects. Respondents will rate the impact of each maturity criterion on the cost, schedule, and quality outcomes of these projects.

Section 4: Improvement Strategies Prioritization

The final section is dedicated to identifying and prioritizing strategies for enhancing public procurement management. Respondents will express their level of agreement with different proposals aimed at improving procurement processes.

Your participation in this survey is completely voluntary and all your responses will be kept confidential. Your honest feedback is crucial to the success of this research and will ultimately contribute to enhancing road construction practices in Adama City.

Thank you for your time and cooperation!

Sincerely,

Abraham Legesse

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Email: abrahamlegesse3@gmail.com

Section1: General Information about the Respondents

A. Educational Background (Highest Qualification).

Please select the highest level of education you have achieved.

[ ] College Diploma

[ ] Bachelor's Degree

[ ] Master's Degree

[ ] Doctorate or higher

[ ] Other (Please specify): _____

B. Current Job Title/Responsibility

Briefly describe your current position and primary responsibilities within your company or organization.

Job Title: _____

Primary Responsibilities: _____

C. Total Years of Experience in the Construction Industry

How many years of total experience do you have working in the construction industry?

Years of Experience: _____

D. Experience in Public Procurement (Years)

If you have any experience in public procurement, enter the number of years you have worked in this specific area.

Years of Experience in Public Procurement: _____ (Enter 0 if none)

E. Experience in Procuring Entity (Years)

Have you ever worked for a public entity involved in construction procurement? If yes, enter the total number of years of experience.

Years of Experience in Procuring Entity: _____ (Enter 0 if none)

F. Additional Information

Please include any other relevant information that you believe is pertinent to this survey.

Additional Details: _____

Section 2: Maturity Level Assessment

This survey aims to understand the current state of public procurement management practices in the road construction sector. Your valuable insights will help us identify areas for improvement and enhance overall project success.

The survey consists of two sections. This first section focuses on the maturity level of your organization's procurement practices. We will present you with various criteria that are considered essential for effective procurement. For each criterion, you will be asked to rate two aspects:

- **Importance Weight:** How important you believe that particular criterion is for successful procurement in road construction projects.
- **Maturity Level:** The current level of implementation of that criterion within your organization.

We will be using a scale to assess the maturity level of your organization's procurement practices. The followings are a brief explanation of the maturity levels you will encounter:

- **Level 1: Ad Hoc** - Procurement activities are reactive and informal, with limited planning and formal processes.
- **Level 2: Basic** - Basic contract management processes are established, but their application might be inconsistent. Standards are still under development.
- **Level 3: Structured** - Formalized and documented procurement processes are consistently applied across the organization.
- **Level 4: Integrated** - Procurement is fully integrated with other core functions, fostering collaboration and alignment.
- **Level 5: Optimized** - Performance metrics are actively used to continuously improve processes and implement best practices.

Category	Criteria	Level of Importance						Level of Maturity				
Procurement Strategy and Policy	Clarity and adherence to procurement authorization procedures.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Existence and implementation of a documented procurement policy and standard.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Clearly defined and documented selection phases for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Availability and utilization of clear and comprehensive procurement guidelines.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Defined strategy for selecting contractors for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Established process for determining procurement priorities and targets for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Extent of stakeholder involvement in the procurement strategy development process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Procurement Process	Existence and implementation of an integrated and systematic procurement plan for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Integration of risk management practices into the procurement process for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Level of user involvement in the planning stages of road construction procurement.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Strict adherence to relevant regulations and ethical considerations during the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Transparency and completeness of reporting throughout the selection stage.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Efficiency and effectiveness of the selection process and contract management system for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**

	Implementation of a quality plan with control mechanisms for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Commitment to continuous improvement of the procurement process for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Procurement Organization and Human Resources	Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Clear and efficient distribution of work responsibilities within the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Level of collaboration and coordination between different stakeholders involved in the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Existence and effectiveness of a performance management system for the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Definition and utilization of performance indicators for contractors involved in road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Regular evaluation of contractor performance based on pre-defined criteria.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Effective human resource management practices within the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Clearly defined job specifications for procurement personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**

	Defined career path for professional development of procurement personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Existence and effectiveness of an incentive plan to motivate procurement personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Personnel Competency	Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Availability and participation in general procurement training programs for relevant personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Availability and participation in specialized training programs related to road construction procurement.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**

Section 3: Impact on Project Performance

This section is designed to gather insights into the impact of public procurement management practices on road construction projects. Your responses will be vital in helping us understand how different aspects of procurement management influence project outcomes. We are particularly interested in how these practices affect the cost, schedule, and quality of road construction projects. This section will present you with various public procurement management practices. We kindly ask you to rate the level of impact each practice has on the cost, schedule, and quality of road construction projects using a Likert scale. The Likert scale used in this survey will likely range from 1 to 5, with each value representing a different level of impact on the cost, schedule, and quality of road construction projects. Consider the following breakdown of the scale:

- **1 (Very Low Impact):** The practice has minimal or negligible influence on the specific outcome (cost, schedule, or quality).
- **2 (Low Impact):** The practice has a slight or limited effect on the outcome.
- **3 (Moderate Impact):** The practice has a noticeable influence on the outcome, but it's not necessarily the strongest factor.
- **4 (High Impact):** The practice has a significant and positive impact on the outcome.

- **5 (Very High Impact):** The practice is a critical factor and has a strong positive influence on the outcome.

Category	Public Procurement Management Maturity Criteria	Impact on Cost						Impact on Schedule						Impact on Quality					
Procurement Strategy and Policy	Clarity and adherence to procurement authorization procedures.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Existence and implementation of a documented procurement policy and standard.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Clearly defined and documented selection phases for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Availability and utilization of clear and comprehensive procurement guidelines.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Defined strategy for selecting contractors for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Established process for determining procurement priorities and targets for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Extent of stakeholder involvement in the procurement strategy development process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
Procurement Process	Existence and implementation of an integrated and systematic procurement plan for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Integration of risk management practices into the procurement process for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Level of user involvement in the planning stages of road construction procurement.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
	Strict adherence to relevant regulations and ethical considerations during the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	

	Transparency and completeness of reporting throughout the selection stage.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Utilization of information technology systems to support the procurement process (e.g., e-procurement platforms).	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Efficiency and effectiveness of the selection process and contract management system for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Implementation of a quality plan with control mechanisms for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Regular conduct and analysis of stakeholder satisfaction surveys regarding the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Mechanisms for receiving and incorporating feedback from stakeholders into the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Commitment to continuous improvement of the procurement process for road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Procurement Organization and Human Resources	Clarity and effectiveness of the organizational structure for procurement in the road construction sector.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Clear and efficient distribution of work responsibilities within the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Level of collaboration and coordination between different stakeholders involved in the procurement process.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Existence and effectiveness of a performance management system for the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Composition and effectiveness of a dedicated team for performance assessment within the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Definition and utilization of performance indicators for contractors involved in road construction projects.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**

	Regular evaluation of contractor performance based on pre-defined criteria.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Implementation of a system for rewarding good performance and penalizing poor performance by contractors.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Effective human resource management practices within the procurement department.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Clearly defined job specifications for procurement personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Defined career path for professional development of procurement personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Existence and effectiveness of an incentive plan to motivate procurement personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Personnel Competency	Regular assessment of procurement personnel's competencies and implementation of relevant development programs.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Availability and participation in general procurement training programs for relevant personnel.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
	Availability and participation in specialized training programs related to road construction procurement.	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**

Section 4: Improvement Strategies Prioritization

This survey consists of a series of statements regarding potential improvements in procurement management. You are invited to express your level of agreement with each proposal using a five-point Likert scale. The scale is designed to capture the extent of your agreement and is structured as follows:

- **Strongly Disagree**: This rating indicates that you believe the proposal is significantly misaligned with what is needed for improvement.
- **Disagree**: You think the proposal has certain elements that do not support or contribute to the enhancement of procurement management.
- **Neutral**: You neither agree nor disagree with the proposal, suggesting that it may have an equal balance of pros and cons.
- **Agree**: You feel that the proposal could contribute positively to procurement management, although it may have minor areas for adjustment.
- **Strongly Agree**: This rating is given when you believe the proposal aligns perfectly with the necessary steps towards enhancing procurement management and will significantly contribute to project success.

Category	Improvement Strategies	Level of Agreement
Strategic Planning and Policy Development	Develop a comprehensive infrastructure plan with clear project priorities and budgets.	**1 2 3 4 5**
	Establish standardized procurement policies to ensure transparency and fairness.	**1 2 3 4 5**
	Implement clear guidelines for all stages of the procurement cycle.	**1 2 3 4 5**
	Match Procurement Methods to Project Needs based on project complexity and risk factors.	**1 2 3 4 5**
Process Optimization and Efficiency	Continuously assess and update procurement strategies to optimize processes.	**1 2 3 4 5**
	Optimize operational processes to reduce costs and enhance efficiency.	**1 2 3 4 5**
	Regularly evaluate the effectiveness of procurement strategies and adjust as necessary.	**1 2 3 4 5**
	Ensure effective tendering, evaluation, and contract administration procedures.	**1 2 3 4 5**
Technology	Adopt new technologies and best practices to enhance efficiency.	**1 2 3 4 5**

Integration and Data Utilization	Integrate advanced technologies to streamline procurement processes.	**1**	**2**	**3**	**4**	**5**
	Adopt E-procurement Platforms for automation and efficiency.	**1**	**2**	**3**	**4**	**5**
	Implement BIM Technology for better project visualization.	**1**	**2**	**3**	**4**	**5**
	Utilize data analytics for decision-making and risk assessment.	**1**	**2**	**3**	**4**	**5**
	Leverage Data Analytics for cost tracking and performance indicators.	**1**	**2**	**3**	**4**	**5**
Risk Management and Capacity Building	Proactively identify and manage risks to minimize cost overruns and delays.	**1**	**2**	**3**	**4**	**5**
	Benchmark against industry standards to adopt best practices.	**1**	**2**	**3**	**4**	**5**
	Encourage continuous learning and improvement among procurement professionals.	**1**	**2**	**3**	**4**	**5**
	Foster Collaborative Contracting Approaches for shared risk-reward models.	**1**	**2**	**3**	**4**	**5**
	Implement Effective Contract Management with performance metrics and dispute resolution.	**1**	**2**	**3**	**4**	**5**
	Invest in Professional Training for procurement personnel.	**1**	**2**	**3**	**4**	**5**
	Promote Stakeholder Collaboration to build trust and address concerns.	**1**	**2**	**3**	**4**	**5**
	Measure Performance and Improve Continuously with KPIs.	**1**	**2**	**3**	**4**	**5**
	Proactively identify and manage risks to minimize cost overruns	**1**	**2**	**3**	**4**	**5**

Appendix B: Interviews Question

1. Can you describe the current procurement management practices in the road construction sector?
2. How do you assess the maturity level of these practices?
3. What are some specific areas for improvement that have been identified?
4. How do you measure the impact of procurement management practices on the performance of road construction projects?
5. Can you provide examples of how improved procurement management has led to project success in the past?
6. How do you plan to prioritize improvement strategies to increase procurement management maturity level?
7. What are some potential challenges or obstacles you anticipate in implementing these improvement strategies?
8. How will you measure the success of these improvement efforts in the road construction sector?

Appendix C: Linear Regression Assumptions

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Project Performance	77	100.0%	0	0.0%	77	100.0%

Descriptive

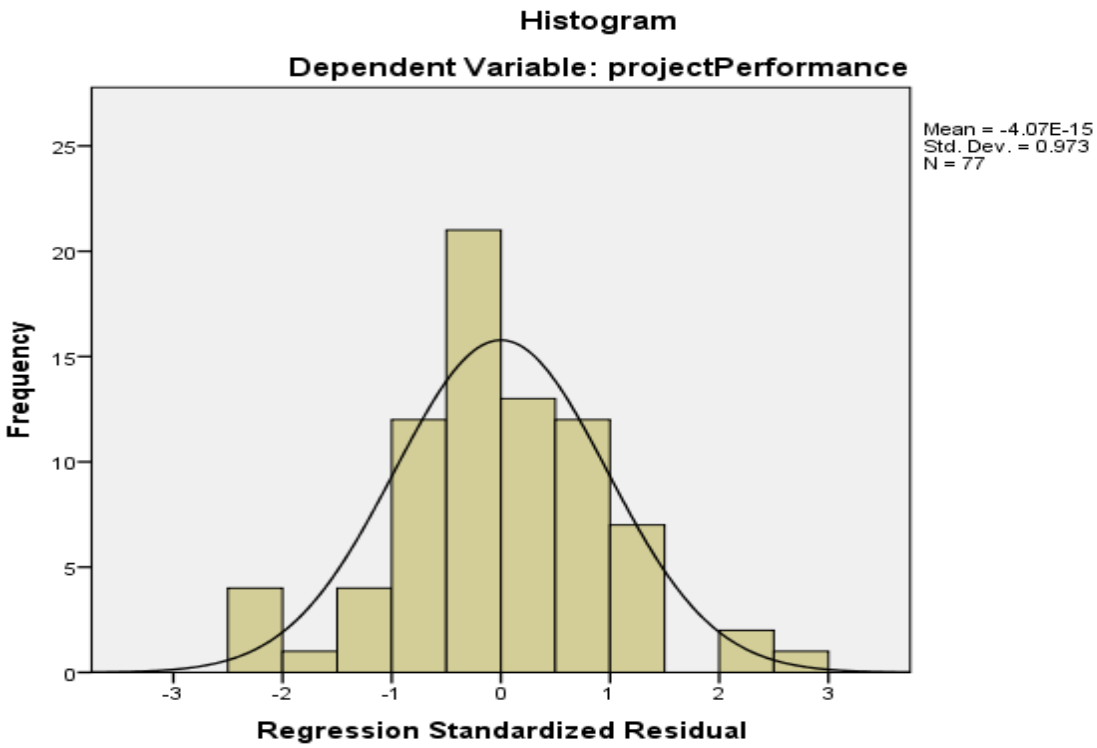
			Statistic	Std. Error
Project Performance	Mean		3.1099	0.02630
	95% Confidence Interval for Mean	Lower Bound	3.0575	
		Upper Bound	3.1623	
	5% Trimmed Mean		3.1118	
	Median		3.0909	
	Variance		0.053	
	Std. Deviation		0.23076	
	Minimum		2.55	
	Maximum		3.68	
	Range		1.14	
	Interquartile Range		0.30	
	Skew ness		-0.087	0.274
	Kurtosis		0.307	0.541

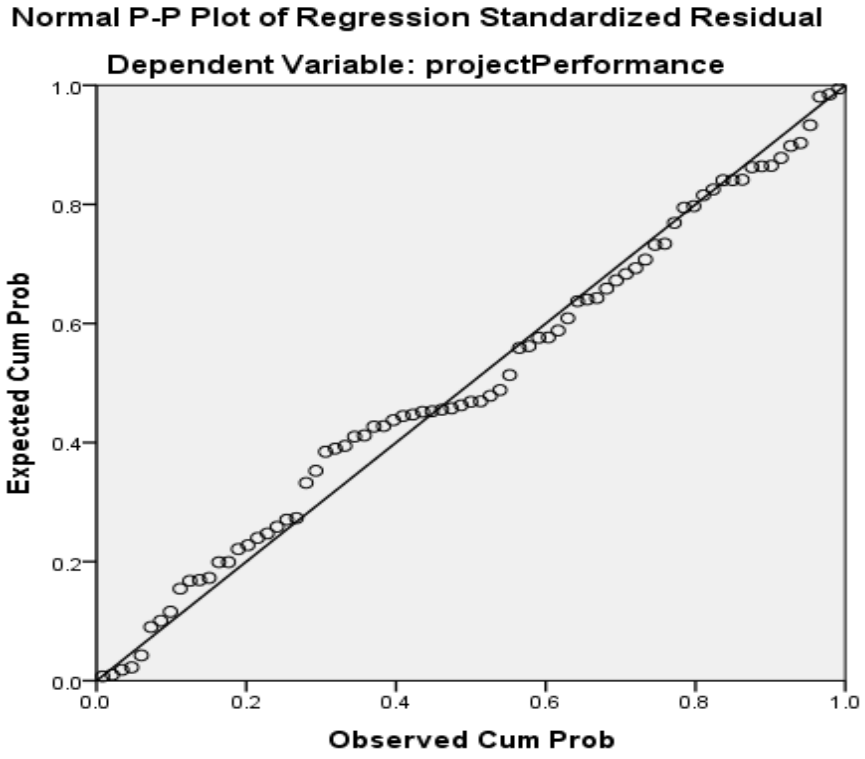
Tests of Normality

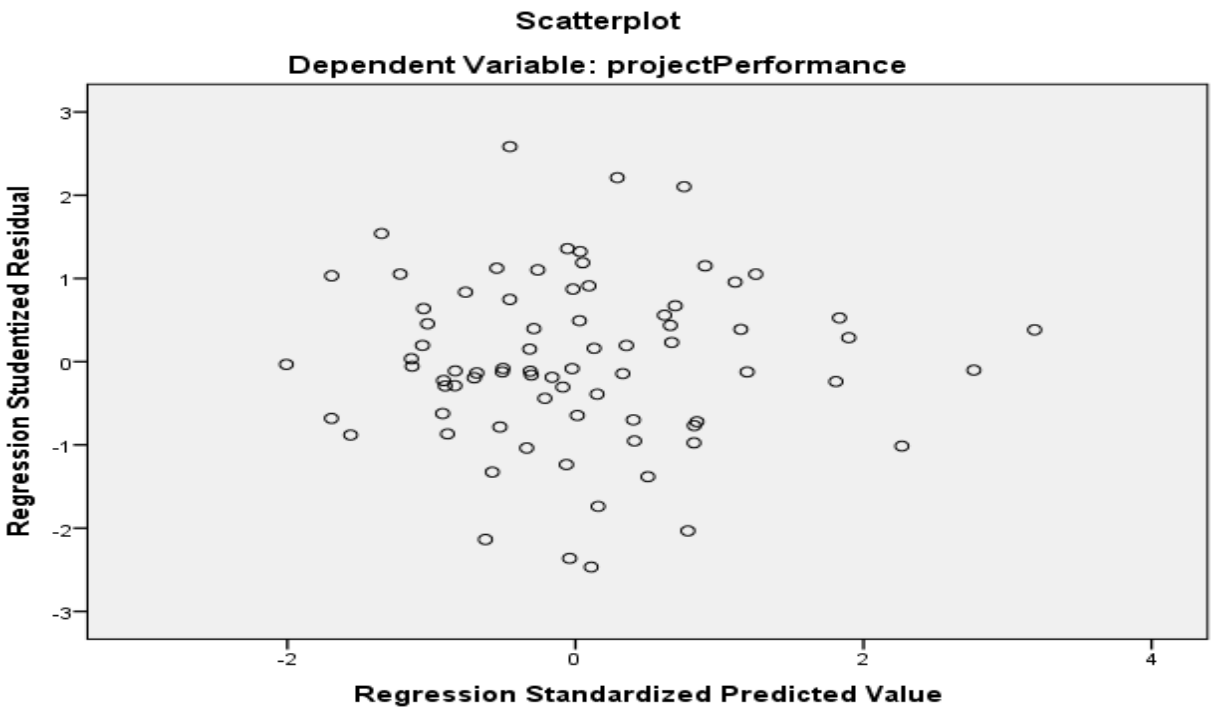
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Project Performance	0.061	77	0.200*	0.986	77	0.536

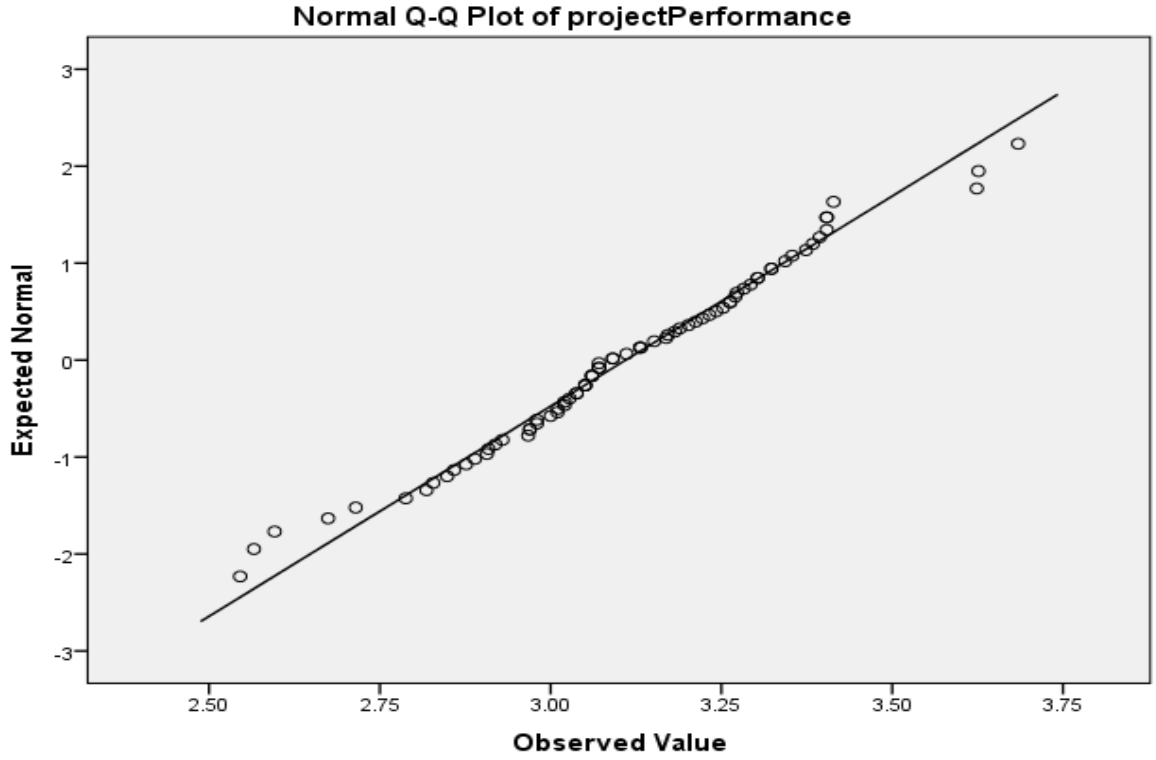
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction


Histogram
Dependent Variable: projectPerformance
Mean = -4.07E-15
Std. Dev. = 0.973
N = 77
Frequency
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: projectPerformance
Expected Cum Prob
Observed Cum Prob


Scatterplot
Dependent Variable: projectPerformance
Regression Studentized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-2
0
2
4


Normal Q-Q Plot of projectPerformance
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
2.50
2.75
3.00
3.25
3.50
3.75

Appendix D: Target population frame are 30 road construction projects in Adama

No.	Project Name	Allocated budget for 2015/16	Town	Client	Consultant Name & Grade	Contractor Name & Grade
1	Asphalt road Back of Aba Geda	262,396,767.8	Adama	ACM	ECO	ANWAR SEID
2	Moenco Bridge	127,623,48.54	Adama	ACM	TCD	IDRIS AHMED
3	Gravel road express way 0+00-1+700km & Around Bole prep. school	143,654,554.3	Adama	ACM		KIDKON
4	Gravel road from ASella Asfalt to Ali Birra road	106,355,689.7	Adama	ACM		KIDKON
5	Gravel Road from Flora recreation to deka Adi kebele	113,214,084.6	Adama	ACM		KIDKON
6	Gravel road from jemal store to Around sheria court and sekelo and Rob gebeya	909,763,75.18	Adama	ACM		TUTAD
7	Gravel road infront of Goro school and Tractor factory to 40m Asefalt	462,991,034.68	Adama	ACM		DACHO D.
8	Asfaaltii road Sheria court to Dagega Kebele	139,436,111.2	Adama	ACM	TCD	ANWAR SEID
9	Gravel road Etur to Awash RIVER	335,346,021.49	Adama	ACM		GGC GC
10	Asphalt maintenance	126,837,410	Adama	ACM		Dursif EMI
11	Asphalt maintenance	134,346,277.5	Adama	ACM		SUBI EMI
12	Asphalt maintenance	158,714,379.8	Adama	ACM		Robibon
13	Asphalt road G. Wako Gutu to Sheria court	290,408,080.2	Adama	ACM	TCD	ANWAR SEID
14	Asphalt road Express way to Etur	268,563,655.2	Adama	ACM	ECO	GGC GC
15	Gravel road Express way to Boku spring	323,626,315.1	Adama	ACM		KIDKON GC
16	Gravel road Moenco to 40m and Finfine asphalt to Sire Aba bune secandary school	125,481,595.5	Adama	ACM	ECO	AKLESIYA GC

17	Asphalt road	535,985,954.45	Adama	ACM	ECO	Aniwar seid GC
18	Coble Stone Road	4,532,798.86	Adama	ACM		OLIF
19	Coble Stone Road	4,532,798.86	Adama	ACM		FALMII
20	Coble Stone Road	4,139,920.85	Adama	ACM		BURQAA
21	Coble Stone Road	4,532,798.86	Adama	ACM		IRREE
22	Coble Stone Road	4,532,798.86	Adama	ACM		MO'AB
23	Coble Stone Road	5,502,281.55	Adama	ACM		Hunde R&B
24	Coble Stone Road	5,502,281.55	Adama	ACM		Birmaji R&B
25	Walk way	6,245,050.7	Adama	ACM		Hiriya R&B
26	Walk way	7,035,757.59	Adama	ACM		Walif Gachena
27	Walk way	8,449,403.87	Adama	ACM		Walabuma R&B
28	Walk way	11,705,190.14	Adama	ACM		Hawinet R&B
29	Walk way	12,02,3097.1	Adama	ACM		Kanko R&B
30	Walk way	12,023,097.1	Adama	ACM		Walif R&B